UNITED STATES DEPARTMENT OF AGRICULTURE

FARM SERVICE AGENCY

FINAL

Programmatic Environmental Assessment for Implementation of the Conservation Reserve Enhancement Program Agreement for the Illinois River Watershed in Arkansas

August 2007

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COVER SHEET

Proposed Action: The U.S. Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the Conservation Reserve Enhancement Program (CREP) agreement for the Illinois River Watershed in Arkansas. CREP is a voluntary land conservation program for agricultural landowners.

Type of Statement: This programmatic environmental assessment (PEA) was prepared in accordance with the *National Environmental Policy Act* (42 *United States Code* parts 4321 et seq., 2000), the Council on Environmental Quality implementing regulations (40 *Code of Federal Regulations* parts 1500 et seq., 2006), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 *Code of Federal Regulations* parts 799 et seq., 2007). This analysis is programmatic in nature and does not address individual site specific impacts, which would be evaluated for individual CREP contracts prior to approval.

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EXECUTIVE SUMMARY

This programmatic environmental assessment identifies the possible environmental consequences resulting from the proposed implementation of the Conservation Reserve Enhancement Program agreement for the Illinois River Watershed in Arkansas. The assessment process is designed to inform decision makers and the public about the potential environmental effects of the proposed action and to ensure public involvement in the process. The process will help decision makers take into account all environmental factors when making decisions related to the proposed action.

This programmatic environmental assessment has been prepared by the U.S. Department of Agriculture Farm Service Agency in accordance with the requirements of the *National Environmental Policy Act* (42 *United States Code* parts 4321 et seq., 2000), the Council on Environmental Quality implementing regulations (40 *Code of Federal Regulations* parts 1500 et seq., 2006), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 *Code of Federal Regulations* parts 799 et seq., 2007).

Purpose and Need for the Proposed Action

The purpose of this action is to implement the Conservation Reserve Enhancement Program agreement for the Illinois River Watershed in Arkansas to reduce the amounts of pathogens, sediments, and phosphorus entering waterways. Under this agreement, eligible agricultural land would be removed from production and planted in grass, shrubs, and trees.

The proposed action is needed to:

- Improve overall water quality in the Illinois River Watershed
- Decrease road maintenance
- Preserve existing floodplain pasture
- Enhance wildlife habitat
- Promote soil and water conservation.

Proposed Action and No Action Alternatives

This programmatic environmental assessment documents the analysis of the proposed action and no action alternatives. The proposed action would remove 15,000 acres of land from agricultural production and establish approved conservation practices on the land. Eligible land would include cropland, pastureland, and marginal pastureland adjacent to streams, rivers, or lakes within the Illinois River Watershed in Arkansas.

The proposed action would provide participants with annual rental payments at 200 percent of established pastureland rates and annual maintenance payments of $9 per acre. Participants would also receive one time payments including $200 per acre, a 50 percent cost share payment, and a $100 per acre signing incentive payment.

Under the no action alternative, lands would not be removed from agricultural production and conservation practices would not be implemented.

The Farm Service Agency has identified the proposed action as the preferred alternative because it is the alternative that would satisfy the purpose and need for the proposed action.

Summary of Environmental Consequences

It is expected that there would be both beneficial and temporary minor adverse impacts associated with implementation of the proposed action. A summary of the potential impacts is given in Table ES.1.

Table ES.1 Summary of potential impacts from implementation of the proposed action and no action alternatives.

Resource	Proposed Action	No Action
Biological Resources	• Increased quality and abundance of wildlife and fisheries habitats, including those used by protected species • Establishment of migration corridors for wildlife • Reduced habitat fragmentation • Increased vegetation diversity • Beneficial impacts to five of six protected species; no or negligible impact to remaining species with appropriate mitigation measures in place • Temporary adverse impacts due to human disturbance and increased sedimentation.	• Increased loss, degradation, and fragmentation of habitats • Decreased health and persistence of fish populations • Continued alteration and depletion of native vegetation.
Cultural Resources	• Potential for encountering both recorded and unidentified archeological and architectural sites and traditional cultural properties • Actions to be reviewed with the Arkansas State Historic Preservation Office on a site specific basis • No anticipated impact to cultural resources.	• Continuation of farming not expected to impact resource • Potential adverse impacts if agricultural practices occur on previously undisturbed lands.
Water Resources	• Reduced pathogens, sediments, phosphorus, and other pollutants in surface water, groundwater, and wetlands • Greater rates of aquifer recharge • Improved function of floodplains • Beneficial impacts to surface water, groundwater, wetlands, and floodplains.	• Continued degradation of surface water, groundwater, and wetlands due to pathogens, sediments, phosphorus, and other pollutants • Continuation of current rates of erosion and changes in topography of floodplains.
Soil Resources	• Stabilization of soils and topography • Reduced wind and water erosion • Temporary increase in erosion during implementation.	• Continuation of current rates of erosion and changes in topography due to erosion.
Air	• Increased vegetation would reduce erosion • Vegetation may help reduce dust and bacteria emissions from confined animal operations • Decreased acreage in agricultural production would reduce field burning and tilling	• No change to existing conditions.

Table ES.1 Continued

Resource	Proposed Action	No Action
	• Beneficial impacts to local air quality • Temporary, minor adverse impacts during implementation activities.	
Recreation	• Benefits to recreation from improved water quality, wildlife habitat, and aesthetics • Temporary displacement of wildlife species and increased sediments in waterways during implementation.	• No change to existing conditions.
Traffic and Transportation	• Reduced erosion and sedimentation may reduce highway and road system maintenance expenditures.	• No change to existing conditions.
Socio-economics	• Positive net present value for program • Implementation would create total net present value of $3.4 million over 15 years • Increased recreation opportunities may generate economic activity.	• Socioeconomic conditions would continue to follow current trends.
Environmental Justice	• No change to existing conditions.	• No change to existing conditions.

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CONTENTS

EXECUTIVE SUMMARY 2

Purpose and Need for the Proposed Action 2
Proposed Action and No Action Alternatives 2
Summary of Environmental Consequences 3
CONTENTS 6
FIGURES 9
TABLES 9
ACRONYMS AND ABBREVIATIONS 12
1.0 INTRODUCTION 14

1.1 Background 14
1.1.1 Regulatory Compliance 15
1.2 Purpose and Need for Action 15
1.3 Objectives 16
1.4 Organization of the PEA 17
2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION 18

2.1 Proposed Action (Preferred Alternative) 18
2.1.1 Established Conservation Practices 18
2.1.2 Financial Support to Land Owners 18
2.2 Scoping 19
2.2.1 Discussion 19
2.2.2 Resources Considered but Eliminated from Analysis 19
2.3 Alternatives Eliminated from Analysis 20
2.4 Alternatives Selected for Analysis 20
2.4.1 Alternative A—Preferred Action 20
2.4.2 Alternative B—No Action 20
2.5 Comparison of Alternatives 20
2.5.1 Identification of Geographical Boundaries 20
2.5.2 Identification of Temporal Boundaries 21
3.0 AFFECTED ENVIRONMENT 22

3.1 Biological Resources 22
3.1.1 Wildlife and Fisheries 22
3.1.1.1 Description 22
3.1.1.2 Affected Environment 22
3.1.2 Vegetation 29
3.1.2.1 Description 29
3.1.2.2 Affected Environment 29
3.1.3 Protected Species and Habitat 31
3.1.3.1 Description 31
3.1.3.2 Affected Environment 31
3.2 Cultural Resources 35
3.2.1 Archaeological Resources 35
3.2.1.1Description 35
3.2.1.2Affected Environment 35
3.2.2 Architectural Resources 38
3.2.2.1Description 38
3.2.2.2Affected Environment 38

3.2.3 Traditional Cultural Properties 38
3.2.3.1 Description 38
3.2.3.2 Affected Environment 38
3.3 Water Resources 38
3.3.1 Surface Water 38
3.3.1.1 Description 38
3.3.1.2 Affected Environment 38
3.3.1.3 Description 39
3.3.1.4 Affected Environment 40
3.3.2 Wetlands 40
3.3.2.1 Description 40
3.3.2.2 Affected Environment 40
3.3.3 Floodplains 41
3.3.3.1 Description 41
3.3.3.2 Affected Environment 41
3.4 Soil Resources 42
3.4.1 Topography 42
3.4.1.1 Description 42
3.4.1.2 Affected Environment 42
3.4.2 Soil 42
3.4.2.1 Description 42
3.4.2.2 Affected Environment 42
3.5 Air 43
3.5.1 Description 43
3.5.2 Affected Environment 43
3.6 Recreation 44
3.6.1 Description 44
3.6.2 Affected Environment 44
3.7 Traffic and Transportation 45
3.7.1 Description 45
3.7.2 Affected Environment 45
3.8 Socioeconomics 45
3.8.1 Description 45
3.8.2 Affected Environment 46
3.9 Environmental Justice 49
3.9.1 Description 49
3.9.2 Affected Environment 49
4.0 ENVIRONMENTAL CONSEQUENCES 50

4.1 Biological Resources 50
4.1.1 Wildlife and Fisheries 50
4.1.1.1 Level of Impact 50
4.1.1.2 Alternative A—Preferred 50
4.1.1.3 Alternative B—No Action 51
4.1.2 Vegetation 51
4.1.2.1 Level of Impact 51
4.1.2.2 Alternative A—Preferred 51
4.1.2.3 Alternative B—No Action 51
4.1.3 Protected Species and Habitat 51
4.1.3.1 Level of Impact 51
4.1.3.2 Alternative A—Preferred 52

4.1.3.3 Alternative B—No Action 53
4.2 Cultural Resources 53
4.2.1 Archaeological Resources 53
4.2.1.1 Level of Impact 53
4.2.1.2 Alternative A—Preferred 53
4.2.1.3 Alternative B—No Action 53
4.2.2 Architectural Resources 53
4.2.2.1 Level of Impact 53
4.2.2.2 Alternative A—Preferred 54
4.2.2.3 Alternative B—No Action 54
4.2.3 Traditional Cultural Properties 54
4.2.3.1 Level of Impact 54
4.2.3.2 Alternative A—Preferred 54
4.2.3.3 Alternative B—No Action 54
4.3 Water Resources 55
4.3.1 Surface Water 55
4.3.1.1 Level of Impact 55
4.3.1.2 Alternative A—Preferred 55
4.3.1.3 Alternative B—No Action 55
4.3.2 Groundwater 55
4.3.2.1 Level of Impact 55
4.3.2.2 Alternative A—Preferred 55
4.3.2.3 Alternative B—No Action 56
4.3.3 Wetlands 56
4.3.3.1 Level of Impact 56
4.3.3.2 Alternative A—Preferred 56
4.3.3.3 Alternative B—No Action 56
4.3.4 Floodplains 56
4.3.4.1 Level of Impact 56
4.3.4.2 Alternative A—Preferred 56
4.3.4.3 Alternative B—No Action 56
4.4 Soil Resources 56
4.4.1 Level of Impact 56
4.4.2 Alternative A—Preferred 57
4.4.3 Alternative B—No Action 57
4.5 Air 57
4.5.1 Level of Impact 57
4.5.2 Alternative A—Preferred 57
4.5.3 Alternative B—No Action 58
4.6 Recreation 58
4.6.1 Level of Impact 58
4.6.2 Alternative A—Preferred 58
4.6.3 Alternative B—No Action 58
4.7 Traffic and Transportation 58
4.7.1 Level of Impact 58
4.7.2 Alternative A—Preferred 58
4.7.3 Alternative B—No Action 59
4.8 Socioeconomics 59
4.8.1 Level of Impact 59
4.8.2 Alternative A—Preferred 59
4.8.3 Alternative B—No Action 60

4.9 Environmental Justice 60
4.9.1 Level of Impact 60
4.9.1.1 Alternative A—Preferred 60
4.9.1.2 Alternative B—No Action 60
5.0 CUMULATIVE EFFECTS 62

5.1 Introduction 62
5.2 Past, Present, and Reasonably Foreseeable Actions 62
5.3 Cumulative Effects Matrix 63
5.4 Irreversible and Irretrievable Commitment of Resources 65
6.0 MITIGATION MEASURES 66

6.1 Introduction 66
6.2 Roles and Responsibilities 66
6.3 Mitigations 66
7.0 LIST OF PREPARERS 68

8.0 PERSONS AND AGENCIES CONTACTED 70

9.0 GLOSSARY 72

10.0 REFERENCES 76

Appendix A Conservation Reserve Enhancement Program Illinois River CREP Proposal State of Arkansas A-1

Appendix B Relevant Laws and Regulatios B-1

Appendix C Summary of Conservation Practices C-1

Appendix D Net Present Value Analysis D-1

FIGURES

Figure 1.1 Area proposed for CREP enrollment (i.e., the ROI). 17
Figure 3.1 Ecoregions and subregions within the ROI. 30
Figure 3.2 Recreation areas within the ROI. 45

TABLES

Table ES.1 Summary of potential impacts from implementation of the proposed action and no action alternatives. 3
Table 2.1 Financial incentives that would be provided to participants under the preferred alternative. . 18
Table 3.1 Common and scientific names of game species and furbearing mammals in the ROI. 22
Table 3.2 Common and scientific names of migratory game birds that may occur in the ROI. 26
Table 3.3 Fish species that may occur in the ROI. 27
Table 3.4 Game fish in Arkansas. 28
Table 3.5 Level III Ecoregions and subregions in the ROI. 30
Table 3.6 Protected species in Arkansas. 31

Table 3.8 Archaeological sites within the ROI. 36
Table3.9 Surface water impairments in the ROI. 39
Table 3.10 Common soils in the subregions of the ROI. 43
Table 3.11 Hired farm and contract labor as a percentage of total production expenses for 1997 and 2002. 46
Table 3.13 Average value of land, buildings, machinery, and equipment per farm in 2002. 47
Table 4.1 Impact of preferred alternative on federally listed and candidate species within the ROI. 52
Table 5.1 Cumulative effects matrix. 63
Table 8.1 CREP PEA consultation. 70

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ACRONYMS AND ABBREVIATIONS

ADEQ	Arkansas Department of Environmental Quality
AHPP	Arkansas Historic Preservation Program
AMAWPT	Arkansas Multi-Agency Wetland Planning Team
ANHC	Arkansas Natural Heritage Commission
ANRC	Arkansas Natural Resources Commission
ASHPO	Arkansas State Historic Preservation Office
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BMP	best management practice
CCC	Commodity Credit Corporation
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CP	conservation practice
CPGL	Conservation of Private Grazing Lands
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
DDT	dichloro-diphenyl-trichloroethane
EO	Executive Order
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FR	*Federal Register*
FS	Forest Service
FSA	Farm Service Agency
FWS	Fish and Wildlife Service

FY	fiscal year
GRP	Grassland Reserve Program
HIP	Harvest Information Program
LMBV	largemouth bass virus
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act*
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSFHWAR	*National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*
NWR	national wildlife refuge
PEA	programmatic environmental assessment
ROI	region of influence
SIP	signing incentive payment
TCP	traditional cultural property
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USC	*United States Code*
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WHIP	Wildlife Habitat Incentives Program
WMA	wildlife management areas
WRP	Wetlands Reserve Program

1.0 INTRODUCTION

The U.S. Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the draft Conservation Reserve Enhancement Program (CREP) agreement for the Illinois River Watershed in Arkansas (hereafter referred to as the *Illinois River Watershed CREP agreement*) (Appendix A). This programmatic environmental assessment (PEA) has been prepared to analyze the potential environmental consequences associated with the proposed action and the no action alternatives in accordance with the *National Environmental Policy Act* (NEPA) (42 *United States Code* [USC] parts 4321 et seq., 2000), the Council on Environmental Quality (CEQ) implementing regulations (40 *Code of Federal Regulations* [CFR] parts 1500 et seq., 2006), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 CFR parts 799 et seq., 2007). This analysis is programmatic in nature and does not address individual site specific impacts, which would be evaluated for individual CREP contracts prior to approval.

1.1 Background

FSA was established during the reorganization of USDA in 1994. The mission of FSA is to:

> "…ensure the well-being of American agriculture and the American public through efficient and equitable administration of agricultural commodity, farm loan, conservation, environmental, emergency assistance, and domestic and international food assistance programs." (FSA 1997)

The Conservation Reserve Program (CRP) was established under Title XII of the *Food Security Act of 1985* (16 USC part 3831, 1996). The purpose of CRP is to cost-effectively assist owners and operators in conserving and improving soil, water, and wildlife resources on their farms and ranches. Highly erodible and other environmentally sensitive acreage, normally devoted to the production of agricultural commodities, is converted to a long-term resource conservation cover. CRP participants enter into contracts for periods of 10 to 15 years in exchange for annual rental payments and cost-share assistance for installing certain conservation practices (CPs).

The *Farm Security and Rural Investment Act of 2002*, commonly known as the *2002 Farm Bill*, authorizes CRP through December 31, 2007, and raises the overall enrollment cap to 39.2 million acres (16 USC part 3831, 1996). The *Conservation Reserve Program Final Programmatic Environmental Impact Statement* contains a detailed analysis of the impacts of implementing CRP nationwide, including the CREP component (FSA 2003a).

The Secretary of Agriculture initiated CREP in 1997. CREP is authorized pursuant to the *Federal Agriculture Improvement and Reform Act of 1996* and is a subset of CRP (7 USC parts 7201 et seq., 1998). This program is based on the continuous CRP model (i.e., producers can sign up anytime provided their operation is located within an area covered by a CREP proposal) but differs in four important ways (FSA 2006a):

- CREP is targeted to specific geographic areas and designed to focus CPs on addressing specific environmental concerns.
- CREP is a partnership between USDA, State and/or tribal governments, other Federal and State agencies, environmental groups, wildlife groups, and other stakeholders who have an interest in addressing particular environmental issues.
- CREP is results-oriented, and requires States to establish measurable objectives and conduct annual monitoring to measure progress toward implementation of those objectives.

- CREP is flexible, within existing legal constraints, and may be adapted to meet local conditions on the ground.

This voluntary program uses financial incentives to encourage farmers and ranchers to enroll in contracts of 15 years in duration to remove lands from agricultural production. The two primary objectives of CREP are to:

- Coordinate Federal and non-Federal resources to address specific conservation objectives of a State and the Nation in a cost-effective manner.

- Improve water quality, erosion control, and wildlife habitat related to agricultural use in specific geographic areas.

CRP and CREP are administered by FSA in cooperation with the Natural Resources Conservation Service (NRCS) and the Arkansas Natural Resources Commission (ANRC). FSA is the lead agency in the development of this PEA.

1.1.1 Regulatory Compliance

This PEA has been completed as part of the NEPA process and is in compliance with CEQ and FSA implementing regulations (40 CFR parts 1500 et seq., 2006; 7 CFR parts 799 et seq., 2007). The intent of NEPA is to protect, restore, and enhance the human environment through well-informed Federal decisions. The following non-exclusive list of higher-tier executive orders (EOs), acts, and relevant decision and guidance documents apply to actions undertaken by Federal agencies and form the basis of the analysis presented in this PEA (see Appendix B for summaries):

- *Clean Air Act* (42 USC parts 7401 et seq., 1999)

- *Clean Water Act* (33 USC parts 1251 et seq., 2000)

- *Endangered Species Act of 1973*, as amended (16 USC parts 1531 et seq., 1988)

- EO 11514, *Protection and Enhancement of Environmental Quality* (35 *Federal Register* [FR] 4247, 1977)

- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 32, 1995)

- *National Historic Preservation Act of 1966*, as amended (16 USC part 470, 2000).

1.2 Purpose and Need for Action

The purpose of this action is to implement the Illinois River Watershed CREP agreement to reduce the amounts of pathogens, sediments, and phosphorus entering waterways. The primary need for this action is to improve the overall water quality in the Illinois River Watershed. This action is expected to provide the following secondary benefits:

- Decreased road maintenance

- Preservation of existing floodplain pasture

- Enhanced wildlife habitat

- Promotion of soil and water conservation.

1.3 Objectives

CREP agreements are designed to meet specific regional conservation goals and objectives related to agriculture. The proposed agreement with Arkansas is focused on improving water quality in the Illinois River Watershed. This watershed is a major poultry growing and cattle producing area, and waterways are subject to impairments related to these activities. Livestock access to floodplains contributes to the presence of pathogens and to high levels of sediment input from streambank erosion. The excessive buildup of phosphorous is due to the common practice of fertilizing the soil for grazing purposes by applying poultry litter.

The primary objective of the Illinois River Watershed CREP agreement is to reduce pathogen, sediment, and phosphorous input to the watershed. This would be accomplished by restoring riparian vegetation and reducing livestock access to floodplains. These actions would result in less overland flow of pathogens, sediments, and phosphorous to streams and less stream bank erosion. This, in turn, would result in better water quality, lower maintenance requirements to road and highway systems, and would help to preserve existing floodplain pasture.

Under the proposed CREP agreement, farmers and ranchers who voluntarily participate would enter into contracts with the Federal government for 15 years, agreeing to remove portions of their land from agricultural production and plant them to grass, shrubs, and trees. On all approved CREP contracts, landowners will be given the opportunity to enroll CREP lands in perpetual easements.

The CREP agreement would intend on enrolling 15,000 acres of riparian land in the Arkansas portion of the Illinois River Watershed. As the exact location of parcels that might be enrolled in CREP is not known at this time, this PEA considers the region of influence (ROI) to be the area bounded by roads that most closely follow the watershed boundary (Figure 1.1). This area encompasses approximately 482,732 acres and spans portions of Benton and Washington counties.

The intended outcome of the CREP agreement is to enhance the ability of producers to enroll certain acreage under CRP where deemed desirable by USDA and the Commodity Credit Corporation (CCC). CCC is a Federal entity within USDA that was created to stabilize, support, and protect agricultural income and prices.

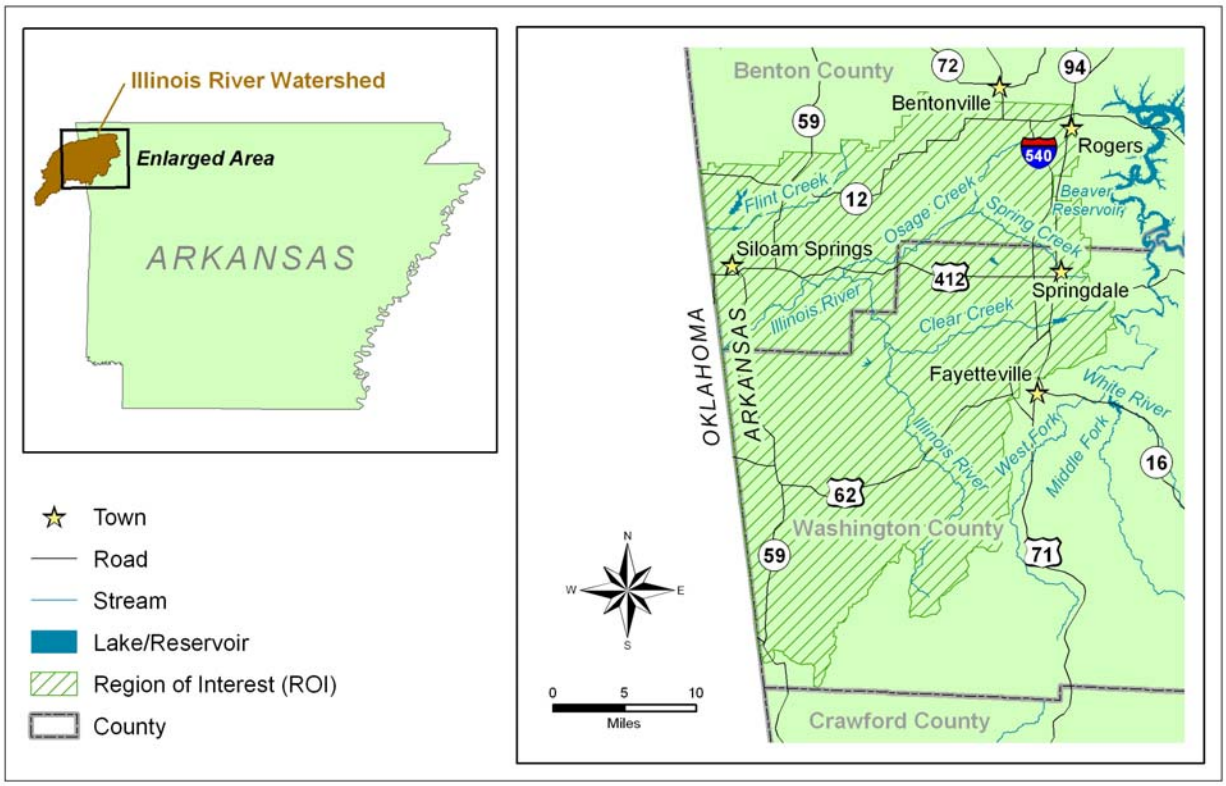

Figure 1.1 Area proposed for CREP enrollment (i.e., the ROI).

1.4 Organization of the PEA

This PEA discloses the potential impacts of the proposed action and no action alternatives on affected environmental and economic resources. Chapter 1.0 provides background information relevant to the proposed action and discusses the purpose and need for the proposed action. Chapter 2.0 describes the proposed action and no action alternatives. Chapter 3.0 describes the baseline conditions (i.e., the conditions against which potential impacts of the proposed action and no action alternatives are measured) for each of the resource areas. Chapter 4.0 explains the potential environmental impacts to these resources. Chapter 5.0 provides an analysis of cumulative impacts and irreversible resource commitments. Chapter 6.0 describes mitigations to reduce potential impacts of the proposed action. Chapter 7.0 is a list of the preparers of this document, and Chapter 8.0 lists those persons and agencies contacted during the preparation of this document. Chapter 9.0 is a glossary of terms and Chapter 10.0 contains references used in the PEA.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the proposed action and no action alternatives. These two alternatives are compared in terms of their environmental impacts and ability to achieve the objectives listed in Section 1.3. FSA has identified the proposed action as the preferred alternative because it is the alternative that would satisfy the purpose and need for the proposed action.

2.1 Proposed Action (Preferred Alternative)

The preferred alternative would implement the Illinois River Watershed CREP agreement by enrolling 15,000 acres of riparian land in the Arkansas portion of the Illinois River Watershed. Specific CPs would be installed on eligible land and according to rules in *Agricultural Resource Conservation Program for State and County Offices* (*Handbook 2–CRP*) (FSA 2003b).

Eligible land would include cropland, pastureland, and marginal pastureland adjacent to streams, rivers, or lakes within the Illinois River Watershed in Arkansas. This includes portions of Benton and Washington counties. Cropland must have been planted, or considered planted, to a crop in four of the six years between 1996 and 2001. Marginal pastureland must be suitable for use as a riparian buffer planted to trees or as wildlife habitat buffer. If the land is currently enrolled in CRP, that contract must expire before being eligible for CREP.

2.1.1 Established Conservation Practices

There are two CPs proposed for implementation under the CREP agreement. These are CP22—Riparian Buffer and CP29—Marginal Pastureland Wildlife Habitat Buffer with modifications.

These CPs require a contract period of 15 years and would be installed according to *Handbook 2–CRP* provisions unless otherwise specified in the Illinois River Watershed CREP agreement. Installation and maintenance of CPs may include activities such as tilling, excavation, prescribed burning, herbicide application, and mowing. A detailed description of each CP is provided in Appendix C.

2.1.2 Financial Support to Land Owners

The preferred alternative would provide participants with annual soil rental payments for each acre enrolled at 200 percent of established county pastureland rates and annual maintenance payments of $9 per acre (Table 2.1). In addition, the State would make a one-time lump sum payment of $200 per acre and FSA would provide one time signing incentive payment (SIP) of $100 per acre and a 50 percent cost share payment (Table 2.1).

Table 2.1 Financial incentives that would be provided to participants under the preferred alternative.

County	Annual Payments			One Time Payments		
	Pasture Rental Rate per Acre	Additional Pasture Rental Rate per Acre	Maintenance Payment per Acre	Lump Sum Payment (per acre)	SIP (per Acre)	Cost Share Payment
Benton	$38	$38	$9	$200	$100	50%
Washington	$34	$34	$9	$200	$100	50%

2.2 Scoping

2.2.1 Discussion

Scoping is a process used to identify any issues that may affect environmental and social resources as a result of the proposed action, and to explore other possible ways of achieving objectives while minimizing adverse impacts. Regulatory agencies, tribal representatives, FSA specialists, and other interest groups were contacted to refine the project purpose and need, to designate resources of potential impact, and to develop preliminary alternatives. Consultations with the U.S. Fish and Wildlife Service (FWS) and the Arkansas State Historic Preservation Office (ASHPO) were completed at a programmatic level.

Public involvement commenced on February 12, 2007 with letters mailed to 36 persons, organizations, and agencies. Recipients included several American Indian tribes that historically resided in or migrated through Arkansas and are federally recognized as tribes associated with Arkansas, even though they are currently based in Oklahoma, and may have ties to cultural resources within the ROI. Three letters of response were received; two of which were favorable to the project and one that was an indifferent opinion.

A complete list of persons and agencies contacted is available in Chapter 8 of this document. These letters included a summary of the proposed action and alternatives and solicitation for comments

2.2.2 Resources Considered but Eliminated from Analysis

CEQ implementing regulations require that issues which are not significant or which have been covered by prior environmental review be identified and eliminated from detailed study (40 CFR parts 1500 et seq., 2006). Accordingly, several resources have been eliminated from further analysis in this PEA either because they do not occur within the ROI identified in Section 1.3 (sole source aquifers, coastal zones, paleontological resources, wild and scenic rivers, national natural landmarks, wilderness areas) or because they would not be impacted by the proposed action (noise, human health and safety). A brief discussion of these resources is provided in the following subsections.

Sole Source Aquifers

The U.S. Environmental Protection Agency (EPA) defines a sole source aquifer as one which supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas have no alternative drinking water source which could physically, legally, and economically supply all those who depend upon the aquifer for drinking water (EPA 2006a, b).

Coastal Zones

There are no coastal zones in or near the ROI.

Paleontological Resources

Paleontological resources (e.g., fossils) may be considered part of the national natural, scientific, and educational heritage. There is currently no unified Federal policy regarding the treatment of paleontological resources outside of an archaeological context; however, various historic, cultural, or natural resource preservation statutes may apply to fossil resources on State and Federal lands.

Noise

Implementation of the proposed action would not permanently increase ambient noise levels. Noise levels may increase slightly during installation of CPs, but this increase would be temporary and would cease after installation.

Human Health and Safety

The proposed action would not have any permanent or significant impact to human health and safety.

Wild and Scenic Rivers

Wild and scenic rivers are designated and protected under the *Wild and Scenic Rivers Act* (16 USC parts 1271–1287, 1968). These rivers must be preserved in their free-flowing conditions and, with their immediate environments, protected for the benefit of present and future generations.

National Natural Landmarks

A national natural landmark is an area designated by the Secretary of the Interior as being of national significance because it is an outstanding example of major biological and geological features found within the boundaries of the U.S. (36 CFR parts 62.1–62.9, 2006).

Wilderness

A wilderness area is federally owned land that has been designated by Congress for inclusion in the National Wilderness Preservation System (16 USC parts 1131 et seq., 1964).

2.3 Alternatives Eliminated from Analysis

No alternatives were eliminated from analysis.

2.4 Alternatives Selected for Analysis

2.4.1 Alternative A—Preferred Action

Alternative A, the preferred action, would implement the Illinois River Watershed CREP agreement by enrolling 15,000 acres of riparian land in the Arkansas portion of the Illinois River Watershed. Specific CPs would be installed on eligible land to restore riparian vegetation and restrict livestock access to floodplains. This action is intended to improve water quality by reducing the levels of pathogens, sediments, and phosphorous entering waterways. Participants would receive annual rental and maintenance payments for the 15-year contract periods, as well as one-time SIPs and cost share payments.

2.4.2 Alternative B—No Action

Alternative B, the no action alternative, would involve not implementing the Illinois River Watershed CREP agreement. No land would be enrolled in CRP, and the goals for the Illinois River Watershed CREP would not be met. This alternative would result in a continuation of current agricultural practices that have led to the degradation of water quality due to increased levels of pathogens, sediments, and phosphorous.

2.5 Comparison of Alternatives

2.5.1 Identification of Geographical Boundaries

The proposed project area (i.e., ROI) is the Arkansas portion of the Illinois River Watershed that is bounded by roads that most closely follow the watershed boundary (Figure 1.1). This encompasses an area of approximately 482,732 acres and spans portions of Benton and Washington counties. The largest town within the ROI is Springdale, which reported a total population of 45,798 in 2000 (U.S. Census Bureau [USCB] 2007).

2.5.2 Identification of Temporal Boundaries

Landowners participating in the Illinois River Watershed CREP would enroll in 15 year contracts, obligating them to implement the proposed CPs in return for technical and financial assistance. Eligible contracts would be signed by 2007, which would establish the year 2022 as the temporal boundary for the purposes of this analysis. This same temporal boundary is used for the analysis of the no action alternative. On all approved CREP contracts, landowners will be given the opportunity to enroll CREP lands in perpetual easements.

All landowners enrolling eligible land into the Illinois River CREP will be given the opportunity to place a perpetual conservation easement on enrolled acres through the easement portion of this proposed CREP. Perpetual easements are not a required component of the Illinois River CREP. This portion of the CREP will allow landowners to obtain permanent easements soon after the practice is completed and verified as successfully established.

The State of Arkansas will be designated as the "Easement Manager" and be the primary holder of the permanent conservation easements. Arkansas natural resource agencies may assist in easement boundary marking and monitoring easements during and beyond the initial 15-year CREP contract period.

3.0 AFFECTED ENVIRONMENT

This chapter describes relevant existing conditions for the resources potentially affected by the proposed action and no action alternatives. In compliance with guidelines contained in NEPA and CEQ regulations, the description of the affected environment focuses on those aspects potentially subject to impacts. Resources within the ROI are analyzed by geographic area or by county, depending on the spatial character of the available data.

3.1 Biological Resources

3.1.1 Wildlife and Fisheries

3.1.1.1 Description

Wildlife and fisheries include terrestrial, avian, and aquatic species and the habitats in which they occur. The ROI for this resource analysis is Benton and Washington counties.

3.1.1.2 Affected Environment

3.1.1.2.1 Wildlife

The Arkansas Game and Fish Commission (AGFC) has the authority to control, manage, restore, conserve, and regulate birds, fish, game, and wildlife resources within the State of Arkansas (Arkansas Constitutional Amendment 35, 1944). AGFC protects non-game species (i.e., species that are not hunted, fished, or trapped) and establishes hunting regulations and seasons for all game species (Table 3.1).

Table 3.1 Common and scientific names of game species and furbearing mammals in the ROI.

Common Name	Scientific Name	Common Name	Scientific Name
Bear, black	*Ursus americanus*	Beaver, American	*Castor canadensisis*
Bobcat	*Lynx rufus*	Coyote	*Canis latrans*
Deer, white-tailed	*Odocoileus virginianus*	Fox, grey	*Urocyon cinereoargenteus*
Fox, red	*Vulpes vulpes*	Hog, feral	*Sus scrofa*
Mink	*Mustela vison*	Muskrat	*Ondatra zibethica*
Nutria	*Myocastor coypus*	Opossum, Virginia	*Didelphis virginiana*
Otter, river	*Lutra canadensis*	Quail, bobwhite	*Colinus virginianus*
Rabbit, cottontail	*Sylvilagus floridanus*	Rabbit, swamp	*Sylvilagus aquaticus*
Raccoon	*Procyon lotor*	Skunk, spotted	*Spilogale puforius*
Skunk, striped	*Mephitis mephitis*	Squirrel, fox	*Sciurus niger*
Squirrel, gray	*Sciurus carolinensis*	Turkey, Eastern wild	*Meleagris gallopavo silvestris*
Table source: AGFC 2005a			

Big Game Species

There are four big game species that can be hunted in Arkansas: white-tailed deer, black bear, wild turkey, and elk. All of these species except elk occur within the ROI. During the 1930s, white-tailed deer were reduced to a population of roughly 500 deer in the entire State. AGFC attempted to halt the species' decline by establishing the State's first hunting season and bag limit; however, herds continued to decline and restoration efforts began. Arkansas's first Federal game refuge was created in 1926, followed by the

first State-operated refuge in 1927. White-tailed deer were brought in from other states and placed in the refuges to boost Arkansas's population. By 1950, white-tailed deer could be found in 71 of the 75 counties within the State, including Benton and Washington counties (AGFC 1999).

White-tailed deer populations within the ROI are relatively healthy as evidenced by 1.8 fawns per adult doe, a 72 percent average kidney fat index, and higher than average weights (AGFC 2004). These are all indicators of good white-tailed deer habitat and health. In the 2004–2005 hunting season, harvests yielded 728 bucks and 332 does from Benton County and 1,124 bucks and 408 does from Washington County (AGFC 2004). These data indicate a slightly above average harvest from these two counties compared to the rest of the State (AGFC 2004).

White-tailed deer habitat is comprised of open woodland areas, mixed pine and hardwood forests, brushlands, and areas of forest *edge* (i.e., where the forest meets open land) (Sutton 1998). Thick vegetation found on recently disturbed land provides excellent foraging areas where deer can browse on twigs, shoots, and leaves of new growth. They will also forage on field growing vegetation, such as various grasses and clover (Sutton 1998).

Black bears are present, although not overly common, in the ROI. Washington County reported three black bears harvested in the 2004–2005 hunting season (AGFC 2005b). There were no black bears harvested during that season within Benton County, even though they are known to occur in the area (AGFC 2005b). Black bear populations are on the rise in Arkansas due to recovery efforts made during the 1950s and 1960s, when the species was extirpated from the western portion of the State and limited throughout the remaining areas (Clark 1998).

Black bears are very diverse in their habitat requirements, which include adequate denning sites, a large supply of high quality food sources, and protective cover (Clark 1998). In areas of excellent habitat, male black bears can weigh over 400 pounds, while female black bears rarely weigh over 300 pounds (Clark 1998).

Wild turkeys can be found in every county in Arkansas including the ROI. Benton and Washington counties reported record harvests during the 2001 hunting season, with harvests of 73 and 138 turkeys, respectively (AGFC 2001a). Despite these record harvests, these numbers were significantly lower than that of surrounding counties (AGFC 2001a).

Market hunting, poor logging and agricultural practices, livestock grazing, and year round hunting in the early 1900s caused populations of Eastern wild turkey in Arkansas to decline significantly (AGFC 2001b). In 1915, soon after AGFC was established and market hunting became illegal, a hunting season and bag limit was set for wild turkeys to stop further decline of the State's populations. Hunting restrictions protected hens year round in an attempt to increase population size. Subsequent years brought shorter seasons, smaller bag limits, and entirely closed seasons (AGFC 2001b). From 1920 to 1940, pen raised turkeys were released throughout the State, but without much success (AGFC 2001b). Restoration efforts were more successful once AGFC began using cannon netting to capture turkeys to move them to repopulate other areas within the State. This proved much more effective than supplementing populations with hatchery-reared birds.

Eastern wild turkeys require diverse forest habitat types for survival. Prime habitat is a blend of mixed hardwoods, conifers, areas of open understories, well-distributed water sources, and some cropland.

Small Game Species

Small game in Arkansas includes furbearers, quail, rabbit, squirrel, feral hogs, and migratory game birds. Furbearers are opossum, beaver, otters, muskrat, nutria, coyote, fox, raccoon, mink, skunk, bobcat,

badger, and weasel. Badger and long-tailed weasel populations are very low in Arkansas, and they probably do not occur in the ROI in significant numbers.

In Arkansas, the Virginia opossum has accounted for 36 percent of all furbearing species harvested since 1942 (AGFC 2001c). Opossum pelts are presently of low economic value so, even though the species is common throughout the State, it is not a sought after species.

Beaver were almost eliminated from Arkansas by the 1900s due to unregulated trapping and hunting. The beginning of restocking efforts in 1926 allowed hunters to take two beaver per season in subsequent years. In 1970, AGFC declared beavers unprotected because populations had risen, causing the beaver in some areas of the State to be classified as a nuisance species (AGFC 2001c). Though population numbers have since been regulated, beaver populations are still on the rise in Arkansas and the ROI.

Beavers create habitat for river otters, so population fluctuations of each species are often similar. As with other species, river otters were over-harvested in the 1900s, causing population levels to drop. They were afforded more habitat once beaver populations became more stable, and AGFC listed the river otter as a legal furbearer for harvest in 1961 (AGFC 2001c). Though river otters are more common in the southern and eastern portions of the State, the species does occupy river drainages in the region encompassing the ROI.

Arkansas land uses, such as rice and fish farming, create excellent muskrat habitat due to the irrigation practices that accompany these exploits. This, along with the low economic value of muskrat pelts, has led to unacceptably high populations of Arkansas muskrats in the past (AGFC 2001c). Landowners can take muskrats out of trapping season if they are damaging irrigation structures, but few complaints of this have been recorded. Nineteen percent of muskrats harvested in the 2001 furbearing season came from the Ozark Mountain region, which is located in the northwestern portion of the State and encompasses the ROI (AGFC 2001c).

Nutria were first introduced in Louisiana to control aquatic vegetation and, since then, this species has expanded their range into Oklahoma, Arkansas, Mississippi, Tennessee, and Alabama (AGFC 2001c). Nutria have limited natural predators and measures taken to control the species have been ineffective. Trapping seasons for nutria have been extended due to the species becoming a nuisance. Though nutria may occur within the ROI, the highest population densities occur more in the western and eastern portions of the State (AGFC 2001c).

Coyote are present in every county in Arkansas (AGFC 2001c). Coyotes are beneficial to the State because they prey on small rodent populations. However, coyotes also prey on poultry, game birds, and some domestic pets, and have been known to hybridize with domestic dogs. Results of the 2001 furbearing harvest indicate that the population of coyotes in and around the ROI may be higher than that of the rest of the State (AGFC 2001c).

The two species of fox that may be harvested in Arkansas are the red fox and the grey fox (AGFC 2005a). Historically, red fox populations in throughout Arkansas have fluctuated greatly, causing the species to be protected on and off since 1940. Populations remained small while most of the State was forested, but increased as agricultural practices opened up landscapes (AGFC 2001c). Coyotes are direct competitors to the red fox and, where the two species try to occupy the same area, the coyote will often persist. Unlike the red fox, the grey fox prefers forested habitats. Grey fox have also been protected from harvest in the past. Both fox species can be found in Benton and Washington counties (AGFC 2001c).

Often considered a nuisance species, raccoon populations are currently high throughout Arkansas and the ROI. Raccoons are the number one harvested species during furbearing season, and have been for the past

50 years (AGFC 2001c). At one point, when population numbers were very low due to over hunting and trapping to obtain high priced pelts, raccoon denning trees were protected to help the species proliferate. Raccoons are commonly live-trapped and removed from certain areas due to nuisance complaints. Populations can be high due to the species high fertility rate and easily fulfilled habitat requirements (AGFC 2001c).

Although harvest has been somewhat low in recent years, mink can be found throughout Arkansas and the ROI. They are most plentiful in the eastern portion of the State where irrigation practices provide adequate habitat (AGFC 2001c). As with other species, mink populations declined profusely in the early 1900s due to unregulated trapping and hunting. To help restore populations, the species was live-trapped from in-state game refuges and transplanted to areas where they were scarce. Compared to pelts of other species, current prices for mink pelts are high (AGFC 2001c).

The two species of skunk in Arkansas that can be harvested during furbearer season are the striped skunk and the eastern spotted skunk (AGFC 2005a). Striped skunk populations declined dramatically in the 1950s due to market hunting for pelts. As new laws were passed to stop the use of this species in garment making, populations increased. An even more remarkable decline occurred in the 1970s due to a rabies outbreak in Arkansas (AGFC 2001c). This species most often inhabits cleared pasture and agricultural lands. The spotted skunk, also known as a *civet cat*, is found throughout all but the eastern most portion of the State. Spotted skunks inhabit mountainous areas, such as the Ozark Mountain region, where they utilize rocky outcroppings and ledges for habitat. The Ozark Mountain region accounted for 72 percent of spotted skunks harvested in 2001 (AGFC 2001c).

Before AGFC listed bobcats as a furbearer species with a regulated harvest, they were considered vermin and hunted indiscriminately along with other predators, such as wolves and mountain lions. Due to high prices being paid for spotted animal pelts, there was past concern as to whether bobcat populations could sustain themselves. Although wolves no longer occur in Arkansas and mountain lions are scarce, bobcats now occur in all counties of the State and the ROI (AGFC 2001c). Bobcats are very stealthy and thus rarely seen, so AGFC requires all bobcat pelts to be tagged by a game official before leaving the State to determine populations and harvests.

Other small game includes quail, rabbit, squirrel, and feral hogs. When Arkansas was first settled, the majority of the land was forested; a habitat that is not generally used by bobwhite quail. Once land use changed to accommodate agriculture and cattle grazing, bobwhite quail habitat became abundant and the species thrived. As the population in Arkansas grew and agricultural practices changed to include the use of machinery, bobwhite quail populations declined and have continued to decline since the 1940s. Despite this decline, this species can be found in every Arkansas county and the ROI (AGFC 2001d).

The three species of rabbit in Arkansas are the cottontail, the swamp rabbit, and the jack rabbit. Only the cottontail and swamp rabbit are legal to hunt (AGFC 2001e). The cottontail rabbit commonly utilizes areas of brushy fencerows, woodland edge areas, and overgrown farmland. Populations are currently stable, although they may have declined slightly when farming was modernized by the use of machinery, and cottontails are found throughout the State and ROI (AGFC 2001e). Swamp rabbits often inhabit areas of swampland or riparian habitat. The destruction of bottomland hardwood forests and the draining of wetlands have caused populations of swamp rabbits to decline. There are populations within the ROI, but their overall occurrence in Arkansas is limited. Jack rabbits first began to appear in Arkansas in Benton and Washington counties due to the clearing of land in these areas. As more forested areas are cleared for changing land uses, the range of this species may expand beyond these counties (AGFC 2001e).

Of the three squirrel species inhabiting Arkansas, only gray squirrels and fox squirrels are legal to hunt. Squirrel became a regular part of peoples' diet during the early settlement of the State when deer, bear,

and bison populations began to decline. The gray squirrel tends to prefer areas of dense hardwood and pine forests, while the fox squirrel prefers open upland woodlots. Both species are reliant on forested areas for nesting, foraging, and cover. These species can coexist in the same area; however, one will be the dominant species when they compete for resources (AGFC 2001f). The third species, the flying squirrel, is considered a non-game species. All three squirrel species occur naturally throughout Arkansas and the ROI (AGFC 2001f).

Arkansas classifies feral hogs as any hog, such as the Russian or European wild boar, that roams freely and lives in a feral (i.e., wild) state (AGFC 2006a). Feral hogs can be taken during open hunting seasons when they are found on public land and can be taken any time on private land. AGFC has linked feral hogs to numerous problems throughout the State including habitat destruction, predation on ground nesting birds, disease transmission to livestock and pets (e.g., brucellosis and pseudorabies), and disease transmission to humans (e.g., brucellosis and trichinosis) (AGFC 2006a). Feral hogs can be found throughout the majority of the State and may occur in the ROI.

Migratory game birds that occur in Arkansas and have the potential to occur in the ROI include coots, crows, doves, ducks, gallinules (or moorhens), geese, rails, snipes, and woodcocks (Table 3.2). FWS regulates the take of migratory game birds and AGFC sets regulations specifically for Arkansas based on FWS guidelines.

Table 3.2 Common and scientific names of migratory game birds that may occur in the ROI.

Common Name	Scientific Name	Common Name	Scientific Name
Bufflehead	*Bucephala albeola*	Canvasback	*Aythya valisineria*
Coot	*Fulica atra*	Crow	*Corvus brachyrhynchos*
Dove, Eurasian collared	*Streptopelia decaocto*	Dove, mourning	*Zenaida macroura*
Duck, black	*Anas rubripes*	Duck, ring-neck	*Aythya collaris*
Duck, ruddy	*Oxyura jamaicensis*	Duck, wood	*Aix sponsa*
Gadwall	*Anas strepera*	Gallinule, purple	*Porphurula martinica*
Goldeneye, common	*Bucephala clangula*	Goose, Canada	*Branta canadensis*
Goose, Ross	*Chen rossii*	Goose, snow	*Chen caerulescens*
Goose, white-fronted	*Anser albifrons*	Mallard	*Anas platyrhynchos*
Merganser, common	*Mergus merganser*	Merganser, hooded	*Lophodytes cucullatus*
Merganser, red-breasted	*Mergus serrator*	Moorhen, common	*Gallinula chloropus*
Pintail, northern	*Anas acuta*	Quail, bobwhite	*Colinus virginianus*
Rail, sora	*Porzana carolina*	Rail, Virginia	*Rallus limicola*
Redhead	*Aythya americana*	Scaup, greater	*Aythya marila*
Shoveler, northern	*Anas clypeata*	Snipe, common	*Gallinago gallinago*
Teal, blue-winged	*Anas discors*	Teal, green-winged	*Anas crecca*
Widgeon, American	*Anas americana*	Woodcock	*Scolopax minor*
Table source: AGFC 2005a			

To hunt migratory birds in Arkansas, every hunter over the age of 16 must possess an Arkansas Waterfowl Stamp, a Federal Migratory Bird Hunting and Conservation Stamp, a Harvest Information Program (HIP) registration, and a hunting license (AGFC 2006b). The HIP registration is a form which migratory bird hunters must fill out to inform FWS what species they hunted for and how many of each species were taken. HIP is mandatory nationwide program that allows FWS and individual States to collect data on migratory game bird populations in order to make management decisions regarding these species (AGFC 2006b).

Arkansas is a major waterfowl hunting State and sells more than 70,000 ducks stamps annually (AGFC 2006c). The State is part of the Mississippi flyway which follows the Mackenzie River in Canada and continues along the Mississippi River in the U.S. Other States in the flyway include Mississippi and Louisiana. Arkansas harvests more mallards per year than the rest of the Mississippi flyway combined (AGFC 2006c).

Non-Game Species

Arkansas is home to 48 species of non-game mammals, 291 migratory non-game birds, and numerous amphibians, crayfish, insects, reptiles, mussels, and various invertebrates that are also considered non-game. Non-game mammals include species such as bats, voles, gophers, armadillos, and mice. AGFC lists 25 of these mammals as species of conservation concern within the State. Non-game migratory birds include species such as owls, hawks, and songbirds, of which AGFC lists 19 as species of conservation concern. Also included on AGFC's conservation concern list were 25 amphibians, 24 crayfish, 63 insects, 52 mussels, 14 reptiles, 34 fish, and 44 other invertebrate species (AGFC 2005c). Additional information on these species is provided under *Protected Species and Habitat*.

3.1.1.2.2 Fisheries

Waterways in the ROI include the Illinois River and its tributaries. Several of these have been impacted by high levels of pathogens, sediments, and nutrients, limiting the habitat and variance of fish species. Table 3.3 lists fish species that occur in Arkansas and may also be present in the ROI.

Table 3.3 Fish species that may occur in the ROI.

Common Name	Scientific Name	Common Name	Scientific Name
Bass, Ozark	*Ambloplites constellatus*	Bass, shadow	*Ambloplites ariommus*
Buffalo, bigmouth	*Ictiobus cyprinellus*	Buffalo, smallmouth	*Ictiobus bubalus*
Carpsucker, river	*Carpiodes carpio*	Chub, bigeye	*Hybopsis amblops*
Chub, creek	*Semotilus atromaculatus*	Chub, gravel	*Erimystax x-punctatus*
Dace, Southern redbelly	*Phoxinus erythrogaster*	Darter, banded	*Etheostoma zonale*
Darter, channel	*Percina copelandi*	Darter, fantail	*Etheostoma flabellare*
Darter, greenside	*Etheostoma blennioides*	Darter, least	*Etheostoma microperca*
Darter, orangethroat	*Etheostoma spectabile*	Darter, redfin	*Etheostoma whipplei*
Darter, river	*Percina shumardi*	Darter, slenderhead	*Percina phoxocephala*
Darter, speckled	*Etheostoma stigmaeum*	Darter, stippled	*Etheostoma punctulatum*
Drum, freshwater	*Aplodinotus grunniens*	Lamprey, chestnut	*Ichthyomyzon castaneus*
Logperch	*Percina caprodes*	Madtom, brindled	*Noturus miurus*
Madtom, freckled	*Noturus nocturnus*	Madtom, slender	*Noturus exilis*

Table 3.3 Continued

Common Name	Scientific Name	Common Name	Scientific Name
Minnow, bluntnose	*Pimephales notatus*	Minnow, bullhead	*Pimephales vigilax*
Minnow, fathead	*Pimephales promelas*	Minnow, Ozark	*Notropis nubilus*
Minnow, slim	*Pimephales tenellus*	Mosquitofish, Western	*Gambusia affinis*
Redhorse, black	*Moxostoma duquesnei*	Redhorse, golden	*Moxostoma erythrurum*
Redhorse, river	*Moxostoma carinatum*	Sculpin, banded	*Cottus carolinae*
Shad, gizzard	*Dorosoma cepedianum*	Shiner, bigeye	*Notropis boops*
Shiner, bluntface	*Cyprinella camura*	Shiner, cardinal	*Luxilus cardinalis*
Shiner, emerald	*Notropis atherinoides*	Shiner, ghost	*Notropis buchanani*
Shiner, golden	*Notemigonus crysoleucas*	Shiner, mimic	*Notropis volucellus*
Shiner, redfin	*Lythrurus umbratilis*	Shiner, ribbon	*Lythrurus fumeus*
Shiner, spotfin	*Cyprinella spiloptera*	Shiner, steelcolor	*Cyprinella whipplei*
Shiner, striped	*Luxilus chrysocephalus*	Shiner, wedgespot	*Notropis greenei*
Shiner, whitetail	*Cyprinella galactura*	Silverside, brook	*Labidesthes sicculus*
Stonecat	*Noturus flavus*	Stoneroller, central	*Campostoma anomalum*
Stoneroller, largescale	*Campostoma oligolepis*	Studfish, Northern	*Fundulus catenatus*
Sucker, Northern hog	*Hypentelium nigricans*	Sucker, spotted	*Minytrema melanops*
Sucker, white	*Catostomus commersoni*	Sunfish, longear	*Lepomis megalotis*
Sunfish, redear	*Lepomis microlophus*	Topminnow, blackspotted	*Fundulus olivaceus*
Topminnow, blackstripe	*Fundulus notatus*		
Table source: NatureServe 2004			

Sport fishing is widespread in Arkansas and regulated by AGFC. Popular game fish include bass, catfish, crappie, gar, sunfish, carp, and trout (Table 3.4). Some of these species, such as cutthroat trout and lake trout, are not native to the State. Arkansas supplements its game fish population with hatchery-raised fish. There are five State-owned fish hatcheries in Arkansas, all of which may supply fish to waters within the ROI. The C.B. Craig Hatchery, William H. Donham Hatchery, Joe Hogan Hatchery, and Andrew Hulsey Hatchery are warm-water facilities that raise species such as bass, crappie, and catfish (AGFC 2006c). The Jim Hinkle Spring River Hatchery is a cold-water hatchery that raises trout. There are also three national hatcheries in Arkansas: Greers Ferry Hatchery, Mammoth Springs Hatchery, and the Norfolk Hatchery (FWS 2005a). These hatcheries raise trout, bass, paddlefish, sturgeon, walleye, and bluegill. There is one State-owned hatchery, the C.B. Craig Fish Hatchery, within the ROI and no national hatcheries (see Section 3.6, *Recreation*).

Table 3.4 Game fish in Arkansas.

Common Name	Scientific Name	Common Name	Scientific Name
Bass, largemouth	*Micropterus salmoides*	Bass, rock	*Ambloplites rupestris*
Bass, smallmouth	*Micropterus dolomieu*	Bass, spotted	*Micropterus punctulatus*
Bass, white	*Morone chrysops*	Bass, yellow	*Morone mississippiensis*
Bluegill	*Lepomis macrochirus*	Bowfin	*Amia calva*

Table 3.4 Continued

Common Name	Scientific Name	Common Name	Scientific Name
Bullhead, black	*Ameiurus melas*	Bullhead, brown	*Ictalurus nebulosus*
Bullhead, yellow	*Ameiurus natalis*	Carp, common	*Cyprinus carpio*
Carp, grass	*Ctenopharyngodon idella*	Catfish, blue	*Ictalurus furcatus*
Catfish, channel	*Ictalurus punctatus*	Catfish, flathead	*Pylodictis olivaris*
Crappie, black	*Pomoxis nigromaculatus*	Crappie, white	*Pomoxis nigromaculatus*
Gar, alligator	*Atractosteus spatula*	Gar, longnose	*Lepisosteus osseus*
Gar, shortnose	*Lepisosteus platostomus*	Gar, spotted	*Lepisosteus oculatus*
Paddlefish	*Polyodon spathula*	Pickerel, chain	*Esox niger*
Sauger	*Sander canadense*	Sunfish, green	*Lepomis cyanellus*
Sunfish, orange spotted	*Lepomis humilis*	Sunfish, spotted	*Lepomis gibbosus*
Trout, brown	*Salmo trutta*	Trout, brook	*Salvelinus fontinalis*
Trout, cutthroat	*Salmo clarki*	Trout, lake	*Salvelinus namaycush*
Trout, rainbow	*Oncorhynchus mykiss*	Walleye	*Stizostedion vitreum*
Warmouth	*Chaenobryttus gulosus*		
Table source: AGFC 2006d			

Largemouth bass virus (LMBV) has been found in many Arkansas watersheds including Beaver, Bull Shoals, Norfork, Dardanelle, Conway, Greers Ferry, Ouachita, Hamilton, Greeson, DeGray, DeQueen, Millwood, Lower White Oak, Monticello, Chicrot, Felsenthal, Columbia Lakes, and portions of the Arkansas River Watershed (AGFC 2006e). LMBV affects the swim bladder of adult bass causing the fish to have difficulty in swimming. Most fish showing symptoms of LMBV will rise to the surface of the water. Research indicates that LMBV is not always fatal among bass populations, and some fish may have the virus without showing any symptoms. LMBV can be carried by other fish species, such as bluegill and crappie, but largemouth bass are the only species in which the virus causes disease. As of yet, LMBV has not been found in the Illinois River Watershed (i.e., the ROI) (AGFC 2006e).

3.1.2 Vegetation

3.1.2.1 Description

Vegetation includes native and introduced plant species. The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.1.2.2 Affected Environment

By definition, ecoregions are areas of relatively uniform ecological systems that have similar vegetation, climate, and geology.[1] Arkansas is divided into seven Level III Ecoregions, of which two occur in the ROI: the Ozark Highlands and the Boston Mountains. These Level III ecoregions are further subdivided

[1] A Roman numeral hierarchy is used to denote different levels of ecoregions (Woods et al. 2004). Level I Ecoregions are the broadest level and divide North America into 15 ecological regions. Level II Ecoregions divide North America into 52 ecological regions and Level III Ecoregions divide the continental U.S. into 104 ecological regions. Level IV Ecoregions are a further division of Level III Ecoregions. Within the hierarchy of ecoregions, each lower level is more specific in regards to vegetation, climate, and geology on a smaller scale. Level III and Level IV ecoregions are typically used to describe the ecological regions of individual States.

into Level IV Ecoregions, or for the purposes of discussion in this analysis, *subregions* (Table 3.5, Figure 3.1). The potential natural vegetation of the subregions within the ROI as described by Wood and others (2004) is discussed in the following subsections.

Table 3.5 Level III Ecoregions and subregions in the ROI.

Level III Ecoregion	Subregion	Counties
Boston Mountains	Lower Boston Mountains	Washington
Ozark Highlands	Dissected Springfield Plateau—Elk River Hills	Benton, Washington
	Springfield Plateau	Benton, Washington
Table source: Wood et al. 2004		

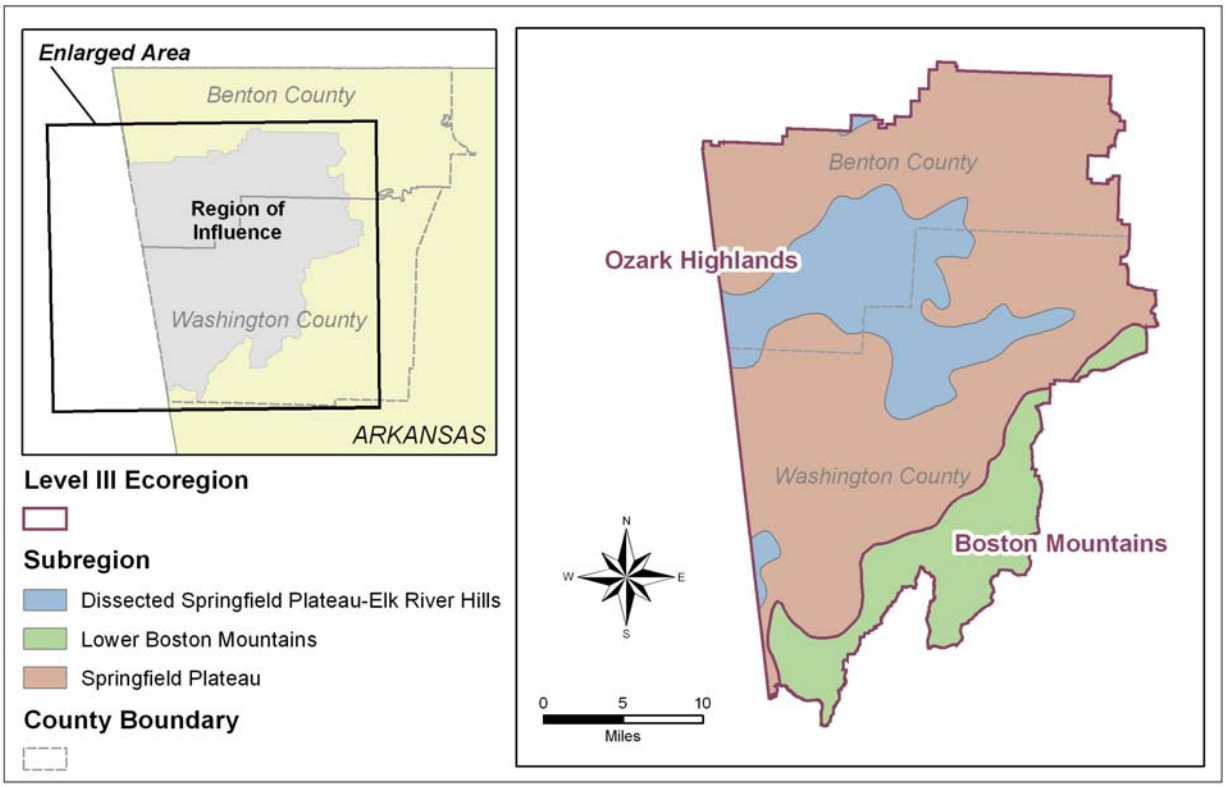

Figure 3.1 Ecoregions and subregions within the ROI.

3.1.2.2.1 Boston Mountains

The Boston Mountains Level III Ecoregion contains one subregion in the ROI, the Lower Boston Mountains. This subregion covers the southeastern border of the Washington County portion of the ROI (Figure 3.1).

Vegetation in the Lower Boston Mountains includes oak-hickory-pine forests, oak-hickory forests, mixed oak forests, and oak-pine forests. Woodland and savanna areas can be found in the uplands. Vegetation species include northern red oak, white oak, post oak, scarlet oak, black oak, blackjack oak, pignut hickory, shagbark hickory, mockernut hickory, and shortleaf pine. Sweetgum, willows, birch, American

sycamore, and hickory and oak species may occur in areas of floodplains and low terraces. Lands within this subregion are used for pasture or hay crops, logging, and recreation.

3.1.2.2.2 Ozark Highlands

Within the ROI, the Ozark Highlands Level III Ecoregion contains the Dissected Springfield Plateau—Elk River Hills and Springfield Plateau subregions. The Dissected Springfield Plateau—Elk River Hills subregion covers three separate portions within Benton and Washington counties (Figure 3.1). This subregion is characterized by oak-hickory pine forests, oak-hickory forests, mixed deciduous upland forests, and mixed deciduous-pine forests. Species present may include black oak, white oak, blackjack oak, post oak, beech, sugar maple, and various hickories. Land uses within the Dissected Springfield Plateau—Elk River Hills subregion includes woodland grazing, logging, recreation, quarrying, livestock farming, and housing developments.

The Springfield Plateau is the dominant subregion in the ROI, covering large portions of Benton and Washington counties. Vegetation in this subregion is similar to that of the Dissected Springfield Plateau—Elk Rivers Hills and includes oak-hickory and oak-hickory-pine forests. Before the 19th century, the Springfield Plateau contained savannas and tallgrass prairie, which were regularly burned due to natural fire regimes. Upland areas now consist of mixed deciduous forests and mixed deciduous-shortleaf pine forests. Vegetation includes such species as black oak, white oak, blackjack oak, post oak, various hickories, willows, maples, birch, American elm, and American sycamore. Land in this subregion is used for pasture, hay crops, residential development, some grain production, fruit orchards, grape crops, and vegetable crops. Farming in this area is primarily poultry, cattle, and hogs.

3.1.3 Protected Species and Habitat

3.1.3.1 Description

Protected species are those terrestrial, avian, and aquatic species designated by FWS as threatened, endangered, or candidate species under the *Endangered Species Act* (16 USC parts 1531 et seq., 1988). Arkansas does not have State legislation for endangered species; however, both Arkansas Natural Heritage Commission (ANHC) and AGFC track species they consider to be of special concern in the State. The ROI for this resource analysis is Benton and Washington counties.

Critical habitats are specific geographic areas that are essential for conservation of a particular species and that have been formally designated by Federal rule. There is no critical habitat located within the ROI.

3.1.3.2 Affected Environment

For the State of Arkansas, FWS lists 25 animals and 6 plants as threatened or endangered, and 5 plant and animal species as candidates for listing. The Federal and State status for each of these protected species is provided in Table 3.6.

Table 3.6 Protected species in Arkansas.

Species	State Status[1]	Federal Status[2]	Species	State Status[1]	Federal Status[2]
Bat, gray (*Myotis grisescens*)	S2	E	Bat, Indiana (*Myotis odalist*)	S1	E
Bat, Ozark big-eared (*Corynorhinus townsendii ingens*)	S1	E	Beetle, American burying (*Nicrophorus americanus*)	S1	E
Bladderpod, Missouri (*Lesquerella filiformis*)	S1	T	Cavefish, Ozark (*Amblyopsis rosae*)	S1	T

Table 3.6 Continued

Species	State Status[1]	Federal Status[2]	Species	State Status[1]	Federal Status[2]
Clover, running buffalo (*Trifolium stoloniferum*)	SH	E	Crayfish, cave (*Cambarus aculabrum*)	S1	E
Crayfish, cave (*Cambarus zophonastes*)	S1	E	Curlew, Eskimo (*Numenius borealis*)	---	E
Darter, Arkansas (*Etheostoma cragini*)	S1	C	Darter, leopard (*Percina pantherina*)	S1	T
Darter, yellowcheek (*Etheostoma moorei*)	S1	C	Eagle, bald (lower 48 States) (*Haliaeetus leucocephalus*)	S2B, SN4	T
Fatmucket, Arkansas (*Lampsilis powelli*)	S2	T	Harperella (*Ptilimnium nodosum*)	S2	E
Hellbender, Ozark (*Cryptobranchus alleganiensis bishopi*)	S2	C	*Geocarpon minimum* (no common name)	S2	T
Mucket, Neosho (*Lampsilis rafinesqueana*)	S1	C	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)	S2	E
Mussel, scaleshell (*Leptodea leptodon*)	S1	E	Orchid, Eastern prairie fringed (*Platanthera leucophaea*)	---	T
Panther, Florida (*Puma concolor coryi*)	---	E	Pearlymussel, Curtis (*Epioblasma florentina curtisii*)	S1	E
Pocketbook, fat (*Potamilus capax*)	S1	E	Pocketbook, Ouachita rock (*Arkansia wheeleri*)	S1	E
Pocketbook, speckled (*Lampsilis streckeri*)	S1	E	Pondberry (*Lindera melissifolia*)	S2	E
Shagreen, Magazine Mountain (*Mesodon magazinensis*)	S1	T	Shiner, Arkansas River (Arkansas River Basin) (*Notropis girardi*)	SX	T
Spectaclecase (*Cumberlandia monodonta*)	S1	C	Sturgeon, pallid (*Scaphirhynchus albus*)	S1	E
Tern, least (interior population) (*Sterna antillarum*)	S2B	E	Wolf, gray (lower 48 States, except MN and where XN; and Mexico) (Canis lupus)	---	E
Woodpecker, ivory-billed (*Campephilus principalis*)	---	E	Woodpecker, red-cockaded (*Picoides borealis*)	S2	E

[1]State status codes: B=breeding; N=nesting; SH=historical occurrence in the State, but not verified within the last 15 years; SX=apparently extirpated from the State; S1=extremely rare and vulnerable to extirpation; S2=very rare and susceptible to extirpation; S4=common, not susceptible to immediate threat

[2]Federal status codes: C=candidate; E=endangered; T=threatened

Table sources: ANHC 2005a, b; FWS 2006a

There are ten of these protected species that may or have historically inhabited the ROI. This includes four mammals, one plant, two fish, one bird, one crayfish, and one mussel (Table 3.7). Although candidate species are not afforded the same protection as threatened and endangered species, they will be considered as protected species for the purposes of this analysis.

Table 3.7 Protected species in the ROI.

Species	County Where Species Occurs	State Status [1]	Federal Status [2]
Bat, gray	Benton, Washington	S2	E
Bat, Indiana	Benton, Washington	S1	E

Species	County Where Species Occurs	State Status [1]	Federal Status [2]
Bat, Ozark big-eared	Washington	S1	E
Bladderpod, Missouri	Washington	S1	E
Cavefish, Ozark	Benton	S1	E
Crayfish, cave	Benton	S1	E
Darter, Arkansas	Benton	S1	C
Eagle, bald	Benton, Washington	S2B, SN4	T
Mucket, Neosho	Benton	S1	C
Panther, Florida	Washington	---	E

[1]State status codes: B=breeding; N=nesting; S1=extremely rare and vulnerable to extirpation; S2=very rare and susceptible to extirpation; S4=common, not susceptible to immediate threat

[2]Federal status codes: C = candidate; E = endangered; T = threatened

Table source: FWS 2007a, MNHP 2006

Gray Bat

The gray bat is a karst-dependant species. Karst topography is formed when water erodes carbonate rocks (e.g., limestone), forming underground streams, sinkholes, and caves. Gray bats live year round in the caves created by this process. Most populations occur in the northern counties of Arkansas, including Benton and Washington counties (ANHC 2006a).

In winter months, gray bats hibernate in deep vertical caves that trap cold air. Gray bats will occupy these areas in clusters, often numbering up to several thousand individuals. In the summer, maternity colonies of gray bats will form in karst caves that contain streams. These caves will have domed ceilings or separate rooms that trap the warm air created by body heat from the clusters of bats. Gray bats rely heavily on riparian areas for foraging, mostly feeding on mayflies and other insects (ANHC 2006a).

Because their habitat requirements are very specific, loss or disruption of habitat is the most critical factor limiting this species across its range. Specifically, the disturbance of maternity colony habitat during the summer months can cause thousands of young bats to be abandoned or dropped to the cave floor. Other factors restricting gray bat populations are pesticide poisoning, stream impoundments and the flooding or collapse of cave habitats (ANHC 2006a).

Indiana Bat

Indiana bats primarily roost in caves which are selected by the dimensions of the cave. In winter, the Indiana bat chooses caves that will provide stable, cold temperatures in order to allow them to retain fat supplies and expend less energy (FWS 1983). There is less known about summer requirements; however, maternity habitat seems focused around riparian areas and floodplains of smaller waterbodies. Riparian areas with mature trees that overhang waterways provide suitable foraging habitat, as Indiana bats appear to forage more on aquatic insects then terrestrial ones (FWS 1983).

Ozark Big-Eared Bat

The requirements of the Ozark big-eared bat are very similar to that of gray bats. This species is also karst-dependant. Colonies of Ozark big-eared bats hibernate in deep vertical caves in the winter and use domed ceiling caves or caves with separate rooms for maternity colonies. Moths are the primary diet of this bat and most foraging takes place along forest edges (ANHC 2006b).

This species used to occupy most of the Ozark Mountain region of Oklahoma, Arkansas, and Missouri, but is now only found in Oklahoma and Arkansas. Within the State of Arkansas, Ozark big-eared bats inhabit areas of suitable habitat in Marion and Washington counties (ANHC 2006b).

The Ozark big-eared bats face the same limiting factors as the gray bat; mainly loss and degradation of habitat. Disturbances at hibernating sites cause the bats to use stored fat reserves which may lead to individual mortalities. Disturbances at maternity colony sites often cause direct mortality to young bats (ANHC 2006b).

Missouri Bladderpod

The Missouri bladderpod is a small annual plant that can be found in four counties of northern Arkansas, including Washington County. Missouri bladderpods populate glade areas, which are naturally dry regions of shallow and loose soil that are often treeless and have exposed rock. Glade habitats are typically found along highways and in pastures that are frequently mowed or grazed (FWS 2003).

Factors inhibiting the spread of Missouri bladderpods include habitat loss, fire suppression, and roadside maintenance. Habitat loss is due to residential development, the introduction of woody and non-native grasses to suitable habitat areas, and overgrazing. Fire suppression reduces Missouri bladderpod habitat is reduced because this species needs open glade areas and cannot compete with other grasses. Roadside maintenance activities, such as spraying for weeds, also negatively affect this species (FWS 2003).

Ozark Cavefish

The Ozark cavefish is a small colorless fish that is karst-dependant. Within Arkansas, this species is only found in Benton County. Ozark Cavefish occupy cave streams and springs with gravel bottoms. It may also use pools with silt and sand bottoms, but less frequently. Because the streams in which Ozark cavefish live are usually fed from underground, nutrient input to these streams is normally from gray bat guano and leaf litter. Therefore, prime Ozark cavefish habitat is within streams in caves occupied by gray bats, which are also an endangered species (ANHC 2006c).

This species is dependant on good water quality, and can be negatively affected by runoff contaminants such as pesticides and animal waste. Lower water tables have also contributed to the decline of this species (ANHC 2006c).

Cave Crayfish

Cambarus aculabrum is a cave crayfish specially adapted to living in stable cave environments that include low light and temperature. This species is known to occur in Benton County; located in Logan Cave, which is federally owned, and Bear Hollow Cave, which is privately owned (FWS 1993a).

Cave crayfish require stable environments that include low light and low temperatures. They are unable to tolerate rapid changes in habitat. Water quality degradation is the number one limiting factor to cave crayfish populations (FWS 1993a).

Arkansas Darter

Arkansas darter populations can be found in the Illinois River Watershed in smaller springs that run mostly through private lands in Benton County. Their habitat requirements include sandy or pebbled pool bottoms in small, spring-fed streams that contain cool water and some aquatic vegetation (FWS 2005b).

The depletion of spring-fed streams and marshes due to agricultural needs has forced the Arkansas darter to inhabit less favorable habits in which it is a poor competitor. This species does not thrive in habitats that contain a diversity of fish species (FWS 2005b).

Bald Eagle

Arkansas ranks in the top ten States in which wintering bald eagles can be observed, numbering 1,000 eagles annually. This species is found in both Benton and Washington counties (AGFC 2006f).

Bald eagles are a riparian-dependant species. They are frequently found in or near riparian areas where they forage on waterfowl and fish. Some eagles will inhabit terrestrial environments and feed on carrion or small game. Nesting bald eagles are predominantly associated with lakes, rivers, or coastal areas. Breeding areas are located on large trees and cliffs and, rarely, on the ground (AGFC 2006f).

Bald eagles are very vulnerable to the effects of habitat loss. Increased development and the modification or destruction of wild lands has had a cumulative negative effect to this species. Human disturbance also affects this species and has been documented as the reason for some reproductive failure in breeding areas. Historically, the decline of the bald eagle was linked to dichloro-diphenyl-trichloroethane (DDT), a commonly used pesticide prior to 1972. The presence of DDT caused eggshells to be very thin, which caused the eggs to break when females began to incubate them. This resulted in a significant and rapid decline in bald eagle populations (AGFC 2006f).

Neosho Mucket

The Neosho mucket is a large mussel that burrows in the gravel substrate of stream riffles and runs. The current within these waterways will be moderately swift and the substrate loose. Reduction of habitat due to impoundments, sedimentation, and pollutants, is adversely affecting this species. Neosho muckets will not inhabit areas of impounded water. Impounding waterways once suitable for this species also causes fragmentation of Neosho mucket habitat. Excessive sedimentation levels adversely affect all mussel species due to suffocation and a reduction in juvenile recruitment. Mining, cattle grazing, construction activities, and agriculture have increased sedimentation entering waterways within the habitat of the Neosho mucket. Pesticides, heavy metals, and excessive nutrients may also adversely affect Neosho muckets (FWS 2004).

Florida Panther

The Florida panther is one of North America's most endangered mammals. Though the historical range of the Florida panther once included portions of Arkansas; including Washington County, there are currently no panthers located within the State. The last remaining population of Florida panthers occurs in south Florida (FWS 1993).

3.2 Cultural Resources

3.2.1 Archaeological Resources

3.2.1.1 Description

Archaeological resources are locations and objects from past human activities. The ROI for this resource analysis is Benton and Washington counties.

3.2.1.2 Affected Environment

American Indians were the earliest inhabitants of Arkansas. They were joined in the late 17th century by the French and, in the 18th and 19th centuries, by Anglo-Americans who migrated west from the states east of the Mississippi River. The rich cultural history of Arkansas, also called the *Land of Opportunity*, represents over 12,000 years of human land use and is illustrated by the thousands of cultural resources found throughout the State. As of 2006, over 53,000 cultural resources had been identified across Arkansas including more than 23,000 properties recorded by the Arkansas Historic Preservation Program (AHPP) and over 30,000 prehistoric and historic archaeological sites listed in the Arkansas

Archaeological Survey database (AHPP 2002, 2006). Arkansas has 2,265 properties listed on the National Register of Historic Places (NRHP), with 279 of them located within Benton and Washington counties. There are presently three archaeological sites listed on the NRHP which occur within or near the ROI (Table 3.8) (NRHP 2006).

Table 3.8 Archaeological sites within the ROI.

Site	County	Cultural Affiliation
Goforth-Saindon Mound Group	Benton	Prehistoric
Bluff Point	Washington	Prehistoric
Brown Bluff	Washington	Prehistoric/Mississippi Period
Table source: NRHP 2006		

3.2.1.2.1 Prehistoric Periods (12,000 B.C.–1540 A.D.)

Studies in paleoecology, ethnography, history, and archaeology have resulted in a better understanding of more than 12,000 years of human land use and culture in Arkansas. Archaeologists organize this information chronologically based diagnostic artifacts or artifact assemblages from the archaeological record and the environmental conditions that affected human adaptation to the landscape. The following are brief summaries of the time periods related to cultures of what is now the State of Arkansas.

Paleoindian Period (12,000–8,000 B.C.)

This period is characterized by a nomadic human population settlement pattern and small bands who hunted game such as mastodons, giant sloths, Pleistocene bison, deer, rabbits, and turtles for subsistence. It is believed that Arkansas was very sparsely populated during this time period. Clovis points, then used for hunting, have not been discovered in Arkansas sites.

Dalton Period (8,000–7,000 B.C.)

The Dalton Period marked a transition between the game hunting of the Paleoindian cultures and the hunting-foraging of the Archaic period. Climate shifts resulted in changes to plant and animal communities and new diet and hunting strategies using a variety of plant and animal foods. The existence of tools such as mortars, manos, grinding slabs, cupstones, and hammerstones indicate plant food processing. The Dalton serrated point with beveled edges is an important technological marker of this period. Studies indicate they may have been used as knives to butcher deer. Dalton points have been discovered across Arkansas at hundreds of sites. Another distinctive woodworking tool, called a Dalton adze, also characterizes this period.

Archaic Period (7,000–500 B.C.)

A long period of dry and warm climate, known as the *hypsithermal*, began in the Archaic Period. Grasslands expanded and deciduous forests shrank. This period marked new reliance on hunting-foraging traditions and dry-climate floral and faunal species for subsistence. One important innovation that occurred during this period in Arkansas was gardening. Mound building was another advance that began in the uplands west of the Mississippi River. Mounds may have been political and ritual activity centers. Archaic technology was similar to that of the earlier Dalton period. It included chipped stone tools and stone-tipped spears that were hurled by atlatls. Stone tools were made by grinding as well as chipping. Although still thinly scattered across the landscape, thousands of Archaic sites have been identified in Arkansas; however, no large mounds have been recorded in the State from this time period.

Woodland Period (500 B.C.–900 A.D.)

Pottery first appeared in Arkansas during the Woodland Period. The appearance of pottery illustrates a change in diet to include seeds, nuts, and other plants that were processed into soups, stews, and mush, and also the beginning of a less mobile lifestyle. Spears, nets, traps, and possibly bolas were used to hunt animals with bows and arrows that appeared about 1,400 years ago. Associated technologies in the forms of plummets and boatstones also appeared. Corn or maize was grown for the first time in this area in the Ozark Highlands and central Arkansas River Valley about 1,200 to 1,400 years ago. Although Woodland people did not live in permanent villages, sturdy structures and middens containing items such as stone tools, waste materials, and human and animal burials have been found. Mound building occurred in Arkansas and regional differences in cultural practices and technology began to take place.

Mississippian Period (900 A.D.–1540 A.D.)

Fundamental cultural changes took place during the Mississippian Period. People subsisted primarily on garden crops and society became hierarchal with some individuals and families having more power and wealth than others. Status symbols included costumes and ritual items of shell, pottery, and other materials. Clay figurines of humans, animals, and supernatural creatures were created for special ceremonies. Mississippian technologies included the bow and arrow, stone hoes used for farming, and, perhaps, blowguns.

A regional version of Mississippian culture arose in what are now Louisiana, Texas, Oklahoma, and southwestern Arkansas. Known as the Caddo culture, settlements were mostly small farmsteads with centralized religious and political mound centers. Pottery was covered with complicated geometric patterns and baskets, mats, and other items were woven from reeds, grasses, and cane. Around 1500 A.D. changes in settlement patterns and cultural practices occurred as a consequence of previously unknown diseases that may have resulted from indirect contact between native peoples and Europeans.

3.2.1.2.2 Protohistoric and Historic Periods (1541 A.D.–Present)

The protohistoric period in what is now considered Arkansas was marked by European contact with American Indians. With this contact, weighty changes occurred to the American Indian culture. Spanish horses were introduced and became a major part of the culture, along with formerly unknown disease. Hernando de Soto and his men were the first Europeans to enter Arkansas on June 18, 1541. They were followed by a French expedition in the summer of 1673 led by Jesuit missionary, Father Jacques Marquette, and trader, Louis Joliet. Larger expeditions followed and established missions and trading posts, including the Arkansas Post established by Henri De Tonti. In 1762, the entire Louisiana Territory, including the Arkansas area, was ceded to Spain. A few farming families of French, Anglo-Americans, and German Protestants began arriving in the latter part of the 18th century. By the end of the century American Indian and black slaves, as well as free blacks and mulattoes, worked for Arkansas farmers and as domestics.

In May of 1803, the Louisiana Purchase was signed between France and the U.S. On March 23, 1804, Arkansas became a part of the U.S. and the displacement of American Indians by European settlers began in earnest. Beginning after the 1830 *Indian Removal Act*, American Indians were driven from the southeast and traveled through Arkansas to Oklahoma on what is now known as the *Trail of Tears*. Comprised of a system of trails rather than a single route, all passed through Arkansas.

In 1836, Arkansas became the 25th State. By the 1850s, most Arkansans were engaged in farming and a slave-based plantation based culture had developed. With cotton as the primary crop, unheralded prosperity occurred in the late 1850s. The Civil War ended this prosperity. Arkansas, a predominantly Confederate State, seceded from the U.S. on May 6, 1861; however, strong Union support existed in the

north and northwestern parts of the State. More than 10,000 Arkansans lost their lives during the war and Civil War cemeteries dot the landscape (Central Arkansas Library System 2006).

3.2.2 Architectural Resources

3.2.2.1 Description

Architectural resources are standing structures that are usually over 50 years of age and of significant historic or aesthetic value. The ROI for this resource analysis is Benton and Washington counties.

3.2.2.2 Affected Environment

Architectural resources in Arkansas include individual structures and groups or districts of related structures such as houses, banks, homesteads, schools, libraries, hotels, and churches. Architectural properties in Arkansas are mostly focused around the lifestyles and cultures of Euro-American settlement, commerce, transportation, education, and government. There are 146 sites in Benton County and 106 sites in Washington County listed on NRHP (NRHP 2006).

3.2.3 Traditional Cultural Properties

3.2.3.1 Description

Traditional cultural properties (TCPs) hold importance to American Indians or other ethnic groups for the continuing practice of traditional culture. Any of these properties may meet the criteria for inclusion in the NRHP and this determination of eligibility (36 CFR parts 800.3–800.13, 2006) is a requirement of Federal and State environmental assessment processes before the initiation of ground disturbance or alteration of a landscape or structure. The ROI for this resource analysis is Benton and Washington counties.

3.2.3.2 Affected Environment

There are 19 federally recognized American Indian tribes that have a historical association with the State of Arkansas. The Trail of Tears, a National Historic Trail, traverses the ROI. However, there are no TCPs within the ROI that are recognized by NRHP (AHPP 2004, Green 2007).

3.3 Water Resources

3.3.1 Surface Water

3.3.1.1 Description

Surface water includes rivers, streams, and lakes, including those designated as impaired. The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.3.1.2 Affected Environment

Waterways within the ROI include the Illinois River and its major tributaries in Arkansas: Osage Creek, Flint Creek, and Spring Creek. Most waters in the ROI are suitable for primary contact (i.e., swimmable) and secondary contact (i.e., limited body contact) recreation; propagation of fish and wildlife; fish consumption; and public, industrial, and agricultural water supplies (Arkansas Department of Environmental Quality [ADEQ] 2004).

Every 2 years States must compile as list of waterbodies within their jurisdiction that do not meet the water quality standards established by Section 303(d) of the *Clean Water Act* (33 USC parts 1251 et seq., 2000). These lists, which identify the impairments to each waterbody, are commonly known as *303(d) lists*. Once the list is complete, each jurisdiction must then determine priority rankings for these waters

and establish total maximum daily loads (TMDLs) for each. A TMDL is the maximum amount of pollutants a waterway can receive daily and still meet water quality standards (EPA 2005).

The most recent EPA-approved 303(d) list for Arkansas is that from 2002. Due to revisions in the methodology used to develop 303(d) lists, Arkansas's 2004 303(d) list has not been completely approved by EPA. The 2006 303(d) list has been drafted but is not yet available for public review. This analysis considers impaired waters from both the 2002 and the 2004 303(d) lists.

Impaired waters in the ROI are Clear Creek, Osage Creek, Spring Creek, and Muddy Fork (Table 3.9). ADEQ designated Clear Creek as impaired on the 2002 303(d) list because aquatic life use was not supported at that time due to siltation/turbidity (ADEQ 2002). Silt occurs naturally in waterways, but too much suspended silt causes turbidity (i.e., a cloudiness of the water). Turbidity reduces the amount of light that penetrates the water, which slows down or stops photosynthesis in aquatic plants and, in turn, limits oxygen production. Siltation may be caused by factors such as construction, eroding streambanks, poorly harvested timber, agricultural croplands, and unimproved pastures. In the ROI, siltation is due to agricultural activities and urban runoff (ADEQ 2002).

Table 3.9 Surface water impairments in the ROI.

Waterbody	County	Impairment	Source
Clear Creek	Washington	Siltation/turbidity, pathogens	Agricultural activities, urban runoff
Osage Creek	Benton, Washington	Phosphorus	No source listed[1]
Spring Creek	Benton, Washington	Phosphorus	No source listed[1]
Muddy Fork	Washington	Phosphorus	No source listed[1]

[1]*The EPA did not specify a source for this listing.*

Table sources: ADEQ 2002, 2004; EPA 2007a

ADEQ includes Clear Creek on the 2004 list as well, but because it does not support primary contact (i.e., swimming) due to pathogens from urban runoff (ADEQ 2004). However, data verification (e.g., additional sampling, biological assessment) is needed to confirm the impairment before a TMDL is scheduled (ADEQ 2004). Pathogen indicators are primarily bacteria, most commonly fecal coliforms and *Escherichia coli* (ADEQ 2004).

EPA has recommended that Osage Creek, Spring Creek, and Muddy Fork be designated as impaired on the 2004 list due to total phosphorus (EPA 2007a). Although nutrients are a necessary component of water ecosystems, excessive amounts stimulate a rapid growth response of aquatic plants, such as algae blooms and aquatic weeds (Klapproth and Johnson 2000, U.S. Geological Survey [USGS] 2006). Algae blooms occur naturally, but with more frequency and severity in the presence of nutrients (NRCS 1994). The algae cause an increase in bacteria and other decomposers that can deplete the dissolved oxygen supply of the waterbody (USGS 2006). Dissolved oxygen is necessary to sustain aquatic life. In addition, the death of large algal populations can create an unpleasant taste and odor to the water. The source of these nutrients in the ROI is not identified; however, excessive nutrients are generally attributed to agricultural fertilizers, urban runoff, and animal waste.

3.3.1.3 Description

Groundwater refers to subsurface hydrologic resources such as aquifers that are used for domestic, agricultural, and industrial purposes. The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.3.1.4 Affected Environment

Arkansas ranked fourth in the Nation in groundwater withdrawals in 1995, with groundwater supplying 63 percent of water usage for the State (ANRC 2006). Long-term general trends show that groundwater levels in Arkansas have been consistently dropping across the State, with a few areas rising slightly or remaining constant (ANRC 2006). The karst topography and associated conduit flow of groundwater through the bedrock allow for rapid rates of groundwater recharge in ROI.

The karst topography and associated groundwater flow also make the ROI especially sensitive to groundwater contamination from to local agricultural activities. Poultry and livestock operations located in northwest Arkansas generate a large volume of waste, which is often spread on pasture lands and agricultural fields as fertilizer. Davis, Brahana, and Johnston (2000) conducted a study to monitor groundwater at five sites in northwestern Arkansas between 1995 and 1999. Two of these sites, Braly Spring and Little Wildcat Spring in Washington County, are in the ROI. A third site, Decatur Spring in Benton County, is within 3 miles of the ROI. Results of the study indicate that these springs have been impacted by nitrate loading and the presence of fecal coliform bacteria, particularly after storm pulses (Davis, Brahana, and Johnston 2000).

3.3.2 Wetlands

3.3.2.1 Description

Wetlands are defined by the U.S. Army Corps of Engineers (USACE) as areas that are characterized by a prevalence of vegetation adapted to saturated soil conditions. Wetlands can be associated with surface water or groundwater and are identified based on specific soil, hydrology, and vegetation. The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.3.2.2 Affected Environment

The 1987 USACE Wetland Delineation Manual (USACE 1987) provides guidelines to identify and delineate wetlands. For regulatory purposes under the *Clean Water Act*, wetlands are defined as:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." (33 CFR part 328.3, 2006)

At one time, Arkansas held approximately 9.8 million acres of wetland area. As the American frontier began to move west wetlands were diminished throughout the State. By 1937, only 4.9 million acres of wetlands remained. During the 1950s and 1960s, 37 percent of the remaining wetlands were lost due to clearing for agriculture. The current rate of wetland loss has slowed due to conservation incentive programs offered to landowners within the State (Arkansas Multi-Agency Wetland Planning Team [AMAWPT] 2001).

AMAWPT has characterized wetlands within the State using a hydrogeomorphic classification system. Using this system, AMAWPT has determined that there are five types of wetlands that have the potential to occur within the ROI area: depressional, flats, fringe, riverine, and slope wetlands (AMAWPT 2006).

Depressional wetlands are topographic low points that accumulate water from precipitation, groundwater seeps, stream flooding, and runoff. There are seven community types (i.e., plant and animal species adapted to similar environmental conditions) associated with depressional wetlands: floodplain depressions, mountaintop depressions, sinkhole depressions, valley train pond depressions, headwater swamp depressions, sand pond depressions, and unconnected alluvial depressions (AMAWPT 2006).

Flats wetlands are in areas of little or no gradient in which the sole water source is precipitation. There is little to no overland flow into or out of flats wetlands. Seven community types are associated with flats wetlands; alkali post oak flats, hardwood flats, post oak flats, alkali wet prairie flats, pine flats, and wet tallgrass prairie flats (AMAWPT 2006).

Fringe wetlands occur on the margins of lakes more than 2 meters deep. These lakes may be natural or man-made impoundments. There are three community types in the fringe wetland class: connected lake margins, unconnected lake margins, and reservoir shores (AMAWPT 2006).

Riverine wetlands are areas directly flooded by streamflow at least one time every five years. Sources of input may be from overbank flow or backwater flow. There are nine community types related to riverine wetlands: beaver complex wetlands, low-gradient backwater wetlands, mid-gradient backwater wetlands, sand prairie wetlands, wildlife management impoundment wetlands, high-gradient riparian zone wetlands, low-gradient overbank wetlands, mid-gradient floodplain wetlands, and spring run wetlands (AMAWPT 2006).

As the name implies, slope wetlands occur on land surfaces with a sloping gradient. The input source of water for slope wetlands is groundwater discharge or shallow subsurface flows that create a saturated condition. There are five community types in the slope wetland class: bayhead wetlands, non-calcareous perennial seep wetlands, wet weather seep wetlands, calcareous perennial seep wetlands, and sandstone glade wetlands (AMAWPT 2006).

3.3.3 Floodplains

3.3.3.1 Description

In this analysis, floodplains are defined as 100-year floodplains, designated by the Federal Emergency Management Agency (FEMA) as those low-lying areas that are subject to inundation by a 100-year flood (i.e., a flood that has a 1 percent chance of being equaled or exceeded in any given year). The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.3.3.2 Affected Environment

In general, a floodplain can be defined as a flat area located adjacent to a stream channel that provides natural storage for water overflow during or after a storm event. EO 11988, *Floodplain Management*, requires that Federal agencies:

> "…take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains…" (42 FR 26951, 1979)

As riparian land may be enrolled under the Arkansas CREP agreement, it is expected that some of the eligible land would be located within floodplains. However, the type of floodplain (e.g., 100-year floodplain) cannot be determined without an exact site location and a FEMA floodplain map. Site specific evaluations would be conducted prior to enrolling a site into CREP to determine if the site is within, or would impact, a 100-year floodplain.

3.4 Soil Resources

3.4.1 Topography

3.4.1.1 Description

Topography is the general configuration of a land surface, including relationships between position and relief of natural and anthropogenic features. For the purposes of this analysis, topography is described by physiographic province. A physiographic province is a region with distinctive geographical features, such as mountain ridges or lowlands. The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.4.1.2 Affected Environment

The two major physiographic regions in Arkansas are the Interior Highlands and the Atlantic Plain (National Park Service [NPS] 2000). The Interior Highlands region encompasses the northwest portion of the State and is characterized by broad flat-topped hills and narrow river valleys to the north, and steeply folded ridges and valleys to the south. The Atlantic Plain, which covers the southeast portion of the State, is the flattest of all the physiographic regions.

The ROI lies within the Ozark Plateaus province of the Interior Highlands region (USGS 2003). The predominant topographical features in this province are plateaus that have been dissected to varying extents by fluvial erosion. Elevations range between 200 and 1,900 feet throughout the province, with the most significant changes in local relief occurring in highly dissected areas (Woods et al. 2004).

Karst features, such as caves and sinkholes, are not uncommon in the ROI and are protected by the *Arkansas Cave Resources Protection Act* (Arkansas General Assembly 1989) and the *Federal Cave Resources Protection Act* (16 USC parts 4301 et seq., 1988). Karst features are created by the dissolution of carbonate rocks (e.g., limestone) at or near the land surface. Sinkholes, which can range in size from several feet to hundreds of feet, can collapse and present a significant hazard if this occurs in a developed area. Human activities, such as those that alter natural hydrologic conditions, can trigger sinkhole collapses (Van Dyke 2003).

3.4.2 Soil

3.4.2.1 Description

Generally speaking, soil is the unconsolidated mineral or organic material found on the land surface capable of supporting plant growth. Soils are classified based on the physical and chemical properties of their horizons[2]. For this analysis, soils are described by ecological subregion as defined in Section 3.1.2.2 (Table 3.10, Figure 3.1) (Woods et al. 2004, University of Idaho 2006). The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.4.2.2 Affected Environment

Soils in the ROI include alfisols, entisols, mollisols, and ultisols. Alfisols are relatively fertile and tend to be very productive for both agriculture and silviculture. Alfisols are common to every ecoregion within the ROI.

Ultisols also occur in every ecoregion of the ROI. These are strongly leached and acidic soils with relatively low native fertility. Clays accumulate in the subsurface horizon and soils often display a strong yellowish or reddish color resulting from the presence of iron oxides.

[2] A soil horizon is a layer of soil that can be distinguished from adjacent layers based on characteristics such as texture, color, chemical composition, etc.

Mollisols can be found in the Dissected Springfield Plateau—Elk River Hills and the Lower Boston Mountains. This soil is typical of grassland ecosystems and is characterized by a thick, dark surface horizon. Mollisols are rich in organic materials and thus very productive agriculturally.

Entisols are very diverse and develop in unconsolidated parent material. They usually lack genetic horizons except an A horizon. Entisols are found in the Lower Boston Mountains and the Springfield Plateau.

Table 3.10 Common soils in the subregions of the ROI.

Subregion	County	Order	Common Soil Series
Dissected Springfield Plateau—Elk River Hills	Benton, Washington	Alfisols, Mollisols, Ultisols	Arkana, Clarksville, Estate, Moko, Nixa, Noark, Portia
Lower Boston Mountains	Washington	Alfisols, Entisols, Mollisols, Ultisols	Ceda, Cleora, Enders, Linker, Mountainburg, Nella, Razort, Sidon, Spadra, Steprock
Springfield Plateau	Benton, Washington	Alfisols, Entisols, Ultisols	Captina, Clarksville, Linker, Mountainburg, Nixa, Noark, Razort, Secesh, Tonti
Table source: Woods et al. 2004			

3.5 Air

3.5.1 Description

Although the *Clean Air Act* (42 USC parts 7401 et seq., 1999) is a Federal law, States are generally responsible for implementing the Act. Each State is required by EPA to develop a State Implementation Plan that contains strategies to achieve and maintain National Ambient Air Quality Standards (NAAQS). NAAQS establish limits for six criteria pollutants including ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, lead, and particulate matter (PM). Areas that violate air quality standards are designated as non-attainment areas for the relevant pollutants. Areas that comply with air quality standards are designated as attainment areas for relevant pollutants.

The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.5.2 Affected Environment

ADEQ is responsible for ensuring that the air quality within the State meets or is better than that required by Federal and State standards. ADEQ operates an air quality monitoring network capable of measuring various air pollutants throughout the State. Monitoring results demonstrate that Arkansas has relatively good air quality and Federal air quality standards are consistently met (ADEQ 2005).

There is one air quality monitor located in the ROI. It is in the town of Springfield in Washington County and it monitors ozone (EPA 2007b). There are no non-attainment areas in the ROI (EPA 2006c).

Agriculture plays a role in diminishing air quality in Arkansas. Processing emissions, dust from tilling, and smoke from the controlled burning of fields all negatively affects air quality (University of Arkansas 2006). Confined animal operations, such as poultry farms, that can be found throughout the State often

emit ammonia gasses and airborne particulates from manure, feathers, feed, dust, and bacteria that may cause harmful respiratory ailments (University of Arkansas 2006).

3.6 Recreation

3.6.1 Description

Recreational resources are those activities or settings, natural or anthropogenic, designated or available for recreational use by the public. In this analysis, recreational resources include lands and waters used by the public for hunting, fishing, wildlife viewing, hiking, and boating. The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.6.2 Affected Environment

Lands that could be enrolled in CREP are privately held; therefore, access to these lands is and would be controlled by the landowners. Public lands available for recreation within the ROI include a national forest and the three wildlife management areas (WMAs) within it, a State park, a national historic trail, a fish hatchery, and three natural areas (Figure 3.2). There is also one national wildlife refuge (NWR), but it is closed to public access (Figure 3.2). There are no State forests or national parks in the ROI.

The Ozark National Forest is comprised of five sections that cover a total of 1.2 million acres in northwestern Arkansas (U.S. Forest Service [FS] 2006). It lies in the center of the ROI and spans parts of both Benton and Washington counties. The Wedington, White Rock, and Ozark National Forest WMAs are located within the boundaries of the Ozark National Forest and at least partially within the ROI. These WMAs are comprised of both federally and privately owned lands that are cooperatively managed by AGFC and FS (AGFC 2006g). In general, WMAs are managed according to specific objectives such as game management, public hunting, waterfowl refuge, wetland development, or migratory bird refuge. All WMAs offer some hunting, fishing, boating, camping, hiking, and wildlife viewing opportunities to the public. Hunting and fishing, regardless of whether the land is public or private, require State-issued licenses and may also require a Federal stamp. A discussion of the economics associated with hunting, fishing, and other recreational activities is provided in Sections 3.7 and 4.7.

The Prairie Grove Battlefield State Park is located in Prairie Grove, southwest of Fayetteville (Arkansas Department of Parks and Tourism 2003). The Trail of Tears National Historic Trail runs south along the eastern border of the ROI and then westward through Washington County (NPS 2006). The C.B. Craig Fish Hatchery is in Benton County near the town of Centerton (AGFC 2006c).

Natural areas are lands specifically managed to preserve or restore natural communities that are now rare (ANHC 2006d). The three natural areas in the ROI are Chesney Prairie, Searles Prairie, and Cave Springs Cave. All are located in Benton County. Chesney Prairie is a 60-acre tallgrass prairie (ANHC 2006d). Searles Prairie is a 10-acre tallgrass prairie located in the town of Rogers (ANHC 2006d). Both are remnants of much larger tallgrass prairies that once occupied Arkansas. Cave Springs Cave, located in the town of Cave Springs, was formed by a groundwater-fed stream. This cave stream hosts the largest known population of Ozark cavefish, it has sheltered gray bat colonies, and is home to many rare plant species including the Ozark trillium (ANHC 2006d).

An NWR is an area managed by FWS that has been designated for the protection of wildlife and wildlife habitat. The Logan Cave NWR is closed to all public use for the protection of the endangered gray bat, endangered cave crayfish, threatened Ozark cavefish, and the fragile cave habitat (FWS 2007b).

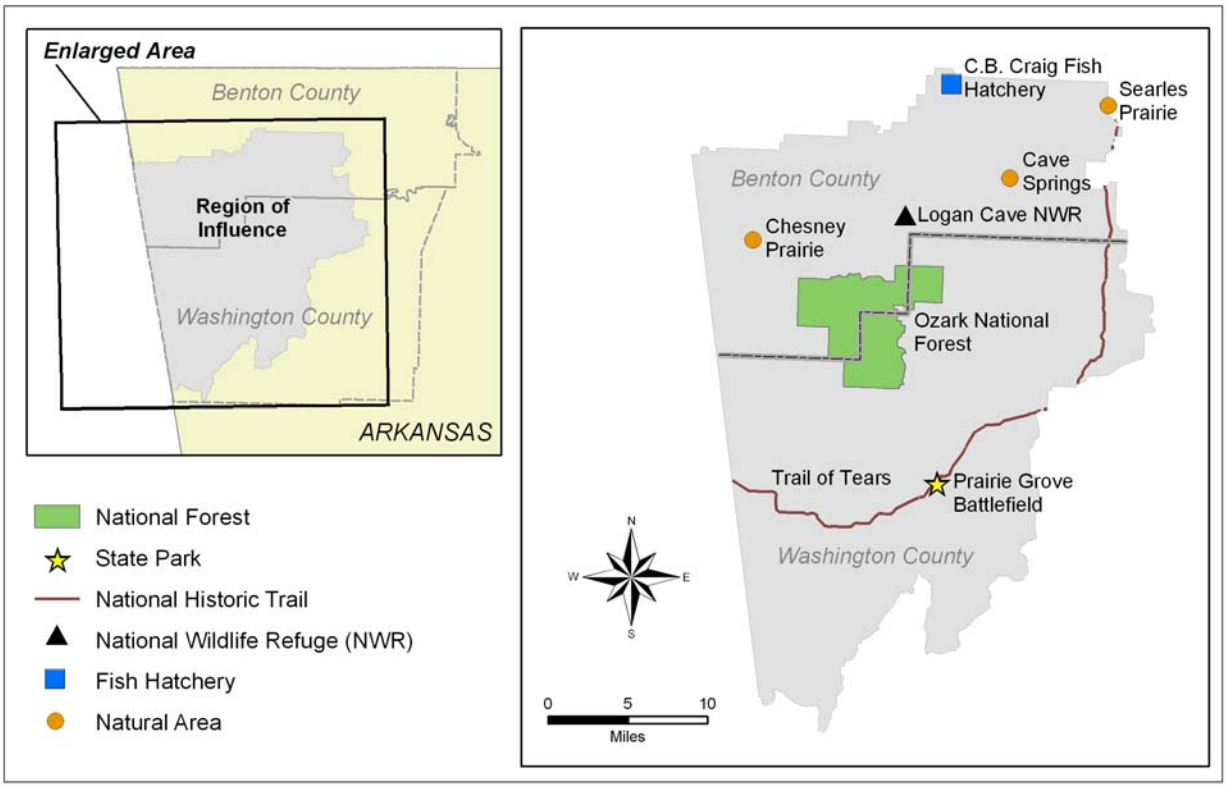

Figure 3.2 Recreation areas within the ROI.

3.7 Traffic and Transportation

3.7.1 Description

Analyses of traffic and transportation can include investigations of traffic flow, routing and scheduling, transportation management, and maintenance. The relevant traffic and transportation issues for this analysis are the maintenance requirements to roads and highway systems within the ROI. The ROI for this resource analysis includes portions of Benton and Washington counties as described in Section 1.3.

3.7.2 Affected Environment

The road and highway system in the ROI includes paved and unpaved roads, highways, and an interstate. There were an estimated 272 miles of roads in riparian areas in the Illinois River watershed in 1999 (FS 1999). These roads may all be impacted to some degree by erosion and sedimentation.

3.8 Socioeconomics

3.8.1 Description

Socioeconomic analyses generally include investigations of population, income, employment, and housing conditions of a specific area. Socioeconomic issues that are significant and considered in detail in this analysis are non-farm and farm employment and income, farm production expenses and returns, agricultural land use, and recreation spending in the ROI. The ROI for this resource analysis is Benton and Washington counties.

3.8.2 Affected Environment

The total population within the ROI was 311,121 people in 2000, which was a 47.5 percent increase from the population of 1990 (USCB 1990, 2000a). Approximately 64.3 percent of the total population was located in urban areas, and 35.7 percent of the population was located within rural areas (USCB 2000a). This was a slight increase in the urban population, which was 60.7 percent in 1990 (USCB 1990).

3.8.2.1.1 Non-Farm Employment and Income

Between 1993 and 2002, the non-farm labor force within the ROI steadily increased from 122,683 in 1993 to 173,458 in 2002 (Bureau of Labor Statistics [BLS] 2006). Non-farm employment during this period ranged from a low of 119,169 positions in 1993 to a high of 168,005 positions in 2002 (BLS 2006). The unemployment rate within the ROI varied from a high of 6.2 percent in 2002 to a low of 4.6 percent in 1995 (BLS 2006). Benton County experienced a 2.6 percent average non-farm unemployment rate for the period, which was only slightly lower than that of Washington County (2.8 percent) (BLS 2006).

Within the ROI, median household income in 1999 was $40,281 in Benton County and $34,691 in Washington County (USCB 2000b).

3.8.2.1.2 Farm Employment and Income

As reported by the *2002 Census of Agriculture* (USDA 2004a), there were 3,166 farm workers on 1,009 of the 5,176 farms within the ROI in 2002, accounting for a payroll of $23.0 million. Table 3.11 lists the hired farm and contract labor costs per county within the ROI and labor costs as a percentage of total production costs. In 1997, the total hired farm and contract labor costs were $25.1 million, which was 3.9 percent of total production costs. In 2002, the total hired farm and contract labor costs were $26.7 million, which was 5.4 percent of total production costs.

Approximately two-thirds of farm cash receipts in Arkansas are from crops, while livestock and livestock products account for the remaining one-third (USDA 2004b). Arkansas ranked second in the U.S. for poultry and eggs and fourth for cotton and cottonseed in 2002 (USDA 2004b). The Bureau of Economic Analysis (BEA) (2006) reported a realized net farm income of more than $82.9 million within the ROI in 2002. This was a decrease of 51.6 percent as compared to the 1992 net farm income. BEA (2006) also reported that total government payments to farms within the ROI were $1.5 million in 2002, a decrease of 54.2 percent from 1992. These decreases contributed to the 54.0 percent reduction in net farm proprietors' income within the ROI from 1992. Farm wages and perquisites (for hired farm labor) in 2002 in the ROI were approximately $23.8 million, which was a 29.5 percent decrease from those in 1992.

Table 3.11 Hired farm and contract labor as a percentage of total production expenses for 1997 and 2002.

Area	2002				1997			
	Hired Farm Labor ($1000)	Contract Labor ($1000)	Total Production Expenses ($1000)	Labor as a Percent of Total Production Expenses	Hired Farm Labor ($1000)[a]	Contract Labor ($1000)[a]	Total Production Expenses ($1000)[a]	Labor as a Percent of Total Production Expenses
Arkansas	253,395	27,758	3,898,297	7.2	259,973	28,141	4,709,755	6.1
Benton	12,583	1,955	260,495	5.6	11,061	1,257	335,834	3.7
Washington	10,446	1,727	234,414	5.2	11,876	878	315,064	4.0

[a]*Value in 2002 dollars*

Table source: USDA 2004a

3.8.2.1.3 Farm Production Expenses and Returns

In 2002, farm production expenses were $495 million within the ROI (USDA 2004a). This was a decrease from the 1992 figure of $651 million (adjusted to 2002 dollars) (USDA 2004a). The average cost per acre within the ROI in 2002 was $735 (USDA 2004a). Average net cash return per farm within the ROI was $36,869 in 2002 (USDA 2004a). The average net cash receipts per acre within the ROI in 2002 were $280 (USDA 2004a). Table 3.12 lists the average farm production expenses and return per dollar of expenditure in 2002 for each county in the ROI. Table 3.13 lists the average value of land and buildings and the average value of machinery and equipment per farm in 2002 within each county in the ROI.

Table 3.12 Average farm production expenses and return per dollar of expenditure in 2002.

Area	Average Size of Farm (acres)	Average Total Farm Production Expense ($)	Average Cost per Acre ($)	Average Net Cash Return per Farm ($)	Average Net Cash Return per Acre ($)	Average Return per $ Expenditure ($)
Arkansas	305	82,114	269	29,158	96	0.36
Benton	132	109,775	832	44,702	339	0.41
Washington	131	83,630	638	29,035	222	0.35
Table source: USDA 2004a						

Table 3.13 Average value of land, buildings, machinery, and equipment per farm in 2002.

Area	Average Size of Farm (acres)	Average Value of Land and Buildings per Farm ($)	Average Value of Machinery and Equipment per Farm ($)
Arkansas	305	447,104	65,299
Benton	132	386,606	46,902
Washington	131	363,663	36,773
Table source: USDA 2004a			

3.8.2.1.4 Agricultural Land Use

In 2002, there were 680,284 acres of land in the ROI in farms including cropland, woodland, pastureland and rangeland, and house lots, etc. (USDA 2004a). This was a 4.0 percent increase from 1997. Table 3.14 provides a list of the acreage for different agricultural land uses in the ROI in 1997 and 2002 and the percent change during that period.

In 1997, there were 188,902 acres in Arkansas enrolled in either CRP or the Wetlands Reserve Program (WRP) (USDA 2004a). Of that amount, 1,944 acres were located within the ROI. Five years later (in 2002), enrollment had decreased statewide to 147,878 acres, with a corresponding decrease in the ROI to 559 acres (USDA 2004a). As of December 2006, a total of 232,572 acres in Arkansas were enrolled in CRP (FSA 2006b). The current average land values in Arkansas are estimated at $1,580 per acre for cropland and $1,740 per acre for pastureland (USDA 2006).

Table 3.14 Agricultural land uses in 1997 and 2002 in the ROI and the percent change during that period.

Land Use	Acres in 1997	Acres in 2002	Percent Change
Cropland[1]	348,341	329,713	-5.3
Woodland[2]	155,053	159,665	3.0
Pastureland and rangeland[3]	117,821	155,906	32.3
House lots, ponds, roads, wasteland, etc.	33,025	35,000	6.0
CRP and WRP[4, 5]	1,944	559	-71.2
Total Land in Farms[6]	654,240	680,284	4.0

[1]Cropland includes all harvested cropland, cropland used for pasture or grazing, and other cropland

[2]Woodland includes wooded pastureland and wooded non-pastureland

[3]Pastureland and rangeland excludes cropland and wooded pastureland

[4]Operations with land enrolled in CRP or WRP are counted as farms if they received $1,000 or more in government payments.

[5]Acreage from Washington County in 2002 withheld to avoid disclosing data for individual farms

[6]Total land in farms includes the sum of cropland, woodland, pastureland and rangeland, and house lots, etc.

Table source: USDA 2004a

3.8.2.1.5 Recreation Spending

According to the *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (NSFHWAR) (FWS and USCB 2001), approximately 960000 individuals over the age of 16 participated in fishing and hunting related activities in Arkansas in 2001. In the same year, roughly 841,000 individuals participated in some sort of wildlife viewing (e.g. observing, photographing, or feeding wildlife).

Arkansas waterways attracted 782,000 anglers to the State in 2001 for fishing-related activities. Of these anglers, 539,000 were residents of the State and 243,000 were non-residents. According to NSFHWAR, total fishing-related expenditures in 2001 were in the range of $446 million from resident and non-resident anglers. Of this amount, approximately $184 million was spent on trip-related expenditures, such as lodging, food, and transportation; while $208 million went to equipment expenditures, such as rods, reels, and fishing line. The remaining $54 million went to other related costs, such as permits, licenses, and membership dues. The 2001 survey data indicate that the number of anglers living in and entering the State for fishing activities increased from 1996 by roughly 18,000 individuals. Responses to the 2001 survey indicated that the most popular species among anglers were catfish, crappie, and black bass (FWS and USCB 2001).

Arkansas resident and non-resident hunters totaled 431,000 according to the 2001 survey. Residents accounted for 303,000 of those individuals; with non-residents accounting for 128,000 individuals. Hunting-related expenditures contributed revenue of about $517 million dollars to the State. Of this amount, trip-related expenditures amounted to $207 million, while equipment-related expenses totaled $157 million. Other related hunting expenses added $153 million of the total revenue. Comparison of the 1996 survey to the 2001 survey shows an increase of 52,000 hunters within or entering the State. Responses to the 2001 survey suggest that there is a preference for hunting big game species. Survey results show that around 322,000 hunters preferred hunting big game, 145,000 hunted small game, and 171 thousand hunted migratory birds (some individuals hunted in more than one category) (FWS and USCB 2001).

Wildlife-viewing activities in Arkansas were enjoyed by roughly 841,000 individuals in 2001. These activities produced revenue of $244 million dollars for the State that year. Trip-related expenses, such as transportation, food, and lodging, amounted to $20 million; while equipment related expenses, such as

film, binoculars, and cameras, added up to $205 million. Donations, contributions, memberships, and other related expenses contributed the remaining $19 million (FWS and USCB 2001).

3.9 Environmental Justice

3.9.1 Description

Populations of special concern are identified and analyzed for environmental justice impacts. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that Federal agencies:

> "…make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…." (59 FR 32, 1995)

Race and ethnicity are two distinct categories of minority populations. A minority population can be described by either category, or by a combination of the two. Race as defined by USCB includes White, Black or African American, American Indian or Alaskan Native, Asian, and Native Hawaiian or Other Pacific Islander (USCB 2001). Ethnicity is defined as either being of Hispanic or Latino origin and any race, or not of Hispanic or Latino origin and any race (USCB 2001). Hispanic or Latino origin is further defined as "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race" (USCB 2001). A minority population can be described as being composed of a minority group and exceeding 50 percent of the population in an area, or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population (CEQ 1997a).

National poverty thresholds are measured in terms of household income and are dependent upon the number of persons within the household. Individuals falling below the poverty threshold are considered low-income individuals. USCB census tracts where at least 20 percent of the residents are considered poor are known as *poverty areas*. When the percentage of residents considered poor is greater than 40 percent, the census tract is considered an *extreme poverty area* (USCB 1995).

The ROI for this resource analysis is Benton and Washington counties.

3.9.2 Affected Environment

As reported by USCB for year 2000 (2000a), demographics for the ROI population were 89.4 percent White, 1.3 percent Black or African American, 1.5 percent American Indian or Alaska Native, 1.3 percent Asian, 0.3 percent Native Hawaiian or Pacific Islander, and 6.2 percent all other races or combination of races. Hispanic or Latino of any race accounted for approximately 8.5 percent of the population. The ROI is not a location of a concentrated minority population.

The average poverty rate for the ROI in 1999 was 12.35 percent, with Benton County at 10.1 percent and Washington County at 14.6 percent (USCB 2000b). The ROI would not be considered a poverty area because less than 20 percent of the residents overall are considered poor.

There were 329 minority-operated farms in the ROI in 2002, accounting for 11.1 percent of all minority-operated farms within Arkansas. Within the ROI, 136 farms were operated by Indians or Alaskan Natives; 1 by Blacks or African Americans; 13 by Asians; 4 by Native Hawaiians or Pacific Islanders; 98 by persons of Spanish, Hispanic, or Latino origin; and 77 by persons reporting more than one race (USDA 2004a). These farms comprised 6.4 percent of the total number of farms within the ROI (USDA 2004a).

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter discloses the potential environmental consequences or impacts to resources described in Chapter 3 that may result from implementing the preferred alternative or no action alternative. As this analysis is programmatic and not site specific, resource impacts may not always be quantifiable. In compliance with guidelines contained in NEPA and CEQ regulations, each individual CREP agreement would require a site specific environmental evaluation to be completed by FSA.

4.1 Biological Resources

4.1.1 Wildlife and Fisheries

4.1.1.1 Level of Impact

Significant impacts to wildlife and fisheries would include those actions that resulted in harming, harassing, or reducing those populations to the point they become imperiled or populations of concern, or reducing or adversely altering their habitat.

4.1.1.2 Alternative A—Preferred

Implementation of preferred alternative would result in long-term, beneficial impacts to both wildlife and fisheries in and around the ROI. Agricultural practices, both current and historical, have limited some species within the ROI and displaced others from their habitat. Removing portions of land from agricultural production and implementing the proposed CPs would increase the quality and abundance of wildlife and fisheries habitat.

4.1.1.2.1 Wildlife

Implementation of riparian buffers (CP22) and marginal pastureland wildlife habitat buffers (CP29) would restore and enhance riparian vegetation. The grasses, shrubs, and trees would benefit wildlife species such as white-tailed deer, wild turkey, and numerous small mammals by creating nesting, foraging, and protective cover areas. These areas would provide travel corridors for the daily and seasonal migration of many wildlife species.

Migratory birds often use riparian buffers for breeding, wintering, and feeding areas, and thus would also benefit from CP implementation (Anderson and Masters 2004). There would be an additional benefit to terrestrial and avian wildlife species if riparian buffers and hardwood tree plantings are attached to existing forest vegetation, such as shelterbelts and windbreaks, so that habitat is maximized and habitat fragmentation is reduced. This would benefit all wildlife species within the ROI.

Grassland nesting bird species have declined significantly with the loss and degradation of grassland habitat. The encroachment of woody vegetation on grasslands results in a higher incidence of predation and brood parasitism on grassland nesting species. Research indicates that predation and brood parasitism on grassland nesting species can be reduced by increasing the distance between grassland habitat and forest edge. One study reported that nests located less than 60 meters from forest edge were less successful than those located more than 60 meters from the edge (Burger; Burger, Jr.; and Faaborg 1994). Other studies found that increased predation occurred at less than 50 meters from the forest edge (Winter, Johnson, and Faaborg 2000; Gates and Gysel 1978). Therefore, if grassland nesting species are of concern to landowners participating in CREP, woody vegetation such as that common to riparian buffers or hardwood tree planting areas should not be planted directly adjacent to areas of current grassland or areas to which large tracts of native and introduced grasses and legumes are to be established.

4.1.1.2.2 Fisheries

Implementation of the proposed CPs would restore and enhance aquatic habitat and improve overall water quality. Establishing riparian buffers and upland marginal pastureland wildlife habitat buffers would stabilize loose soils and cover areas of bare ground, reducing the amount of sediments entering waterways. Restricting livestock access to floodplains would also reduce sediment input due to streambank erosion. High sediment levels in waterways can interfere with the hatch of aquatic insects, which is a major component of the aquatic food chain. Reducing sedimentation in waterways would also decrease the turbidity of the water. Lowering turbidity may lower water temperatures, allowing the water to hold more dissolved oxygen.

Establishing riparian and upland vegetation would reduce the amount of nutrients and pollutants entering water sources. Reducing nutrients would limit the excessive growth of aquatic plants. Excessive and rapid growth of aquatic plants in areas of high nutrient loading causes a decline in dissolved oxygen content within the water. Restricting livestock access to floodplains would reduce the amount of fecal coliform and other bacteria entering water sources.

Once mature, riparian buffers would create an overstory canopy and provide shade to waterways. Shade would allow the water to stay cooler, which would increase the ability of the water to hold dissolved oxygen. Eventually, downed and decaying trees from the buffers would provide detritus such as limbs, leaves, fruit, and insects from overhanging and submerged vegetation. Detritus can contribute as much as 75 percent of the organic food base in small streams (Welsh 1991). Submerged and downed vegetation would eventually create pools, riffles, and gravel beds for spawning areas.

4.1.1.3 Alternative B—No Action

Under the no action alternative, lands eligible for CREP enrollment would remain in agricultural production. Wildlife and fisheries habitat could continue to decline in quality and become more fragmented, and impaired waterways within the ROI would be likely to remain as such. Terrestrial, avian, and aquatic species would most likely continue to be exposed to poor water quality.

4.1.2 Vegetation

4.1.2.1 Level of Impact

Significant impacts to vegetation would include those actions that resulted in removing or choking out unique or imperiled vegetation, or introducing vegetation that is invasive.

4.1.2.2 Alternative A—Preferred

Implementation of the proposed CPs would result in a beneficial impact to vegetation resources within the ROI. Historic vegetation has been altered due to practices such as clearing for agricultural fields and restricting natural fire regimes. The CPs would enhance existing vegetation and establish grasses, legumes, forbs, shrubs, and trees in riparian areas and marginal pasturelands.

4.1.2.3 Alternative B—No Action

Under the no action alternative, the proposed CPs would not be implemented and native vegetation would continue to be removed for agricultural purposes.

4.1.3 Protected Species and Habitat

4.1.3.1 Level of Impact

Significant impacts to protected species and habitat would include any action that resulted in the harassment or loss of threatened, endangered, or candidate species or their defined habitat.

4.1.3.2 Alternative A—Preferred

Implementation of the proposed CPs would result in beneficial impacts to eight of the ten federally listed and candidate species that occur within the ROI (Table 4.1). There is potential for the Missouri bladderpod to be negatively impacted; however, this impact can be mitigated. Florida panthers will not be affected at all as they are no longer found in the State.

Table 4.1 Impact of preferred alternative on federally listed and candidate species within the ROI.

Species	State Status[1]	Federal Status[1]	Impact
Bat, gray	S2	E	+
Bat, Indiana	S1	E	+
Bat, Ozark big-eared	S1	E	+
Bladderpod, Missouri	S1	E	-/0
Cavefish, Ozark	S1	E	+
Crayfish, cave (*Cambarus aculabrum*)	S1	E	+
Darter, Arkansas	S1	C	+
Eagle, bald	S1	T	+
Mucket, Neosho	S1	C	+
Panther, Florida	---	E	0
Status Codes: E = Endangered, T = Threatened, C = Candidate, S1 = extremely rare and vulnerable to extirpation, S2 = very rare and susceptible to extirpation.			
Impact Codes: + = positive impact, - = negative impact, 0 = no or negligible impact.			

Establishment of riparian buffers would benefit the gray bat, Indiana bat, Ozark big-eared bat, and bald eagle by creating habitat for breeding, foraging, and nesting. These bats use riparian areas for foraging habitat, where they fly between trees while catching insects. These bats feed around mature trees that overhang waterways for protection from predation. The bald eagle is often considered a riparian dependant species that forages on waterfowl, fish, and small game. Bald eagles use large trees in riparian areas for nesting and perching areas.

The Ozark cavefish, Arkansas darter, cave crayfish, and Neosho mucket would benefit from improved water quality and increased habitat. Ozark cavefish are dependant on good water quality. Decreasing the overland flow of pollutants into waterways would improve water quality within and downstream of the ROI. Because Ozark cavefish rely on nutrients from gray bat guano, the benefit of CP implementation to gray bats would in turn benefit the Ozark cavefish. Arkansas darters require cool water temperatures and good water quality. Implementation of riparian buffers would increase the amount of shade over waterways, allowing for cooler water temperatures. Because the biggest limiting factor to cave crayfish populations is poor water quality, the improvements to water quality provided by implementation of the proposed CPs would significantly benefit this species. Reduced sedimentation and improved water quality would also benefit the Neosho mucket.

In general, riparian buffers would reduce the amount of sediment, nutrients, and other pollutants entering water sources, allowing for better water quality. The aquatic species within the ROI rely on low levels of turbidity, cooler water temperatures, and overall good water quality.

Missouri bladderpods can sometimes be found in pastures where frequent mowing and grazing have kept the areas open. Disruption of areas that contain Missouri bladderpods may have a negative impact to this species. Care should be taken to ensure that areas containing populations of Missouri bladderpod

are not enrolled into marginal pastureland wildlife habitat buffers. With this mitigation, there would be no impact to the Missouri bladderpod.

All listed species may be temporarily negatively impacted during CP implementation due to construction activities and increased sedimentation. To ensure these temporary impacts are negligible, implementation activities should be scheduled to avoid breeding and nesting periods of protected species. The net impact of the proposed action on protected species within the ROI would be beneficial.

4.1.3.3 Alternative B—No Action

Under the no action alternative, the degradation of vegetation, wildlife habitat, and aquatic habitat would continue. Habitat would decline in quality and become more fragmented, and impaired waterways within the ROI would be likely to remain as such. Protected species would continue to be exposed to poor water quality.

4.2 Cultural Resources

4.2.1 Archaeological Resources

4.2.1.1 Level of Impact

Significant impacts to archaeological resources would include those actions which resulted in: 1) directly or indirectly altering the characteristics of the property that qualify it as a historic cultural resource; 2) causing destruction or damage to the property; 3) removing parts or all of the property from its historic location; 4) introducing any permanent atmospheric, audible, or visual elements that diminish the integrity of the historic property; 5) the neglect of a registered property; or 6) the disturbance of important religious sites or sites of cultural significance to American Indians or others.

4.2.1.2 Alternative A—Preferred

There is the potential that archaeological resources could be encountered during implementation of the preferred alternative. Activities that require any excavation to accomplish tasks associated with CP installation may impact recorded and unidentified archaeological resources.

As the Arkansas CREP agreement does not address specific sites and Federal law precludes the release of specific locational information of archaeological sites, detailed cultural resources information is not offered in this analysis (16 USC part 470, 2000). All actions would be reviewed with ASHPO during the planning and implementation phases of the proposed action. When specific areas that are to be enrolled in CREP are identified by legal description, a Class I literature search, as appropriate, would be conducted on these properties to determine if further investigation or mitigation would be warranted.

4.2.1.3 Alternative B—No Action

Under the no action alternative, agricultural practices that occur on lands within the ROI would continue. Though the continuation of farming and other agricultural practices on previously disturbed land would not be expected to impact archaeological resources, any change in these activities that would disturb previously intact areas may result in impacts to known or unidentified properties.

4.2.2 Architectural Resources

4.2.2.1 Level of Impact

Significant impacts to architectural resources would include those actions which resulted in: 1) directly or indirectly altering the characteristics of the property that qualify it as a historic cultural resource; 2) causing destruction or damage to the property; 3) removing parts or all of the property from its historic location; 4) introducing any permanent atmospheric, audible, or visual elements that diminish the

integrity of the historic property; 5) the neglect of a registered property; or 6) the disturbance of important religious sites or sites of cultural significance to American Indians or others.

4.2.2.2 Alternative A—Preferred

There is the potential that architectural properties would be encountered during implementation of the preferred alternative. Activities associated with CP installation may impact recorded and unidentified architectural resources.

As the Arkansas CREP agreement does not address specific sites, detailed cultural resources information is not offered in this analysis. All actions would be reviewed with ASHPO during the planning and implementation phases of the proposed action. When specific areas that are to be enrolled in CREP are identified by legal description, a Class I literature search, as appropriate, would be conducted on these properties to determine if further investigation or mitigation would be warranted.

4.2.2.3 Alternative B—No Action

Under the no action alternative, agricultural practices that occur on lands within the ROI would continue. Though the continuation of farming and other agricultural practices on previously disturbed land would not be expected to impact architectural resources, any change in these activities that would disturb previously intact areas may result in impacts to known or unidentified architectural properties.

4.2.3 Traditional Cultural Properties

4.2.3.1 Level of Impact

Significant impacts to TCPs would include those actions which resulted in: 1) directly or indirectly altering the characteristics of the property that qualify it as a historic cultural resource; 2) causing destruction or damage to the property; 3) removing parts or all of the property from its historic location; 4) introducing any permanent atmospheric, audible, or visual elements that diminish the integrity of the historic property; 5) the neglect of a registered property; or 6) the disturbance of important religious sites or sites of cultural significance to American Indians or others.

4.2.3.2 Alternative A—Preferred

There is the potential that TCPs could be encountered during implementation of the preferred alternative. Activities to accomplish tasks associated with CP installation may impact eligible and unidentified TCPs.

As the Arkansas CREP agreement does not address specific sites, detailed cultural resources information is not offered in this analysis. All actions would be reviewed with ASHPO during the planning and implementation phases of the proposed action. When the specific areas that are to be enrolled in CREP are identified by legal description, a Class I literature search, as appropriate, would be conducted on these properties to determine if further investigation or mitigation would be warranted.

4.2.3.3 Alternative B—No Action

Under the no action alternative, agricultural practices that occur on lands within the ROI would continue. Though the continuation of farming and other agricultural practices on previously disturbed land would not be expected to impact TCPs, any change in these activities that would disturb previously intact areas may result in impacts to known or unidentified properties.

4.3 Water Resources

4.3.1 Surface Water

4.3.1.1 Level of Impact

Significant impacts to surface water would include those actions that permanently increase runoff or pollutants entering rivers, streams, or lakes; adversely change water supply or storage; or cause violations of State or Federal laws or regulations.

4.3.1.2 Alternative A—Preferred

Implementation of the preferred alternative would have long-term beneficial impacts on surface water quality throughout and downstream of the ROI. The proposed CPs would establish vegetation on marginal pastureland areas and riparian areas. These buffers would stabilize soils and reduce soil erosion. Doing this would result in less sediment entering surface waters.

Riparian buffers would reduce the amount of nutrients, including phosphorus, entering waterways. Excess phosphorus is the most common impairment of waterways within the ROI. Establishing vegetation would also reduce the amount of herbicides and other pollutants entering surface waters by decreasing the velocity of overland flow. Decreasing the velocity of flow allows soluble pollutants to be taken up by vegetation before they run into waterways.

Restricting livestock access to floodplains would benefit water quality by reducing both pathogen and sediment input. In addition, CREP implementation is expected to cause a decrease in agricultural acreage that would result in reduced runoff from agricultural herbicides, nutrients, and other pollutants.

Installation of CPs may involve the clearing of vegetation and some soil disturbance. These activities may result in high levels of sediment runoff, resulting in temporary adverse impacts to surface water quality. The use of silt fencing or similar mitigation practices would reduce these impacts (EPA 2006d).

4.3.1.3 Alternative B—No Action

Under the no action alternative, the quality of surface water in the ROI would continue to be degraded from sources including agricultural production. Waterways would continue to exhibit high levels of pathogens, sediments, and phosphorus.

4.3.2 Groundwater

4.3.2.1 Level of Impact

Significant impacts to groundwater would include those actions that permanently increase pollutants entering groundwater; adversely change water supply or storage; or cause violations of State or Federal laws or regulations.

4.3.2.2 Alternative A—Preferred

Implementation of the preferred alternative would result in positive effects on groundwater quality within and around the ROI. The proposed CPs would have a positive impact to surface water quality, which would also help improve the quality of groundwater that is recharged by surface water. Establishing permanent vegetation in riparian areas and on marginal pasturelands would slow the rate of overland flow, allowing for great rates of aquifer recharge. Reducing livestock access to floodplains would result in less fecal coliform and other bacteria from entering surface water; translating to less of these pollutants entering groundwater. Furthermore, reducing agricultural acreage would decrease the amount of related pollutants leaching into groundwater.

4.3.2.3 Alternative B—No Action

Under the no action alternative, groundwater resources in the ROI would continue to be subject many of the same impairments as those of surface waters including high levels of phosphorus. Rates of groundwater recharge may decrease over time if vegetation is removed due to expanding agricultural practices.

4.3.3 Wetlands

4.3.3.1 Level of Impact

Significant impacts to wetlands would include those actions that permanently diminish or degrade wetland resources.

4.3.3.2 Alternative A—Preferred

Implementation of the preferred alternative would have a beneficial impact to wetlands within the ROI. Wetlands may receive water from groundwater, rain, water runoff, streams, rivers, and lakes. Therefore, improving the quality of groundwater and surface water would also improve water quality within wetlands. In addition, establishing vegetation in riparian areas and marginal pasturelands would reduce the amount of sediments and pollutants entering water sources that contribute to wetland recharge in the ROI.

The removal of some land from agricultural use may affect the number and size of artificial wetlands formed by anthropogenic features associated with agricultural activities such as reservoirs and drainage channels; however, this effect is expected to be minor.

4.3.3.3 Alternative B—No Action

Under the no action alternative, wetlands in the ROI would continue to be subject to high levels of sediments and pollutants.

4.3.4 Floodplains

4.3.4.1 Level of Impact

Significant impacts to floodplains would include those actions that cause destruction to or reduce the function of floodplains.

4.3.4.2 Alternative A—Preferred

The preferred alternative would have a beneficial effect to floodplains. Establishing vegetation would help decrease stream bank erosion and improve overall function of the floodplains. Restricting livestock access to floodplains would reduce streambank destabilization and the amount of exposed soil, which would decrease erosion and sediment buildup on floodplains. The proposed CPs are not expected to adversely alter the drainage, flow, or holding capacity of floodplains.

4.3.4.3 Alternative B—No Action

Under the no action alternative, the present rates of stream bank erosion and the resulting overland flow of sediments would remain unchanged.

4.4 Soil Resources

4.4.1 Level of Impact

Significant impacts to earth resources would include those actions that erode or diminish unique topographical features or soil types, or permanently increase erosion and sedimentation.

4.4.2 Alternative A—Preferred

Long-term beneficial impacts to topography and soils are expected to occur under Alternative A. Implementation of the proposed CPs would result in localized stabilization of soils and topography as a result of decreased erosion and runoff. Establishing permanent vegetation on former croplands would reduce erosion by wind and water. Reducing livestock access to floodplains would also reduce erosion and stream bank destabilization.

Short-term disturbances to soils during implementation of CPs may include tilling or excavation, resulting in temporary increases in soil erosion. The use of silt fencing, filter fabric, or similar measures would reduce these impacts.

4.4.3 Alternative B—No Action

Under the no action alternative, the current rates of erosion and the changes in topography resulting from erosion would continue.

4.5 Air

4.5.1 Level of Impact

Significant impacts to air quality would include those actions that: 1) cause or contribute to a violation of any national, State, or local ambient air quality standard; 2) expose sensitive receptors (e.g., residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, parks, and outdoor restaurants) to substantially increase pollutant concentrations; or 3) cause emissions which exceed any significant criteria established by the State Implementation Plan.

4.5.2 Alternative A—Preferred

Implementation of the preferred alternative would provide a slight benefit to local air quality over time. The establishment of vegetation in riparian areas and marginal pasturelands would minimize the amount of exposed soil, resulting in a beneficial impact to local air quality. Vegetation may help reduce dust and bacteria emissions from some confined animal operations. Reducing the amount of lands used for agricultural practices would also reduce annual activities such as field burning and tilling, which cause air pollution.

Implementation the proposed CPs may include activities such as tilling, burning, and installation of various structures. These activities may temporarily impact local air quality. Tilling may temporarily increase particulate matter in the immediate area. This can be mitigated by watering exposed soil before and after work. Despite the temporary increase in particulate matter, effects to air quality due to implementation of the proposed CPs would not be significant nor long term.

Installing various structures such as roads, firebreaks, and fences may require the temporary use of heavy-duty diesel construction vehicles. Primary emissions from construction vehicles include carbon monoxide and some particulate matter. Best management practices (BMPs) would be used during construction activities to reduce the amount of emissions.

Prescribed open burning would release pollutants into the environment such as particulates, partially consumed fuel, liquid droplets, carbon monoxide, hydrocarbons, and nitrogen oxides. The quantity and distribution of these pollutants would depend on the type of vegetation that is being burned, the configuration of the burned material (material heaped or organized in rows), and the weather at the time of burning. Moderate prescribed burning would not likely have a significant impact to local air quality.

4.5.3 Alternative B—No Action

Under the no action alternative, existing air quality conditions would not change.

4.6 Recreation

4.6.1 Level of Impact

Significant impacts to recreational resources would include those actions that drastically change the quantity of lands used for public recreation, or that degrade any aspect of these lands such as aesthetics, fisheries, wildlife, or water quality.

4.6.2 Alternative A—Preferred

Implementing the preferred action would result in a long-term beneficial impact to recreation resources within the ROI. The proposed CPs would improve water quality, which would support more abundant and healthier fish populations in the ROI. This would result in increased fishing opportunities. Creating or enhancing quality wildlife habitat would increase the abundance of species frequenting the ROI and provide more successful opportunities for hunting and wildlife viewing.

The growth in hunting, wildlife viewing, and fishing opportunities may increase monies received from the purchase of licenses and from other recreational spending, potentially improving socioeconomic conditions in the area (see Section 4.7, *Socioeconomics*). Implementation of the proposed CPs would increase the desirability of land to be used for non-consumptive outdoor activities such as swimming, boating, and camping due to improved aesthetics.

Construction activities associated with CP implementation may temporarily displace some wildlife species. These activities may also temporarily increase sedimentation entering waterways, which would have an adverse impact to some fish species and water-related recreation. The adverse impacts associated with construction activities would be temporary and minimized using BMPs.

4.6.3 Alternative B—No Action

Under the no action alternative, the current condition of water and lands used by the public for recreation would remain unchanged.

4.7 Traffic and Transportation

4.7.1 Level of Impact

Significant impacts to traffic and transportation resources would include those actions that drastically alter maintenance requirements to roads and highway systems.

4.7.2 Alternative A—Preferred

Highway and road system maintenance expenditures typically include costs associated with erosion and sedimentation. The proposed CPs would result in reduced erosion and sedimentation due to slower stream velocities and decreased overland flow. Therefore, the preferred action would have a slight beneficial impact to existing traffic and transportation conditions.

4.7.3 Alternative B—No Action

Under the no action alternative, the current maintenance requirements to roads and highway systems due to erosion and sedimentation resulting from agricultural activities in the ROI would remain unchanged.

4.8 Socioeconomics

4.8.1 Level of Impact

Significant impacts to socioeconomics would include those activities which may induce changes in population density, growth rate, or patterns of land use.

4.8.2 Alternative A—Preferred

Implementation of the preferred alternative would result in a maximum of 15,000 acres of land being conserved for a period of 15 years. This would result in a positive net present value for the land rentals.

This action would result in a maximum loss of 15,000 acres of agricultural land. In 2002, there were 3,166 farm workers on the 680,284 acres of farms within the ROI, accounting for a payroll of $23.0 million (USDA 2004a). Removing 15,000 acres from agricultural production would decrease the land in farms to 665,284 acres and may result in the loss of 69.8 farm worker positions at an estimated cost of $507,075 per year when all 15,000 acres are under contract. The loss of these positions would account for approximately 2 percent of the farm worker positions available in 2002. The loss of production on 15,000 acres would reduce the amount of total farm production expenditures, less hired and contract labor, by $10.3 million per year, or approximately 2 percent of the total 2002 farm production expenditures (USDA 2004a).

Based on established county pastureland rates in Arkansas, CREP enrollment is estimated at an average of $36 per acre for the 15,000 acres proposed. In addition, participants would receive an annual maintenance fee of $9/acre. FSA would provide one time SIP of $100 per acre and would cost share with producers for 50 percent of the eligible reimbursable costs. The State would also provide a one time incentive of $200/acre. The total net present value is $3.4 million over 15 years (Appendix D).

Hines, Sommer, and Petrulis (1991) noted that enrolling lands into CRP negatively affected agricultural-based industries such as transportation and processing. The replacement of expenditures that would have supported local agriculture-related industries with CRP payments is often spent on other commodities within the local community. Impacts are generally greater where agriculture is the dominant economic activity and CRP enrollment is high.

Feather, Hellerstein, and Hansen (1999) reported non-market benefits associated with the implementation of CRP. For annual consumer surplus in Arkansas, these would include an estimated $1.33 per acre for wildlife viewing and $2.93 per acre for freshwater recreation activities for a total consumer surplus per acre from CRP of $4.26. Total annual consumer surplus attributable to CRP for the U.S. equated to $13.45 or about three times that of the consumer surplus generated by CRP activities in the South Eastern Region, which includes Arkansas. It is expected that the proposed CPs would improve wildlife and fisheries habitat, which in turn may improve hunting, fishing, and wildlife viewing opportunities in the ROI. These increased opportunities may generate recreation-related economic activity within and around the ROI.

4.8.3 Alternative B—No Action

Under the no action alternative, CREP would not be implemented and socioeconomic conditions would continue to follow the trends associated with the ROI, Arkansas, and South Eastern Region of the U.S.

4.9 Environmental Justice

4.9.1 Level of Impact

Significant impacts to environmental justice would include those activities in which low income or minority populations are adversely affected or unfairly compensated, or all affected individuals are not allowed equal access to the decision making process.

4.9.1.1 Alternative A—Preferred

This analysis demonstrates that the ROI is neither an area of concentrated minority population, nor a poverty area. Therefore, there would be no impacts to environmental justice as a result of the proposed action.

4.9.1.2 Alternative B—No Action

There would be no impacts to minority populations or low-income populations under the no action alternative.

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5.0 CUMULATIVE EFFECTS

5.1 Introduction

As defined by CEQ regulations:

> "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency ('Federal or non-Federal') or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR part 1508.7, 2006)

CEQ guidance suggests that the first steps in assessing cumulative impacts involve defining the scope of the proposed action and other actions, and evaluating the nature of potential interactions between the actions (CEQ 1997b). Scope must consider geographic and temporal relationships between the proposed action and other actions. Actions overlapping with or in proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, actions that coincide even partially in time would tend to offer a higher potential for cumulative effects.

For the purpose of this analysis, the ROI is that portion of the Illinois River Watershed proposed for CREP enrollment and described in Section 1.3. The primary sources of information used to identify reasonably foreseeable future actions are public documents prepared by Federal, State, and local government agencies.

5.2 Past, Present, and Reasonably Foreseeable Actions

The Arkansas NRCS manages the implementation of several programs that are focused on conserving and enhancing natural resources within the State. These programs are summarized in the following subsections to demonstrate the types of past, present, and reasonably foreseeable future actions that may occur in the ROI.

Conservation of Private Grazing Lands Initiative

The Conservation of Private Grazing Lands (CPGL) initiative provides technical and educational assistance to landowners who own private grazing lands. CPGL is not a cost share program and there are currently no funds appropriated for this program. Assistance includes opportunities for better grazing land management, reducing soil erosion, conserving water, and providing wildlife habitat (NRCS 2006a).

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program intended to promote agricultural production and environmental quality as compatible national goals. EQIP provides technical and financial assistance for farmers and ranchers to implement structural and management CPs on agricultural lands (NRCS 2006b). In Arkansas, EQIP assistance has helped address specific resource concerns such as water quality, irrigation water quantity decline, soil erosion, plant health, and wildlife habitat (NRCS 2006c). Arkansas received over $23.6 million in financial and technical assistance funding for fiscal year (FY) 2005 (NRCS 2006d).

Grassland Reserve Program

The Grassland Reserve Program (GRP) is a voluntary program that allows landowners to restore and protect grasslands on their property, while still maintaining these areas for grazing (NRCS 2006d). GRP emphasizes support for grazing operations, plant and animal biodiversity, and grasslands most

vulnerable to conversion to cropland, urban development, or other uses. Arkansas landowners were allocated $1.1 million for GRP in FY-2005 (NRCS 2006d).

Wetlands Reserve Program

WRP is a voluntary program that encourages farmers and ranchers to restore and protect wetlands. This program provides financial and technical assistance to landowners so they are able to restore agricultural land back to its former wetland condition. In Arkansas, WRP is focused on restoring bottomland forest ecosystems and improving water quality (NRCS 2006e). The State received $16.0 million in WRP funding for FY-2005 (NRCS 2006d).

Wildlife Habitat Incentives Program

The Wildlife Habitat Incentives Program (WHIP) is a cost-share program that assists landowners in creating high quality habitat to support wildlife populations of national, State, tribal, and local significance. NRCS and local conservation districts work with landowners to develop plans for establishing upland, wetland, riparian, or aquatic habitat areas on their properties (NRCS 2006d). In Arkansas, WHIP emphasis is on declining species such as the bobwhite quail, neo-tropical migratory songbirds, and several threatened or endangered species (NRCS 2006f). Arkansas was allocated over $1.5 million for this program in FY-2005 (NRCS 2006d).

5.3 Cumulative Effects Matrix

When considered in combination with other past, present, and reasonably foreseeable future actions, the incremental impact of the proposed action is expected to result in net beneficial impacts to biological resources, water resources, soil resources, air, recreation, and traffic and transportation conditions in the area proposed for CREP enrollment and in waters downstream (Table 5.1). No adverse cumulative impacts to any other resource discussed in Chapter 3.0 are expected.

Table 5.1 Cumulative effects matrix.

Resource	USDA Programs: CPGL EQIP, GRP, WRP, and WHIP	Cumulative Effects when combined with the Proposed Action
Biological Resources	The majority of these programs incorporate practices that provide restoration and enhancement of wildlife and fisheries habitat, vegetation, and water quality in their overall goals. These programs provide long-term beneficial impacts to biological resources.	The proposed action would enhance and restore wildlife and fisheries habitat, vegetation, and water quality within the ROI. When combined, the proposed action and USDA programs would result in cumulative impacts that benefit wildlife and fisheries, vegetation, and protected species.
Cultural Resources	There is potential for cultural resources to be impacted when these programs are initiated on previously undisturbed ground. ASHPO review of all proposed actions prior to implementation helps to ensure that cultural resources are protected and preserved. All actions would be reviewed with ASHPO during the planning and implementation phases of the proposed action.	The proposed action has the potential to impact cultural resources. Consultation with ASHPO would be conducted prior to implementation activities to ensure cultural resources are not adversely impacted. Because the proposed action and USDA programs both require ASHPO consultation, no cumulative impacts to cultural resources would be expected.
Water Resources	Several of these programs are designed to improve water resources by planting shrubs, trees, and grasses in riparian areas and on floodplains to reduce pollution	The proposed action would improve water quality in the ROI. The amount of pollutants and sediments entering waterways would be reduced by planting

Table 5.1 Continued

Resource	USDA Programs: CPGL EQIP, GRP, WRP, and WHIP	Cumulative Effects when combined with the Proposed Action
	runoff to surface water and to allow for greater rates of groundwater recharge. WRP specifically restores and enhances degraded wetlands. These programs contribute long-term beneficial impacts to water quality.	vegetation and restricting livestock access to floodplains. When combined, the proposed action and USDA programs would result in cumulative impacts that benefit water resources.
Soil Resources	The majority of these programs establish vegetation on erodible lands as a practice to achieve their overall goal. This increases soil stability and reduces erosion, and has a long-term beneficial impact to soil resources.	Implementation of the proposed action would involve planting permanent vegetation and restricting livestock access to floodplains, which would benefit local soil resources. When combined, the proposed action and USDA programs would result in cumulative impacts that benefit soil resources.
Air	The programs which restore and enhance vegetation and reduce local soil erosion may indirectly improve air quality.	The proposed action would reduce local soil erosion and may also improve air quality, although to what extent can not be quantified. When combined, the proposed action and USDA programs would result in cumulative impacts that benefit air quality.
Recreation	These programs are implemented on private lands, so benefits to areas used by the public for recreation are limited. However, there may be slight benefits to this resource in the form of improved wildlife and fisheries habitat, which may result in increased hunting, wildlife viewing, and fishing opportunities on nearby public lands. Improved aesthetics would also benefit recreation.	The proposed action would be implemented on private lands, but may also benefit wildlife and fisheries habitat and aesthetics on nearby public lands. When combined, the proposed action and USDA programs may result in cumulative impacts that benefit recreation.
Traffic and Transportation	The majority of these programs establish vegetation on erodible lands as a practice to achieve their overall goal. This increases soil stability and reduces erosion, and may provide a slight reduction in expenditures associated with transportation system maintenance due to erosion and sedimentation.	The proposed action would result in reduced erosion and sedimentation due to slower stream velocities and decreased overland flow. Highway and road system maintenance expenditures typically include costs associated with erosion and sedimentation. When combined, the proposed action and USDA programs may result in cumulative impacts that benefit existing traffic and transportation conditions.
Socioeconomics	The majority of these programs provide incentives focused on providing for more environmentally-sound farming and land use practices. The implementation of the conservation practices and expenditure of the incentives produce positive economic benefits, in addition to the economic benefits resulting from more environmentally-sound farming and land	The proposed action would provide incentives, rental payments, and maintenance fees which may offset some farm job losses. When combined with other USDA programs, the cumulative impact is expected to be negligible.

Table 5.1 Continued

Resource	USDA Programs: CPGL EQIP, GRP, WRP, and WHIP	Cumulative Effects when combined with the Proposed Action
	use practices.	
Environmental Justice	The majority of these programs provide incentives and/or education opportunities focused on providing for more environmentally-sound farming and land use practices. This would potentially produce new opportunities for local workers in pursuing job prospects that support more environmentally-sound farming and land use practices.	The proposed action would potentially provide new employment opportunities that support more environmentally-sound farming and land use practices. When combined with other USDA programs, the cumulative impact may be increased employment opportunities and a more stable work environment.

5.4 Irreversible and Irretrievable Commitment of Resources

As required by NEPA, any irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented must be identified in environmental analyses. Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the effect that this use may have on future generations. Irreversible commitments are those that consume a specific resource that is renewable only over a long time period. Irretrievable commitments are those that consume a specific resource that is neither renewable nor recoverable for use by future generations. No irreversible or irretrievable resource commitments are expected from implementation of the proposed action.

6.0 MITIGATION MEASURES

6.1 Introduction

CEQ requires that all relevant reasonable mitigation measures that could improve a project should be identified, even if they are outside the jurisdiction of the lead agency or the cooperating agencies (40 CFR parts 1500 et seq., 2006). This serves to alert agencies or officials who can implement these extra measures, and to encourage them to do so. As this analysis is programmatic in nature and does not address exact locations, it is understood that detailed mitigation measures would be addressed on a site specific basis.

6.2 Roles and Responsibilities

As a part of the individual CREP contract approval process, consultation with the appropriate agencies would be conducted to reduce or eliminate potential impacts to resources identified in this PEA. For example, NRCS would provide technical expertise in the implementation of CPs. FWS would provide guidance to ensure that actions do not jeopardize or destroy protected species or their habitat. ASHPO would review actions to minimize potential impacts to cultural resources.

6.3 Mitigations

This chapter presents mitigation measures that would be used to avoid or lessen impacts to resources including biological, cultural, water, soil, and air.

Biological Resources

- Riparian buffers may require mowing to stimulate some vegetation growth. Mowing should take place before or after the nesting time for ground-nesting birds, which varies among species.

- If grassland nesting species are of concern to landowners participating in CREP, woody vegetation such as that common to riparian buffers or hardwood tree planting areas should not be planted directly adjacent to areas of current grassland or areas in which large tracts of native and introduced grasses and legumes are to be established.

- Disruption of areas that contain Missouri bladderpods may have a negative impact to this species. Care should be taken to ensure that areas containing populations of Missouri bladderpod are not enrolled into marginal pastureland wildlife habitat buffers.

- As riparian buffers mature, activities consistent with customary thinning or timber stand improvement may be necessary. Such activities may temporarily disrupt daily migration patterns of resident wildlife. The use of BMPs would help ensure these impacts would be minor and temporary.

- Some herbicides may be used during implementation of the CPs. Herbicides would be pre-approved by the governing Federal agency of the specific site and applied strictly according to label directions to minimize the threat to biological resources within the area.

Cultural Resources

- ASHPO and any other State, Federal, and tribal agencies with cultural resources oversight should be consulted as each individual CREP contract is developed and implemented. This would indicate if any cultural resources are known within the ROI or if additional field inventories would be necessary.

- FSA and ASHPO should communicate with any participating tribes to integrate planning with cultural resource protection and mitigation of adverse impacts, as well as soliciting input on the identification and protection of any TCPs.

Water Resources

- Installation of CPs may involve the clearing of vegetation and some soil disturbance. These activities may result in high levels of sediment runoff, resulting in temporary adverse impacts to surface water quality. The use of filter fencing or similar measures would reduce these impacts.

Soil Resources

- Short-term disturbances to soils during implementation of CPs may include tilling or installation of various structures such as fences, breakwaters, and roads. These activities may result in temporary increases in soil erosion. The use of silt fencing, filter fabric, or similar measures would reduce these impacts.

Air

- Implementation of the proposed CPs may include activities such as tilling and burning. This may temporarily increase particulate matter and other pollutants and adversely impact local air quality. Impacts would be minimized by measures such as watering exposed soil before and after tilling and burning in moderation and only in approved weather conditions.

- Installing various structures such as roads, firebreaks, and fences may require the temporary use of heavy-duty diesel construction vehicles. Primary emissions from construction vehicles include carbon monoxide and some particulate matter. BMPs would be used during construction activities to reduce the amount of emissions.

7.0 LIST OF PREPARERS

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8.0 PERSONS AND AGENCIES CONTACTED

Table 8.1 shows the Federal, State, and local agencies; American Indian tribes; and interest groups contacted for the CREP PEA.

Table 8.1 CREP PEA consultation.

Name	Title	Agency
Mark Sattelberg		FWS Formal Consult
Cathie Matthews		ASHPO Formal Consult
Anoatubby, Bill	Governor	Chickasaw Nation
Barbry, Earl, Sr.	Tribal Chairman	Tunica-Biloxi Tribe of Louisiana, Inc.
Berry, John	Tribal Chairman	Quapaw Tribe of Oklahoma
Blackmon, W.A.	President	Arkansas Cattlemen's Association
Butler, Bob	Regional Director	Arkansas Ducks Unlimited Field Station
Carruth, David	President	Arkansas Wildlife Federation
Devine, Marcus C.	Director	ADEQ
Edwards, James Lee	Governor	Absentee Shawnee Tribe
Ellis, A.D.	Principal Chief	Muscogee (Creek) Nation of Oklahoma
Emarthle, Alan	Cultural Preservation Officer	Seminole Nation of Oklahoma
Enyart, Charles	Chief	Eastern Shawnee Tribe of Oklahoma
French, Edgar L.	President	Delaware Nation
Gray, Jim	Principal Chief	Osage Nation
Greene, Richard	Regional Administrator	EPA Region 6
Haak, Bill	President	Benton County Farm Bureau
Hathaway, Randy	Planning, Environmental, and Regulatory Division	USACE, Little Rock District Office
Henderson, Scott	Chairman	AGFC
Hickie, Kevin	Washington County Forester	Arkansas Forestry Commission
Hooks, Glen	Associate Regional Representative	Sierra Club, Arkansas Chapter
Hornsby, Pete	President	Washington County Farm Bureau
Jackson, Mitchell	Crawford County Forester	Arkansas Forestry Commission
Jones, James	Crawford County Ranger	Arkansas Forestry Commission
Lawrence, Jeff	Senior Regional Director	Ducks Unlimited
Martin, Phillip	Chief	Mississippi Band of Choctaw Indians
McAdams, Gary	President	Witchita and Affiliated Tribes
Murray, Elizabeth	Coordinator	Arkansas Multi-Agency Wetland Planning Team Coordination Office
Ornesby, Wayne	Benton County Forester	Arkansas Forestry Commission

Table 8.1 Continued

Name	Title	Agency
Parker, LaRue	Chairperson	Caddo Nation
Pyle, Greg	Chief	Choctaw Nation of Oklahoma
Robertson, Gene	President	Crawford County Farm Bureau
Rodriguez Balandran, Olivia	Associate Director	EPA Region 6, Office of Environmental Justice and Tribal Affairs
Shannon, John T.	Director	Arkansas Forestry Commission
Shook, Doyle	President	The Wildlife Society, Arkansas Chapter
Simon, Scott	State Director	TNC of Arkansas
Smith, Chad	Principal Chief	Cherokee Nation of Oklahoma
Smith, Karen	Director	ANHC
Smith, Kenneth	Executive Director	Audubon Society Arkansas
Sparkman, Ron	Chairman	Shawnee Tribe of Oklahoma
Spears, Dennis	Washington County Ranger	Arkansas Forestry Commission
Stowe, George	Benton County Ranger	Arkansas Forestry Commission
Wickliffe, George	Chief	United Keetoowah Band of Cherokee Indians in Oklahoma
Young, J. Randy, P.E.	Executive Director	ANRC

9.0 GLOSSARY

Algae Bloom—Rapid and flourishing growth of algae in and on a body of water.

Aquifer—An underground formation capable of storing and yielding significant quantities of water; usually composed of sand, gravel, or permeable rock.

Candidate Species—A species of plant or animal being considered for listing by the FWS as threatened or endangered due to declining numbers in all or part of its range.

Community Type—A unique combination of plants and animals that occur in a particular location and are adapted to similar environmental conditions.

Conservation—The management of human and natural resources to provide maximum benefits over a sustained period of time. Conservation practices focus on conserving soil, water, energy, and biological resources.

Conservation Practice—Any technique or measure used to protect soil and water resources for which standards and specifications for installation, operation, or maintenance have been developed.

Cost Sharing—Payments to producers to cover a specified portion of the cost of installing, implementing, or maintaining a conservation practice.

Cropland—A land use/land cover category that includes five components: cropland harvested, crop failure, cultivated summer fallow, cropland used only for pasture, and idle cropland.

Dissolved Oxygen—Amount of free oxygen found in water; most commonly used measurement of water quality.

Ecosystem—A level of organization within the living world that includes both the total array of biological organisms present in a defined area and the chemical/physical factors that influence the plants and animals in it; all biological and non-biological variables within a defined area.

Edge Area—An area of change from one distinct ecosystem to another distinct ecosystem (e.g., forest to field).

Endangered Species—A species of plant or animal that is federally designated as threatened with extinction throughout all or a significant portion of its range.

Erosion—The removal and loss of soil by the action of water, ice, gravity, or wind.

Ethnicity—A person either of Hispanic or Latino origin and any race, or not of Hispanic or Latino origin and any race.

Extreme Poverty Area—An area in which at least 40 percent of the residents are below the poverty threshold.

Farm Income—The earnings of a farming operation over a given period of time, measured by several factors: 1) Gross cash income is the sum of all receipts from the sale of crops, livestock, and farm-related goods and services, as well as all forms of direct payments from the government. 2) Gross farm income is the same as gross cash income with the addition of non-money income, such as the value of home consumption of self-produced food and the imputed gross rental value of farm dwellings. 3) Net

cash income is gross cash income less all cash expenses such as for feed, seed, fertilizer, property taxes, interest on debt, wages to hired labor, contract labor and rent to non-operator landlords. 4) Net farm income is gross farm income less cash expenses and non-cash expenses, such as capital consumption, perquisites to hired labor, and farm household expenses. 5) Net farm income is a longer-term measure of the ability of the farm to survive as a viable income-earning business. 6) Net cash income is a shorter-term measure of cash flow.

Floodplain—The lowland that borders a stream or river and is found outside of the floodway. It is usually dry, but subject to flooding.

Fluvial—Pertaining to rivers or streams.

Flyway—A general term used to describe common migrating patterns among different bird species, based on definite geographic regions.

Groundwater—Water in the porous rocks and soils of the Earth's crust; a large proportion of the total supply of fresh water.

Herbicide—A type of pesticide used to kill or control vegetation.

Hispanic or Latino Origin—A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.

Hydrology—The study of the distribution, movement, and chemical makeup of surface and ground waters.

Introduced Species—Species that have evolved elsewhere and have been transported and purposely or accidentally disseminated by humans. Other terms used to describe these species are alien, exotic, non-native, and non-indigenous.

Invasive Species—A species that is non-native to the ecosystem under consideration, and whose introduction causes or is likely to cause harm to the economy, environmental, or human health.

Karst—A type of topography formed by the dissolution of carbonate rocks and characterized by caves, sinkholes, and underground drainage.

Low-income—Individuals or households falling below the poverty threshold.

Median Household Income—The income level which divides the income distribution of all of the households in a given area into two equal groups; half of the households having incomes above the median, and half having incomes below the median.

Minority population—A population composed of a minority group and exceeding 50 percent of the population in an area or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population.

Mitigation—A method or action to reduce or eliminate adverse impacts.

Native Species —A species that occurs naturally in a given area or region without deliberate assistance by humans.

Nutrient—Usually nitrogen or phosphorus. Excessive inputs of a nutrient can stimulate algal growth. Sources of nutrients include runoff from fields and pastures, discharges from septic tanks and feedlots, and emissions from combustion.

Overland Flow— The flow of non-infiltrating precipitation over land surface toward stream channels (once water enters the stream or channel, it is considered runoff).

Ozone—A highly reactive molecule composed of three oxygen atoms. Environmentally, ozone is important in two completely separate contexts—one, as a naturally occurring screen of harmful radiation in the outer atmosphere (i.e., stratospheric ozone), and two, as a component of polluting smog formed from emissions resulting from human activities (i.e., urban smog). In the stratosphere 7 to 10 miles above the Earth, naturally occurring ozone acts to shield the Earth from harmful radiation.

Particulate Matter—Air pollutants, including dust, soot, dirt, smoke, and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires, and natural windblown dust.

Pastureland—A land use/land cover category of land managed primarily for the production of introduced forage plants for livestock grazing. For the Natural Resource Inventory, this includes land that has a vegetative cover of grasses, legumes, and/or forbs, regardless of whether or not it is being grazed by livestock.

Perquisite—A payment or profit received in addition to a regular wage or salary.

Pesticide—Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest (i.e., insects, animals, weeds, fungi, or microorganisms). The term pesticide refers to insecticides, herbicides, fungicides, and various other substances used to control pests.

Poverty area—An area in which at least 20 percent of the residents are below the poverty threshold.

Poverty Thresholds—For statistical purposes (e.g., counting the poor population), the U.S. Census Bureau uses a set of annual income levels (poverty thresholds) that represent a Federal Government estimate of the point below which a household of a given size has cash income insufficient to meet minimal food and other basic needs. They were developed in the 1960s, based largely on estimates of the minimal cost of food needs, to measure changes in the poor population. The thresholds differ by household size and are adjusted annually for overall inflation.

Race—Classification which includes White, Black or African American, American Indian or Alaskan Native, Asian, and Native Hawaiian or Other Pacific Islander.

Rangeland—A land use/land cover category of land on which the potential vegetation is composed principally of native grasses, grasslike plants, forbs or shrubs suitable for grazing and browsing, and introduced forage species that are managed like rangeland. Under the Natural Resource Inventory definition, this would include areas where introduced hardy and persistent grasses, such as crested wheatgrass, are planted and such practices as deferred grazing, burning, chaining, and rotational grazing are used, with little or no chemicals or fertilizer being applied.

Riparian Areas—Lands adjacent to rivers and streams that are influenced by flooding. They are considered transition zones between the aquatic and terrestrial ecosystem that are connected by direct land-water interaction.

Runoff—Non-infiltrating precipitation entering a stream or other conveyance channel.

Sediment—Any finely divided organic and/or mineral matter derived from rock or biological sources that have been transported and deposited by water or air.

Sedimentation—The process of depositing sediment from suspension in water.

Threatened Species—A species of plant or animal that is federally designated as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Total Maximum Daily Load (TMDL)—A TMDL identifies the amount of a specific pollutant or property of a pollutant, from a point source ("end of the pipe"), a non-point source (from runoff), and natural background sources, including a margin of safety, that may be discharged to a water body and still ensure that the water body attains water quality standards.

Turbidity—A measure of water cloudiness which is caused by sediments or other particles suspended in the water column.

Watershed—The land across and under which water flows on its way to a stream, river, lake, or other water body; the surface drainage area above a specified point on a stream.

Wetlands—Areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil, including swamps, marshes, bogs, and other similar areas.

Woodland—A land cover/land use category that includes wooded pastureland and wooded non-pastureland.

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APPENDIX A
DRAFT CONSERVATION RESERVE ENHANCEMENT PROGRAM AGREEMENT FOR THE ILLINOIS RIVER WATERSHED IN ARKANSAS

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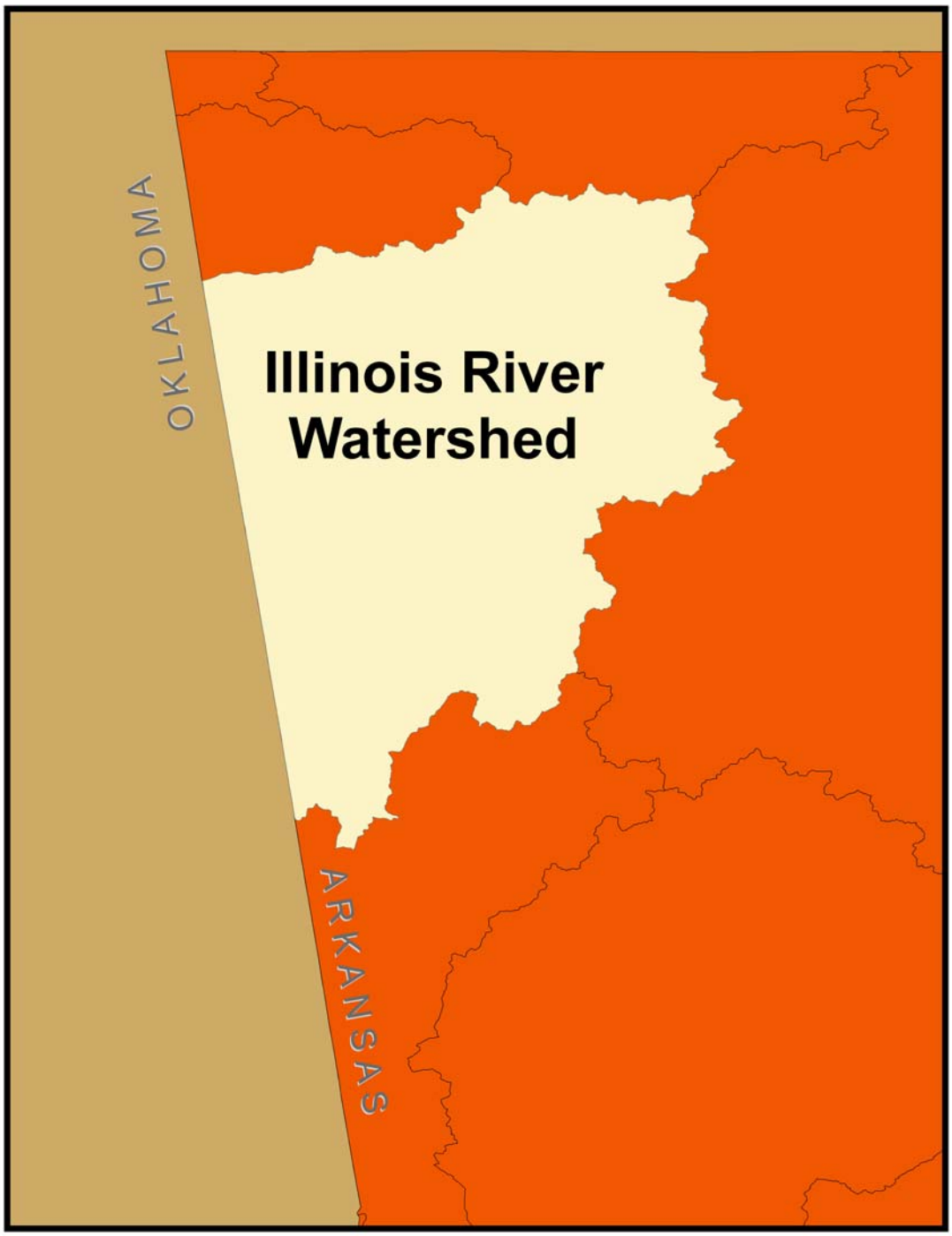
APPENDIX A—CONSERVATION RESERVE ENHANCEMENT PROGRAM ILLINOIS RIVER WATERSHED PROPOSAL STATE OF ARKANSAS

The following pages of this appendix contains the Draft *Conservation Reserve Enhancement Program (CREP) Illinois River CREP Proposal State of Arkansas.* This draft proposal is dated May, 2007.

Conservation Reserve Enhancement Program (CREP)
Illinois River CREP Proposal

State of Arkansas

Benton and Washington Counties



May 2007

Section 1 - Abstract

Arkansas has chosen a high priority watershed in the northwestern portion of the State as the focus of a Conservation Reserve Enhancement Program (CREP) proposal. This watershed was chosen not only because it is a high priority for the State, but also because the water quality problems and sources of contaminants are representative of their regions and of problems that can be significantly addressed with protection of riparian areas.

This project aims to restore stable riparian vegetation and riparian buffers to these systems and to reduce livestock impacts to floodplains. This will result in less overland flow of pathogens (fecal indicator bacteria), sediments, and phosphorus to the streams and will stabilize the stream banks, resulting in less streambank erosion and subsequent stream sedimentation. This, in turn, will result in improved water quality, lower maintenance requirements to the road and highway system, and will help to preserve existing floodplain pasture.

The Illinois River Watershed is part of a major poultry growing and cattle producing area of the State and the nation. Poultry litter has been applied to the nutrient poor, thin, cherty soils of the area and they now grow luxuriant grass and support an important cattle industry. Excessive buildup of phosphorus over the years has polluted the receiving water bodies to the point they are now considered impaired by nutrients. Phosphorus and pathogenic bacteria now impair many of the area streams including the Illinois River.

The proposed CREP will attempt to protect 15,000 acres of riparian area in the Illinois River Watershed which has a total riparian area of approximately 101,098 acres. Practices to be used include CP22 (woody riparian buffers) and CP29 (native warm-season grass buffers) with modifications. Total project cost is estimated to be $30,000,000 ($24,000,000 Federal), 20% of which will be borne by non-federal partners ($6,000,000 = $3 mill. cash + $3 mill. in-kind match).

A major impediment contributing to past failures has been that forested areas along the stream could not be signed up in USDA riparian programs even when they were small components of an otherwise un-forested buffer. Landowners do not want to pay for and maintain a fence at their expense as it crosses through forested areas. In the proposed Arkansas CREP program, monies will be available to pay for fencing and alternative water sources so ranchers fencing livestock out of the stream will still have access to water.

Additionally, strict guidelines concerning the width of riparian buffers sometimes deter otherwise willing landowners if the configuration of the stream is such that they will have trouble maneuvering equipment within the riparian zone or maintaining fences through frequent floods. Another deterrent to participation has been the inflexibility of federal programs concerning management of riparian zones. A state-designed CREP program in conjunction with existing conservation programs (with modifications) will overcome these obstacles.

The State of Arkansas proposes a program that will overcome all of these obstacles and be highly successful. The major components of the Arkansas CREP program will be the same riparian practices that have proven to be successful in Section 319 of the Clean Water Act projects, with some modification. Livestock will be prohibited access to the stream and alternatives will be presented to the producers that provide all the services they were realizing from the stream prior to project implementation.

Section 2 - Existing Conditions

Agricultural producers in the area have already been subjected to significant regulations relating to the use of poultry litter and nutrient management and further water quality degradation will likely result in increased regulation on the industry. Agriculture is a very important industry to the State and as such, it is critical that we take steps to reduce potential impacts from agricultural practices.

All waters within this segment have been designated as suitable for the propagation of fish and wildlife, primary and secondary contact recreation, as well as, public, industrial and agricultural water supplies (APCEC, 2001). The Illinois River Watershed portion of segment 3J contains 152 stream miles in which 125.1 stream miles were monitored at eight permanent monitoring stations. An additional 8.1 stream miles were evaluated for a total of 133.2 stream miles monitored in the Illinois River watershed. Nonpoint source impacts affecting waters in this segment are primarily from pastureland that is also used for application of poultry litter as fertilizer. In addition, many activities contribute to the destabilization of the streambed and excessive bank erosion, including instream gravel removal, conversion of forest to pasture and removal of riparian buffers for construction and other activities. Road construction and maintenance also contribute to siltation problems.

Table 1 summarizes studies that have found impaired reaches of the Illinois River and its tributaries. In addition, nutrient enrichment of the waterbodies in this watershed is a concern, both from point and nonpoint sources. Known problems below wastewater treatment facilities do occur and are easily documented. However, detecting and determining the extent of impacts of the contributions of nutrients from nonpoint sources is difficult. Land use in the watershed is probably the best indicator of where nutrients have the greatest potential to impact water quality. Potentially, confined animal operations in high concentrations within a watershed can result in application of animal manures at nutrient rates greater than can be assimilated, resulting in nutrients being transported to adjacent streams during storm events. Improper management techniques of the nutrients also result in adjacent streams receiving nutrient inputs during storm events.

U.S. Geological Survey (USGS) and the Arkansas Natural Resources Commission (ANRC) cooperated on a project to collect and analyze water quality samples to estimate nutrient loads for nitrogen and phosphorus for 1997-1999 using regression analysis.

Total estimated phosphorus and nitrogen annual loads for calendar year 1997-1999 using regression techniques on 35 samples were similar to estimated loads derived from integration techniques on 1,033 samples. Nitrogen and phosphorus estimates were higher than for comparable undeveloped watersheds (Green et al, 2001).

Arkansas Department of Environmental Quality (ADEQ) surveyed macroinvertebrate and fish communities in the Illinois River in 1995-1996 to assess the impact of municipal wastewater treatment facilities on water quality and aquatic life communities. The study also characterized the effects of point source and nonpoint source pollution on seasonal

water quality (ADEQ, 1997). USGS collected periphyton samples at 51 stream sites in the Ozark Plateau to determine the effect of different land uses.

Table 1: Review of Impaired Reaches, Illinois River Watershed

Reach Name	Seg.	Impairment	Impacts	Cause	Source	Comments
Clear Creek	029	Primary Contact (ADEQ,		Pathogens (ADEQ, 2005)	Urban Runoff (ADEQ, 2005)	
Clear Creek, Mud Creek	029	Aquatic Life (ADEQ, 2005 and 1997)		Siltation and Turbidity	Agriculture & Urban Runoff (ADEQ, 2002)	
Muddy Fork	025		Aquatic Life (ADEQ, 1997)			
Illinois River	022, 023		Aquatic Life (ADEQ, 1997)	Habitat Limitations (ADEQ, 1997)		
Osage Creek	930		Aquatic Life (ADEQ, 1997)			Influenced by cold spring water
Spring Creek	931		Aquatic Life (ADEQ, 1997)			Influenced by cold spring water

Results indicate that periphyton communities are affected by natural and land-use related factors, including nutrients, dissolved organic carbon, alkalinity, canopy shading, suspended sediment, embeddedness, stream morphometry, and velocity (Peterson et al., 2002).

Project Area Description

Arkansas has chosen a high priority watershed in the northwestern portion of the State as the focus of a Conservation Reserve Enhancement Program (CREP) proposal. This watershed was chosen not only because it is a high priority for the State, but also because the water quality problems and sources of contaminants are representative of their regions and of problems that can be significantly addressed with protection of riparian areas.

The Illinois River Watershed lies within the Ozark Mountains Ecoregion. Land is level to highly dissected and is underlain by cherty limestone. Karst features and clear, spring-fed perennial streams are common. These clear or once-clear rivers and lakes are highly valued by the citizens of Arkansas for recreation and water supply.

This project aims to restore stable riparian vegetation and riparian buffers to these systems and to reduce livestock impacts to floodplains. This will result in less overland flow of pathogens (fecal indicator bacteria), sediments, and phosphorus to the streams and will stabilize the stream banks, resulting in less streambank erosion and subsequent stream sedimentation. This, in turn, will result in improved water quality, lower maintenance requirements to the road and highway system, and will help to preserve existing floodplain pasture.

The Illinois River Watershed is part of a major poultry growing and cattle producing area of the State and the nation. Poultry litter has been applied to the nutrient poor, thin, cherty soils of the area and they now grow luxuriant grass and support an important cattle industry. Excessive buildup of phosphorus over the years has polluted the receiving water bodies to the point they are now considered impaired by nutrients. Phosphorus and pathogenic bacteria now impair many of the area streams including the Illinois River.

The Illinois River Watershed contains approximately 1.1 million acres of which approximately 484,514 acres (44%) are in Arkansas and approximately 615,486 acres (56%) are in Oklahoma. The Illinois River Watershed portion of Water Quality Planning Segment 3J (HUC 11110103) occupies the northwestern corner of Arkansas and covers part of Benton County, a large part of Washington County and a small section of Crawford County. This segment includes the Illinois River and its tributaries within Arkansas. The main tributaries in Arkansas are Osage Creek, Flint Creek and Spring Creek.

The proposed CREP will attempt to protect 15,000 acres of riparian area in the Illinois River Watershed which has a total riparian area of approximately 146,462 acres, of which 60,828 acres require vegetative reestablishment. Practices to be used include CP22 (woody riparian buffers) and CP29 (native warm-season grass buffers) with modifications. Total project cost is estimated to be $30,000,000, of which 20% will be borne by non-federal partners ($6,000,000).

Map of the Area

The proposed CREP would focus on the riparian area in the Arkansas portion of the Illinois River Watershed (Figure 1). Riparian protection is critical and one of the most effective strategies to address the water quality issues present in the watershed. The State believes that demonstrating the efficiency of riparian buffers in this high priority watershed is a critical step in reaching our ultimate goal of landowners accepting riparian protection as a standard practice of operation, much like terraces on a sloped field, or septic tanks for a rural residence. Figure 2 depicts the actual project boundary.

Figure 1: Map of the Illinois River Watershed

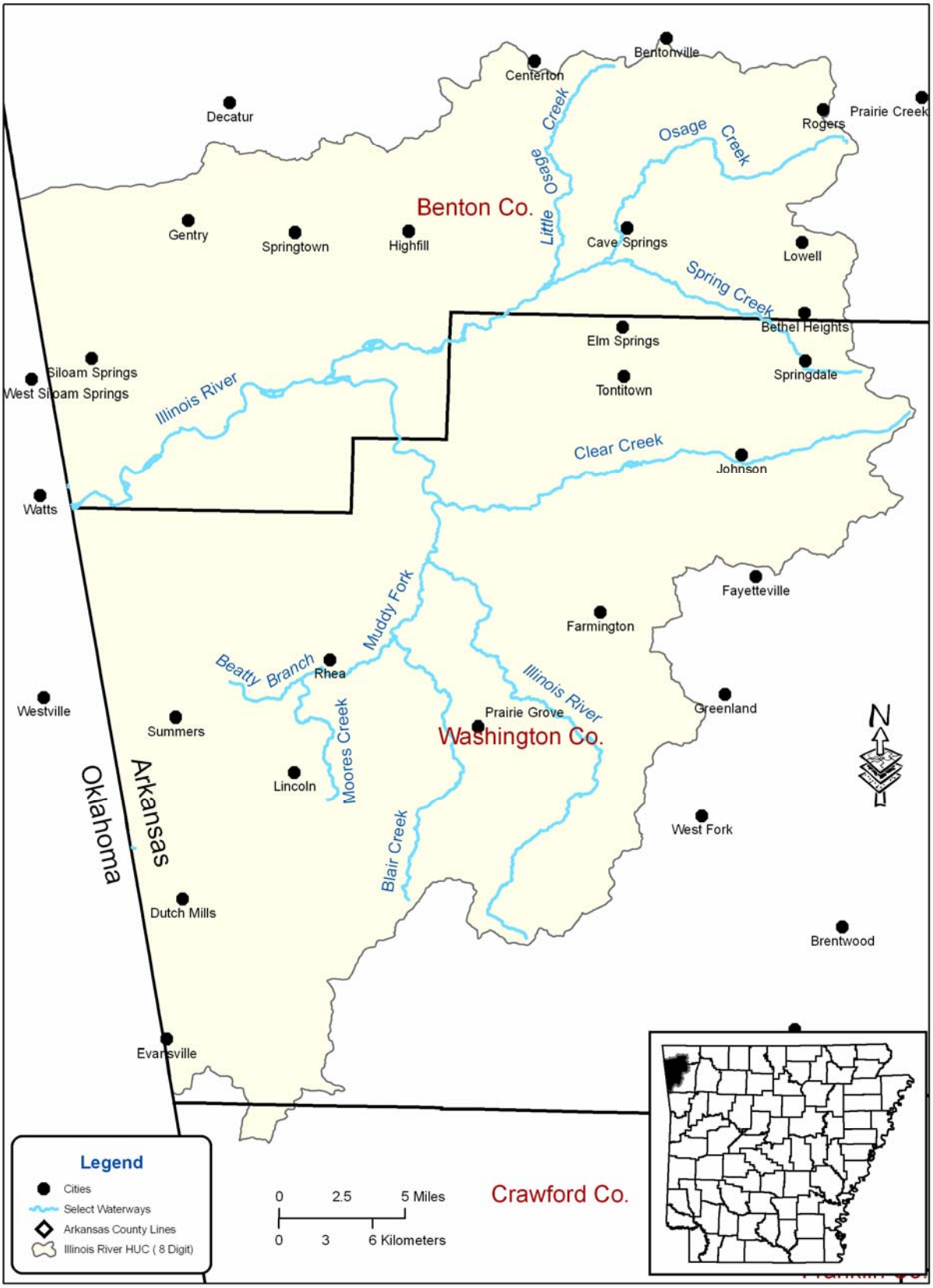
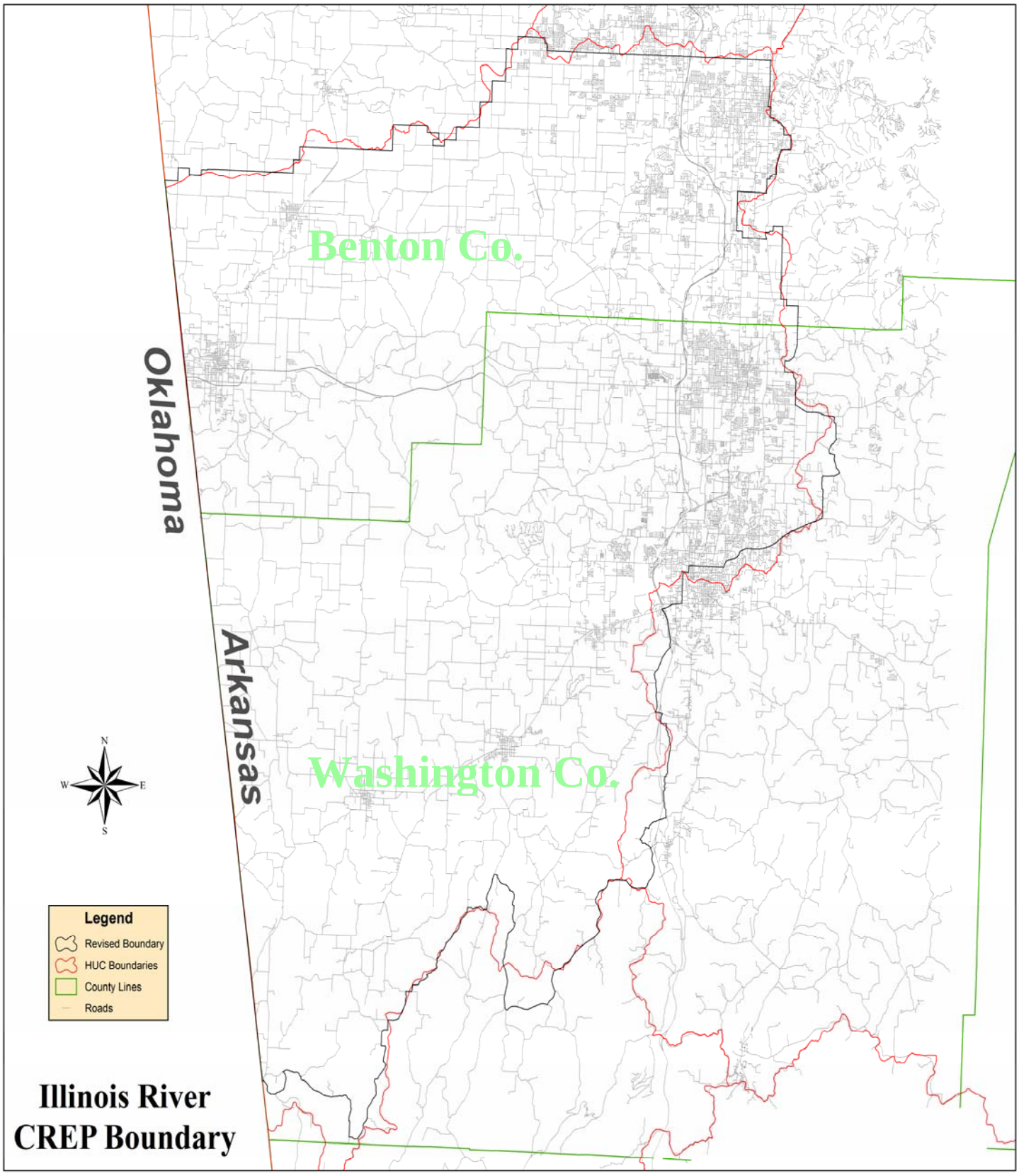


Figure 2: Project Boundary within the Illinois River Watershed



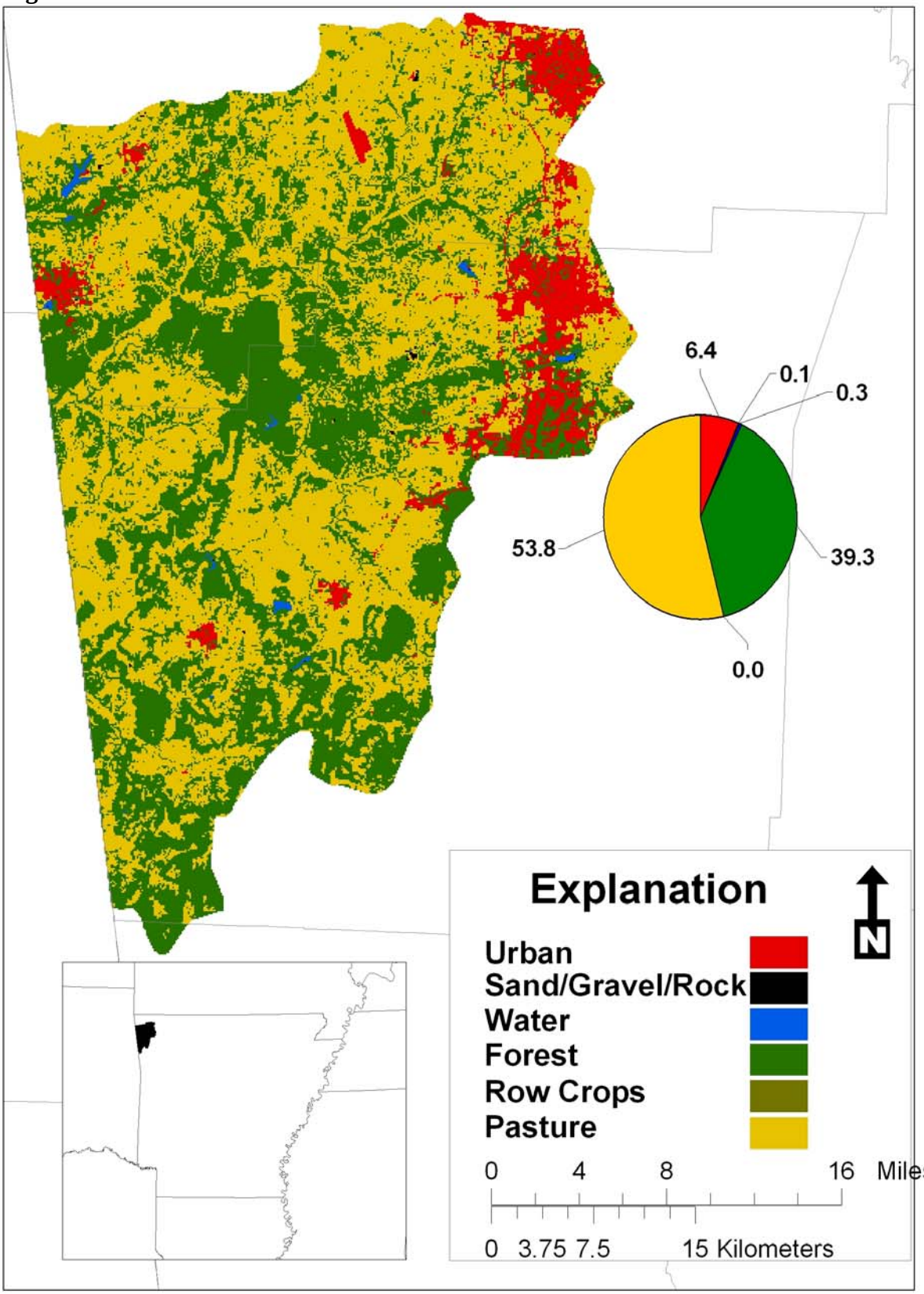
Description of Human Activities and Landuses

The following provide a partial snapshot of land uses in the watershed:

- There are seven drinking water sites in the Arkansas and Oklahoma portions of the watershed (USFS, 1999).
- The population of Washington and Benton counties grew 47% from 1990 to 2000, an increase of more than 100,000 individuals. Washington and Benton counties have continued to grow at a rapid pace from 2000 to 2003. Benton County added 12.1% and Washington County added 7.6% from 2000 to 2003 (University of Arkansas, 2005). As a result, there was significant new construction, including residential, commercial and industrial, roads and other infrastructure. Construction can be found both within municipal boundaries and in rural areas of the watershed where onsite waste disposal is used.
- An estimated 198,000 individuals live in the Arkansas portion of the watershed (Census, 2000).
- 12 municipalities and portions of Washington and Benton counties, as well as, the University of Arkansas are subject to Phase II requirements for a small municipal separate storm sewer system (MS4) National Pollution Discharge Elimination System (NPDES) permit. With leadership from the Northwest Arkansas Regional Planning Commission, all of these entities have joined together to work with the University of Arkansas Cooperative Extension Service to provide education and technical assistance.
- Northwest Arkansas produced more broilers in 2002 than any other area of the state, although production in other areas is gaining (NASS, 2002).
- The entire watershed is designated as a nutrient surplus area subject to new regulations for nutrient planning, nutrient application and certification of nutrient planners.
- 53.8% of the land area in the watershed was pasture in 1999 while 39.3% was forest and 6.4% was urban. Nearly one-quarter of the land area changed uses between 1992 and 1999 (CAST, 1999).
- The USFS estimated there were 62,643 acres of riparian areas in its 1999 assessment of aquatic conditions (USFS, 1999). Of these, nearly half were in agricultural use, primarily pasture.
- The USFS estimated there were 272.0 miles of roads in riparian areas in the Illinois River watershed in 1999, including 113.4 miles of unpaved roads (USFS, 1999).
- The watershed provides habitat for four federally protected species (Ozark Cavefish, Gray Bat, Ozark Big-eared Bat, Bald Eagle).
- Private non-industrial landowners and the national forest own most of the forestland in the watershed.
- Resource extraction (e.g., topsoil removal, gravel mining) primarily supports local construction projects.
- The State of Oklahoma lists the Illinois River watershed on its inventory of impaired water bodies.
- The State of Oklahoma also lists the Illinois River watershed on its scenic rivers list.

Further illustration of landuse distribution in the watershed can be seen in Figure 3.

Figure 3: Distribution of land uses in the Illinois River Watershed



Source: University of Arkansas Department of Biological and Agricultural Engineering, 2005.

Environmental Factors

Average precipitation in the Illinois River Watershed is approximately 45 inches/year. Landforms are mostly moderately to highly dissected portions of the Ozark Plateau with narrow ridge tops separated by steep v-shaped valleys. Lesser amounts of nearly level un-dissected plateau also occur. Karst features occur and springs are common. Most of the smaller streams are perennial and the base flow, consisting largely of spring water, is clear and cool. Larger streams and rivers are also clear but their spring-fed base flow is also supplemented by point sources. These streams and rivers support one of the most diverse assemblages of sensitive fish species in the state.

The northern portion of the Illinois River watershed is on the Springfield Plateau in the Ozark Highland. The southern portion is in the Boston Mountains. The mains soils on the broad uplands of the Springfield Plateau are Captina, Tonti, Peridge, Jay, and Taloka. Clarksville, Nixa, and Noark soils are the main soils in the dissected hilly areas. In the stream valleys, Secesh, Elsah, Britwater, and Captina soils are dominant. These soils are underlain by silty deposits or cherty limestone, or by alluvium derived from these sources. Soil associations in the Boston Mountains are underlain mainly by acid sandstone, siltstone, and shale, or by alluvium derived from these sources. Associations in this area are Allen-Hector-Enders, Enders-Allegheny-Hector, Linker-Apison-Hector, Fayetteville-Hector-Mountainburg, and Savannah-Cleora-Razort.

The area includes the Ozark Plateau and the northern portion of the Boston Mountains. Both are situated in the Ozark Mountains Ecoregion. Most of the natural vegetation is Oak-Hickory and Oak-Hickory-Pine forest. Predominant trees on the uplands include black, white, blackjack, northern red, and post oaks, various elms, sugar maple, and shortleaf pine. Dominant trees on floodplains are sycamore, American and red elm, willows, silver maple, box elder, and river birch.

The clear, cool, spring-fed streams are important biological resources in the state and the larger ones are important as recreational resources. The area has well-developed recreational industries centered around canoeing, rafting, swimming, and camping. Air quality is good and although pollution from the upwind population centers of the state is sometimes evident, the area does not experience any air quality alerts. Federally listed endangered species occur in the area including the Ozark Cavefish (*Amblyopsis rosae*), the Gray Bat (*Myotis grisescens*), the Ozark Big-eared Bat (*Corynorhinus townsendii ingens*), and the Bald Eagle (*Haliaeetus leucocephalus*).

Section 3 - Agricultural-Related Environmental Impacts

Throughout the last several decades, the poultry industry has achieved remarkable success in northwestern Arkansas where many streams and rivers arise, and is a critical part of the State and local economy. Through application of poultry litter to once infertile areas of native pasture or forest, a very successful beef cattle industry has grown alongside the poultry industry. Pastures fertilized with poultry litter are highly productive. Many floodplain forests have been converted to pasture in order to increase forage production, and in the process, many streamside riparian areas have been cleared and converted to pasture as well. Farm demographics for counties within the proposed CREP can be seen in Table 2.

Table 2: Farm Demographics – 2002 Agricultural Census

Item	Benton	Crawford	Washington
Number of Farms	2,376	916	2,800
Average Size of Farms (acres)	132	165	131
Average Farm Production Expenses	$109,775	$47,955	$83,630
Average Farm Net Income	$44,702	$15,650	$29,035
Average Age of Operator	53.1	53.4	54.5
Farming is Primary Occupation for Operator	1,307	471	1,525
Farming is not Primary Occupation for Operator	1,069	445	1,275
Operators Male	2,106	827	2,464
Operators Female	270	89	336
Cattle	113,588	30,295	112,650
Chickens	1,221,497	106,143	2,921,380
Swine	Withheld	133	56,051
Sheep	1,636	680	1,314
Turkey	1,435,810	192,687	1,013,421
Horses	3,570	1,519	4,963
Forage (dry tons)	183,362	67,147	222,687
Wheat (bushels)	--	162,756	5,672
Vegetables (acres)	1,078	1,745	167
Peanuts (lbs.)	--	--	--
Grain Sorghum (bushels)	Withheld	146,250	--
Corn (bushels)	--	316,110	--
Nursery Stock	Withheld	Withheld	Withheld
Pecans	Withheld	Withheld	116
Soybeans (bushels)	11,630	250,506	--
Field & Grass Seed (acres)	1,115	Withheld	137

The Natural Resources Conservation Service (NRCS) and U.S. Forest Service (USFS) completed a Cooperative River Watershed study for the Illinois River and published a Resource Base Report. The study found the Illinois River and many of the lakes on its tributaries were eutrophic from excessive nutrients (USFS and NRCS, 1992).

The Arkansas Water Resources Center (AWRC) prioritized sub-basins in the watershed in 1996 based on total phosphorus, total nitrogen and total suspended solids (Table 3). Each sub-basin was given a low, medium or high prioritization for each of the three factors (AWRC, 1996).

A USFS comparative assessment of 50 watersheds in Arkansas and Oklahoma estimates potential erosion by land use for the Upper White River watershed. The Upper White River watershed is adjacent to and east of the Illinois River basin. Based on 1992 National Resource Inventory (NRI) data, pasture land had the highest potential erosion rate at 72% compared to other lands (including urban) with a 15% potential erosion rate and forestry with a 2% potential erosion rate. Compared to 1982, potential erosion rates increased for pasturelands and decreased for other lands (USFS, 1999).

Table 3: Sub-Basin Priority Ranking (AWRC, Parker et al., 1996)

Basin #	Basin Name	Total Phosphorus	Total Nitrogen	Total Suspended Solids
110	Lake Wedington	Low	Low	Low
120	Ruby	Low	Medium	Medium
130	Goose Creek	Medium	Medium	High
140	Upper Illinois	High	Low	High
220	Hamstring	Low	Medium	Medium
221	Clear Creek	Medium	Medium	Medium
310	Fish	Low	Low	High
320	Robinson	Medium	Medium	Medium
330	Wildcat	Low	High	Low
340	Brush	Medium	High	Medium
351	Lower Osage	Medium	Medium	High
352	Upper Osage	High	High	High
360	Galey	Low	High	Low
371	Lick Branch	Low	Medium	Low
372	Little Osage	High	High	High
380	Spring	High	High	High
391	Cross	Medium	High	Low
392	Puppy	High	High	Medium
410	Muddy Fork	High	High	Medium
420	Blair Creek	Low	Low	Medium
430	Lower Moores	Medium	Medium	Medium
440	Upper Moores	Low	Low	Low
450	Kinion	High	Medium	Medium
510	Francis	Low	Medium	High
520	Gum Springs	Medium	Medium	Medium
530	Chambers	Low	Medium	Low
540	Pedro	Low	Medium	Low
550	Gallatin	Low	Medium	Low
610	Flint	Low	Medium	High
620	Little Flint	Medium	Medium	High
630	Sager	High	Medium	Medium
710	Cincinnati	High	High	Medium
720	Wedington	Medium	Medium	Medium
810	Upper Ballard	High	Low	High
820	Baron Fork	Low	Medium	Medium
830	Evansville	Low	Low	Medium
840	Fly Creek	High	Low	High

	Priority Ranking Group		
Parameter	*Low*	*Medium*	*High*
Total Phosphorus, kg/ha/yr	*0.05-0.065*	*0.065-0.95*	*0.95-1.85*
Total Nitrogen, kg/ha/yr	*0-5*	*5-15*	*15-52*
Total Suspended Solids, kg/ha/yr	*5-75*	*75-170*	*170-324*

USGS has done extensive monitoring and analysis of surface and ground water quality in the Ozark Plateau study area as part of the National Water Quality Assessment Program (NAWQA). Major findings for the Ozark Plateau study area are available at http://ar.water.usgs.gov/nawqa/ozark/findings.html. Some of the major findings include:

- Nutrient concentrations in streams are higher in areas with greater agricultural land use or downstream from wastewater-treatment plants than in forested areas. These higher concentrations may result in increased algal growth in streams.
- Nutrient concentrations in ground water are higher in areas with greater agricultural land use than in forested areas. These higher concentrations seldom exceed drinking-water standards.
- Bacteria concentrations in streams are higher in basins with greater agricultural land use (mostly pasture). Fecal coliform bacteria concentrations occasionally exceed State water-quality standards for whole-body contact recreation.
- Nutrient and bacteria concentrations are affected by hydrologic and geologic factors. Stream discharge and the presence or absence of confining geologic layers are two factors that are important in predicting concentrations.

Under contract with the Arkansas Natural Resources Commission (ANRC), the University of Arkansas Department of Biological and Agricultural Engineering (2005) used the soil and water assessment tool (SWAT) to model priority watersheds for the 2005-2010 NPS Management Program. Figures 4a-4d use SWAT estimates of sediment, run-off, and nutrient loads for phosphorus and nitrogen for some sub-watersheds in the Illinois River watershed to show the relative loading in quintiles for each sub-watershed, which roughly approximates the area of a 14-digit Hydrologic Unit Code area.

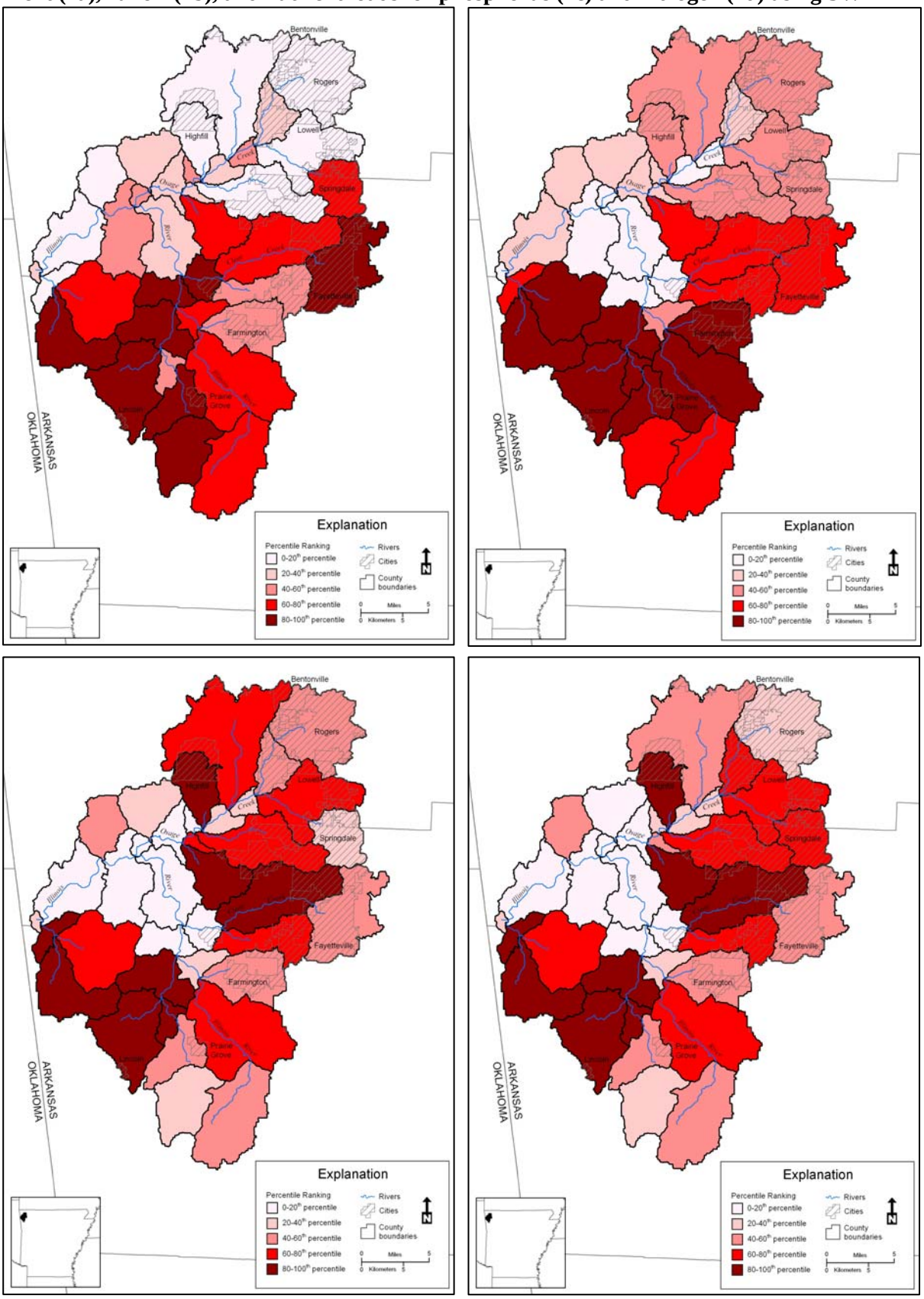
Section 4 - Project Objectives

The implementation of the project will restore 100-foot to 300-foot corridors along streams that will provide habitat for terrestrial species in the project area such as wood ducks, quail, deer, cottontail and swamp rabbits, along with migrant and resident songbirds. Forested riparian buffers will provide new wintering habitat for woodcocks, rabbits, deer and neotropical migrants that are edge species such as warbling vireo, white-eyed vireo, painted bunting and indigo bunting will benefit from the 100'-300' buffers. Forest interior species such as red-eyed vireo will benefit from the 300' buffer, but buffers recommended to benefit interior species are often much wider.

Quail will benefit tremendously from the restored buffers once the hardwood trees are older and have attained mid-story status and the native warm-season grasses have become established. Wood duck populations should improve dramatically, however, because of the long growth requirements of hardwoods, improvements can not be determined over the short-term. Estimated long-term population increases of the wood ducks in the watershed is expected to increase by a minimum of 50% due to quality nesting habitat.

The goal is to increase wildlife populations of the above listed species by an average of 25% over the course of 30 years.

Figures 4a-4d: Relative estimates of contribution of Illinois River sub-watersheds to total estimated sediment (4a), runoff (4b), and nutrient loads for phosphorus (4c) and nitrogen (4d) using SWAT



Source: University of Arkansas Department of Biological and Agricultural Engineering, 2005.

Streamside buffers will help to filter sediments and nutrients from agricultural fields and result in water quality improvements. Typica1 buffer widths recommended for water quality improvement range from 50' to 100' although some range as low as 25' and up to 900'. It is estimated that water quality will be improved by at least 30%.

Through implementation of this project, sediment loading will be reduced by an estimated 10,000 tons per year.

Section 5 - Project Description

A major impediment contributing to past failures has been that forested areas along the stream could not be signed up in USDA riparian programs even when they were small components of an otherwise un-forested buffer. Landowners do not want to pay for and maintain a fence at their expense as it crosses through forested areas. In the proposed Arkansas CREP program, monies will be available to pay for fencing and alternative water sources so ranchers fencing livestock out of the stream will still have access to water.

Additionally, strict guidelines concerning the width of riparian buffers sometimes deter otherwise willing landowners if the configuration of the stream is such that they will have trouble maneuvering equipment within the riparian zone or maintaining fences through frequent floods. Another deterrent to participation has been the inflexibility of federal programs concerning management of riparian zones. A state-designed CREP program in conjunction with existing conservation programs (with modifications) will overcome these obstacles.

These expanded riparian widths are needed to serve as a functional travel corridor for associated neotropical songbirds along with resident species of birds, mammals, and other wildlife. In agricultural landscapes, maximum numbers of the most area-sensitive species peak in streamside management zones of at least 91 m (300ft) (Keller et al., 1993; Hodges et al., 1995).

The State of Arkansas proposes a program that will overcome all of these obstacles and be highly successful. The major components of the Arkansas CREP program will be the same riparian practices that have proven to be successful in Section 319 of the Clean Water Act projects, with some modification. Livestock will be prohibited access to the stream and alternatives will be presented to the producers that provide all the services they were realizing from the stream prior to project implementation.

Livestock access to streams will be limited through fence construction. In northwestern Arkansas where the terrain is very hilly, pastures often contain many small groves of trees in small narrow ravines and other areas that physically inhibit the operation of equipment necessary to maintain the pasture. Many USDA riparian programs do not subsidize the installation and maintenance of fence through these treed areas and livestock producers have been hesitant to take on this responsibility themselves. The State proposes that the Arkansas CREP program should cost-share fencing through these treed areas at the same rates that federal money cost-shares fencing in pasture. The cost list of accepted practices can be found at the end of the document as Attachment A.

Adjustments from CP22 and CP29 critical to program adoption have been determined to be:

1. Stream bank stabilization will be implemented before riparian vegetation is restored or established and will be allowed at a cost-share rate of 50%.
2. The minimum combined width of zones 1 and 2 will be equal to 30% of the width of the geomorphic floodplain but never less than 50 feet or greater than 100 feet. This is the MINIMUM width for the buffer to function properly – the landowner must install this much. Then he/she can choose to install additional buffer out to a 300-foot program MAXIMUM (CP22). Additional buffer can be enrolled under the infeasible to farm definition (includes infeasible to graze).
3. The infeasible to farm definition will also apply to CP29 (infeasible to graze). Producers may request a waiver to enroll infeasible to farm/graze in excess of 25%.
4. Winter feeding facilities composed of a covered heavy-use area (558 - Roof Runoff Structure) combined with a dry manure storage area (313 - Waste Storage Facility) and a cement water tank will be allowed at a cost-share rate of 50%. These facilities will be constructed out of the geomorphic floodplain. They will be a combination of NRCS practices 561 and 313 with a roof over the heavy use area.
5. Alternative water sources may be developed within 1,500 feet of the edge of zone 3 with County Committee approval to encourage upland pasture use for grazing and flood plain pasture use for haying.
6. Watering facilities will allow up to 1,500 feet of pipeline with County Committee approval.
7. The maximum dollar amount allowed for water development, water facilities and pipeline, $3,000, $2,000, and $2,000 respectively, will be per ½ mile of stream rather than per contract.
8. When two eligible tracts are separated by a wooded area, fence through the treed area will be allowed at a cost-share rate of 50%.

In summary, these practice modifications accomplish the following:

- ► Providing stable stream crossings for livestock and equipment;
- ► Stabilize the stream banks, thereby reducing the sediment load into receiving water bodies, decreasing the amount of soil-borne contaminants reaching local water bodies, and increasing the survival of existing or re-established riparian vegetation;
- ► Fencing will protect the vegetation and stream banks until the project site becomes stable; and
- ► Construction of winter feeding areas to replace the ravines and hollows that are currently used. The winter feeding areas allow manure to be stockpiled out of the rain (until it can properly be land applied), allow the cattle protection from the wind, protect soil in the heavy use areas, and provide an alternative water source for livestock.

Project Size

The Illinois River Watershed contains approximately 1.1 million acres of which approximately 484,514 acres (44%) are in Arkansas and approximately 615,486 acres (56%) are in Oklahoma. The proposed CREP will attempt to protect 15,000 acres of riparian area in the Illinois River Watershed of a total riparian area of approximately 146,462 acres. The targeted area is land lying adjacent to perennial and intermittent streams that is currently in cropland or pasture.

Likelihood Project Objectives will be Met

By providing a significant state incentive coupled with the federal cost-sharing and 15-year CRP rental payments, landowners in the watershed will find the proposal attractive enough to enter the program. It is expected that the level of participation will be limited only by project funding. At least 25% of the eligible landowners, representing 25% of the eligible land area, will participate.

Length of Time for Project Implementation

It is anticipated that all contracts will be signed within 3 years of the project opening date. The contracts will have a 15-year lifespan. On all approved CREP contracts, landowners will be given the opportunity to enroll CREP lands in perpetual easements.

All landowners enrolling eligible land into the Illinois River CREP will be given the opportunity to place a perpetual conservation easement on enrolled acres through the easement portion of this proposed CREP. Perpetual easements are <u>not</u> a required component of the Illinois River CREP. This portion of the CREP will allow landowners to obtain permanent easements soon after the practice is completed and verified as successfully established.

The State of Arkansas will be designated as the "Easement Manager" and be the primary holder of the permanent conservation easements. Arkansas natural resource agencies may assist in easement boundary marking and monitoring easements during and beyond the initial 15-year CREP contract period.

Interagency Coordination Method

The Arkansas CREP proposal is being developed by the natural resource agencies of Arkansas and the state offices of NRCS and FSA. The Arkansas Natural Resources Commission is the state Conservation District agency. The Governor's office has been represented. EPA Region 6 staff is supportive of the project. Their commitment to protecting and restoring water quality in the project area has been demonstrated by continued Section 319 funding in this watershed. Meetings have been held with State and Federal and local natural resource agencies operating in Arkansas (U.S. Geological Survey, Arkansas Natural Resources Commission, Arkansas Department of Environmental Quality, Farm Service Agency, Winrock International, Arkansas Game and Fish Commission, Natural Resources Conservation Service, Arkansas Natural Heritage Commission, University of Arkansas Cooperative Extension Service, Arkansas Forestry Commission).

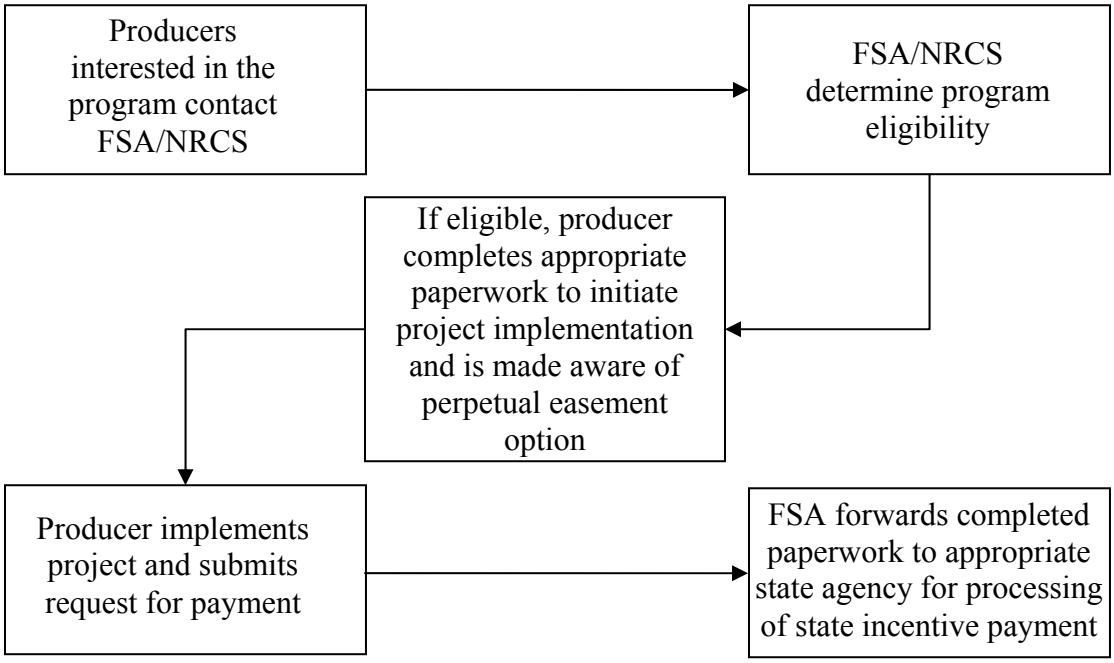
The following agencies and organizations will serve on a committee to develop on-going outreach and general public education of the program: Arkansas Natural Heritage Commission, Arkansas Game and Fish Commission, University of Arkansas Cooperative Extension Service, Arkansas Natural Resources Commission, Arkansas Forestry Commission, USDA Natural Resources Conservation Service, Arkansas Department of Environmental Quality, and Arkansas Stream Teams

Eligible Land

Landowners with pasture and/or cropland adjacent to streams, rivers, or lakes in the selected watersheds will be eligible for the program. The land in question must have been owned or operated by the applicant for the previous twelve months. Cropland must have been planted to a crop four of the previous six years and be physically and legally capable of being cropped. Marginal pastureland may also be enrolled provided it is suitable for use as a riparian buffer planted to trees or as wildlife habitat buffer. Lands that have an existing CRP contract or an approved offer with a contract pending are not eligible for CREP until the previous contract expires.

Landowners interested in the program will receive a site visit from an NRCS plan writer, who will update the existing conservation plan, or draft a new one to address the objectives of the program. If the landowner agrees to implement these recommended practices and provide the required match, their application will be accepted, along with other applications received during the sign-up period.

Application Process



Section 6 - Cost Analysis

The proposed Arkansas CREP program is expected to cost approximately thirty million dollars of Federal, State, and local landowner monies. This program has been developed using lessons learned from past implementation of riparian buffer programs in these areas of the State. Certain modifications have been made to standard BMPs to make them more amenable to local landowners while retaining their efficiency at improving water quality. Certain types of land that would not regularly qualify for inclusion in a CRP program could be eligible for this CREP program. The State of Arkansas believes inclusion of these lands are critical to the success of the program in these areas. The State will provide personnel to provide technical assistance and promotion of the program, monitoring to assess water quality improvements associated with the program, and reporting to summarize project results and progress.

Total Estimated Project Costs

Watershed	Targeted Acres	Cost of Installation & Maintenance	CREP $'s	State Match	State $'s	State Total	Project Total
Illinois River	15,000	$24 mill.	$24 mill.	$3 mill.	$3 mill.	$6 mill.	$30 mill.

Estimated Costs of First Year and Years 2 through 15

County	Pasture Rental Rate per Acre	Additional Pasture Rental Rate	SIP Pymt. per Acre	Maint. Pymt. of $9/Acre	Total/Acre First Year	Pymt./Ac./Yr. for Years 2-15	Pymt./Ac. for 15-Year Contract
Benton	$38	$38	$100	$9	$185	$85	$1,375
Washington	$34	$34	$100	$9	$177	$77	$1,255
Crawford	$32	$32	$100	$9	$173	$73	$1,195

State contributions to the program will be:

1. The State of Arkansas will provide water quality monitoring for the life of the program to document project effectiveness. This will include, where necessary, installation of stream flow gages and automatic samplers programmed to collect flow-weighted chemical loading data. It will also include the staff to operate the equipment, as well as, the associated laboratory costs. Biological data on the fish and macroinvertebrate communities and aquatic habitat conditions will also be collected.
2. The State of Arkansas will provide technical assistance where applicable during the implementation and monitoring phase of the project.
3. The State of Arkansas will make a one-time lump sum payment of $200 per acre to all landowners who participate in the program.
4. The State of Arkansas will allow participants to utilize the Wetlands and Riparian Zones Tax Credit Program to offset eligible out-of-pocket expenses related to their CREP project.

State of Arkansas

The State of Arkansas is prepared to contribute $3,000,000 of in-kind services to the proposed project and $3,000,000 of the required cash match, as outlined by federal guidelines necessary for implementation of the proposed project.

The Illinois River CREP will enable cooperators to tailor the program to meet the needs of both the State and the local watershed stakeholders and allow it to be a very successful riparian buffer program.

Justification for Incentive Payments

Successful Section 319 programs have conclusively shown that a program of this nature can reduce phosphorus loading in both a statistically and environmentally significant manner. Without this assistance, agriculture and the poultry industry will not be able to both protect the environment and keep the rural economy vibrant and growing.

Because these waters are currently listed as not attaining water quality standards, the state will have little choice other than to burden agriculture and related industry with additional regulations if water quality does not begin to improve. Given the current condition of the agricultural industries, they will not survive significant additional costs such as these.

Three Year Average Crop Acreage and Yield- Source – 2002 Ag Census

	Benton		Crawford		Washington	
Crop	acres	yield	acres	yield	acres	yield
Corn-grain	0	0	2,823	316,110	0	0
Cotton-upland	0	0	0	0	0	0
Hay-alfalfa	639	1,796	372	withheld	787	1,871
Hay-other	withheld	withheld	withheld	withheld	withheld	withheld
Peanuts	0	0	0	0	0	0
Sorghum-grain	withheld	withheld	2,047	146,250	0	0
Soybeans	482	11,630	9,056	250,506	0	0
Wheat-all	1,213	43,928	4,230	162,756	173	5,672

Section 7 - Monitoring Program

Water quality stations are established at various locations in the watershed. Samples will continue to be collected monthly and transported to the Arkansas Department of Environmental Quality laboratory. Analyses include ammonia, nitrate/nitrite, total Kjeldahl nitrogen, chloride, sulfate, bromide, fluoride, total hardness, total organic carbon, biochemical oxygen demand, dissolved oxygen, pH, turbidity, total suspended solids, total dissolved solids, ortho-phosphorus and total phosphorus. ICP metals analyses are performed every other month. Other parameters may be added as information, science and public policy dictate. This type of monitoring has been shown to be extremely effective at detecting changes in water quality and should allow us to detect effects of the program.

All monitoring will be carried out by staff of the Arkansas Department of Environmental Quality, the Arkansas Forestry Commission, the Arkansas Game and Fish Commission, and the Arkansas Natural Resources Commission. Data will be compiled and analyzed by Game and Fish Commission staff as well. AFGC staff will be responsible for preparing and submitting annual monitoring reports.

Because State agencies have successfully carried out smaller but similar projects in all of the target areas, we anticipate that objectives will be met. Should the data at any time indicate otherwise, additional modeling and monitoring will be performed to locate the pollutant contributing sub-watersheds and land use practices. If any are identified, they will be corrected using a combination of state, landowner and EPA Clean Water Act Section 319 money.

Section 8 - Public Outreach and Support

Various state and federal natural resource agencies administer conservation programs similar to the one proposed. These programs have been extremely successful, both in terms of sign-up and in the environmental benefits gained. As time progresses, and word spreads among local producers, we find that new money is obligated as soon as it becomes available. Currently, there are large backlogs of landowners waiting for cost share assistance to become available.

A public meeting was held at the Ozarks Electric Co-Op Corporation in Fayetteville, Arkansas on February 15, 2007 to give producers the opportunity to review and comment on the Illinois River CREP Proposal. Approximately 60-70 individuals representing various interest groups were present. Overall response to the proposal was favorable. The primary concern voiced at the meeting was that the proposed project be as flexible as possible in order to accommodate as many producers as possible. The proposal was developed with flexibility as a primary guiding principle.

Riparian area and buffer protection and establishment are two of the most important practices needed to improve water quality. While some of these areas are currently protected through contracts written under the Section 319 program, these contracts will soon expire. Even more riparian areas are unprotected or currently in pasture with eroding streambanks because of lack of funds to meet the demand and because of lack of interest in short-term contracts.

The State Cooperative Extension Service has also been a long-time promoter of the benefits of riparian buffer systems. University of Arkansas Division of Agriculture contribution to the Illinois River Basin CREP will be:

- Contribute $400,000 in development funding toward applied demonstration and research activities. These funds would be in direct support of evaluating and promoting alternative management practices and the educational effort necessary to landowner participation in the CREP project.
- Design and deliver a credible and effective landowner education program with respect to the value and application of the Illinois River Basin CREP program to

individual farm situations. Utilize the County Extension Agent delivery system of Washington and Benton Counties and associated citizen networks to strengthen the public and landowner understanding of the CREP project and its value to both landowners and the environmental health of the region.

- Work cooperatively with partnering agencies and organizations in the watershed to develop a network of supporting technical and planning assistance providers.
- Develop working demonstration and educational outreach sites through the resources of the University of Arkansas Division of Agriculture and the Dale Bumpers College of Food and Life Sciences (included is significant working farm acreage within the Illinois River watershed).
- Assist in assessing the effectiveness of individual and complementary Best Management Practices and evaluating the overall effectiveness of the water quality improvements generated by the CREP.
- Utilize the full complement of diagnostic tools, laboratories and research based knowledge available through the University of Arkansas System in support of the CREP management plan and its successful implementation.

It is important to recognize the different circumstance existing in the Illinois River Watershed and that found in all other CREP project efforts in Arkansas to date. Landowners in the Illinois River Watershed have limited association with cost share programs, long term agreements, easements and other associated conservation programs found in the current USDA Farm Program. They are also in a rapidly developing area with increasing land values. This competition for land use and reluctance on the part of landowners to make long term commitment (potentially limiting future development opportunity) necessitates a CREP project supported by a sophisticated educational program and accompanying economic evaluation of alternatives, developmental limitations and environmental liabilities and benefits. The University of Arkansas Division of Agriculture is uniquely qualified and capable of providing this needed educational support and to conduct synergistic research within the Illinois River Watershed and across the state at the Arkansas Agricultural Research and Extension Centers. The system provides the opportunity to conduct a series of applied research and education demonstrations. Some of the potential opportunities are listed below:

1. Hydro-Geomorphic Restoration of Flowing Waters: Improving Ecological Services
2. Increasing water storage for flood control
3. Restoring sediment transport integrity
4. Increasing stream nutrient retention and biotransformation
5. Increasing aquatic health and aesthetic appearance
6. Animal Behavior Response to Alternative Water Supply and Limited Stream Access
7. Improving Aquatic Health and Water Quality in Adjacent Streams
8. Tracking cattle movement and behavior using GPS
9. Using off-site solar water systems to utilize natural water systems and enhance grazing distribution
10. Evaluating biotic integrity, fecal bacteria and in-channel chemistry

11. Riparian Buffer Zones (Three Zone System) to Improve Water Quality: Retention Efficiency from the Edge-of-Fields to the Aquatic System
12. Monitoring sediment, nutrient and bacteria transport at various stages and with different grazing management strategies in the grass buffer and riparian zone
13. Evaluating stream nutrient retention using whole-reach experimentation
14. Evaluating gentrification potential at various stages through the three zones
15. Simulating (modeling) the effectiveness of riparian buffers at the watershed scale
16. Increasing wildlife habitat and aesthetic value
17. Wetland Use and Restoration: Improved Downstream Water Quality
18. Increasing water storage during episodic storm events
19. Reducing sediment, nutrient and bacteria transport
20. Evaluating gentrification potential to mitigate nitrate loss
21. Chemical remediation to increase the longevity of phosphorus removal
22. Diet, Forage and Grazing Management: Improved Downstream Water Quality
23. Reducing sediment, nutrient and bacteria transport
24. Identifying alternative forages and their management needs
25. Managing cattle numbers to maximize infiltration
26. Monitoring edge-of-field losses and BMP effectiveness
27. Reducing feed supplements in cattle and its effect on manure
28. Evaluating the use of byproduct feeds such as distiller's grains on manure

Actual applicable research and demonstration activities conducted by the University of Arkansas Division of Agriculture are dependent upon the final design of the CREP.

Section 9 - Development of Procedure

The procedures in Attachment B have been developed jointly between the Farm Service Agency (FSA) and the Natural Resources Conservation Service (NRCS) in the Arkansas state office to lay out the various steps for implementing the Continuous Conservation Reserve Program (CCRP) more clearly (Steps 1-21). These procedures are based on basic guidance found in Paragraph 111C of the 2-CRP Manual and other parts as appropriate

Section 10 - Training of Staff

FSA and NRCS will train federal staff as appropriate for this project.

Section 11 - Communication Plan

An Outreach and Education Communication Plan Workgroup will be formed in the targeted watershed. The workgroup will consist of at least one District Board member from the District(s) in which the watershed lies, AGFC Fisheries/Stream Team Coordinator, AFC Forester, Conservation District staff, County Extension Agent from each county, and others as necessary to assist. With advice from Conservation District staff, farmer/ranchers seen as community leaders representing all important facets of local agriculture will also be requested to assist. Additional members may represent local recreational interests and officials of towns who use the water for a drinking water supply or any entities concerned with water quality.

The communication plan will be developed with the goal of providing local communities with the communications, education, and marketing support to ensure success of the CREP program throughout the selected areas. The following objectives will be important in meeting that goal:

- Obtain 100% awareness of the CREP program among landowners with degraded or threatened riparian areas in the selected watersheds,
- Provide 100% of the aforementioned landowners with information about economic and environmental benefits of riparian buffer protection,
- Create a positive response to CREP program in the community affected by the CREP (including not only agriculture producers eligible for the program, but water users of downstream reservoirs, and state tax payers in general),
- Develop or otherwise provide resources and materials to help promote and enlist cooperators in the CREP program,
- Build and maintain a coalition of Federal, State, and most importantly, local stakeholders to promote the program,
- Identify methods to maximize riparian protection beyond the life of, boundaries assigned to, and resources available through the proposed CREP program, and
- Additional objectives determined by the local Watershed Group, once it has been assembled.

The communication plan will recognize the following motivators to enrollment, and possibly identify additional motivators, based on personal knowledge of the watershed and community:

- To conserve natural resources including soil, forests, and wildlife,
- To improve the land and its value,
- To improve water quality,
- To improve farm productivity, either through improved profits, or decreased work maintaining marginal lands,
- To reduce the likelihood of additional lawsuits and/or future regulations,
- Increased incentives for installation and maintenance of conservation practices, and
- To work cooperatively as a watershed unit, including Oklahoma members.

The communications plan will recognize the following barriers to enrollment (and possibly additional ones based on more intimate knowledge of the local community and its needs) and seek ways to minimize the effect of these barriers:

- Investment of time and money,
- Ever increasing costs of implementation and maintenance,
- Hesitation to commit to a long-term program that may restrict ability to use or sell your land,
- Increasing pressure to develop land in northwest Arkansas, northeast Oklahoma, and
- Government guidelines.

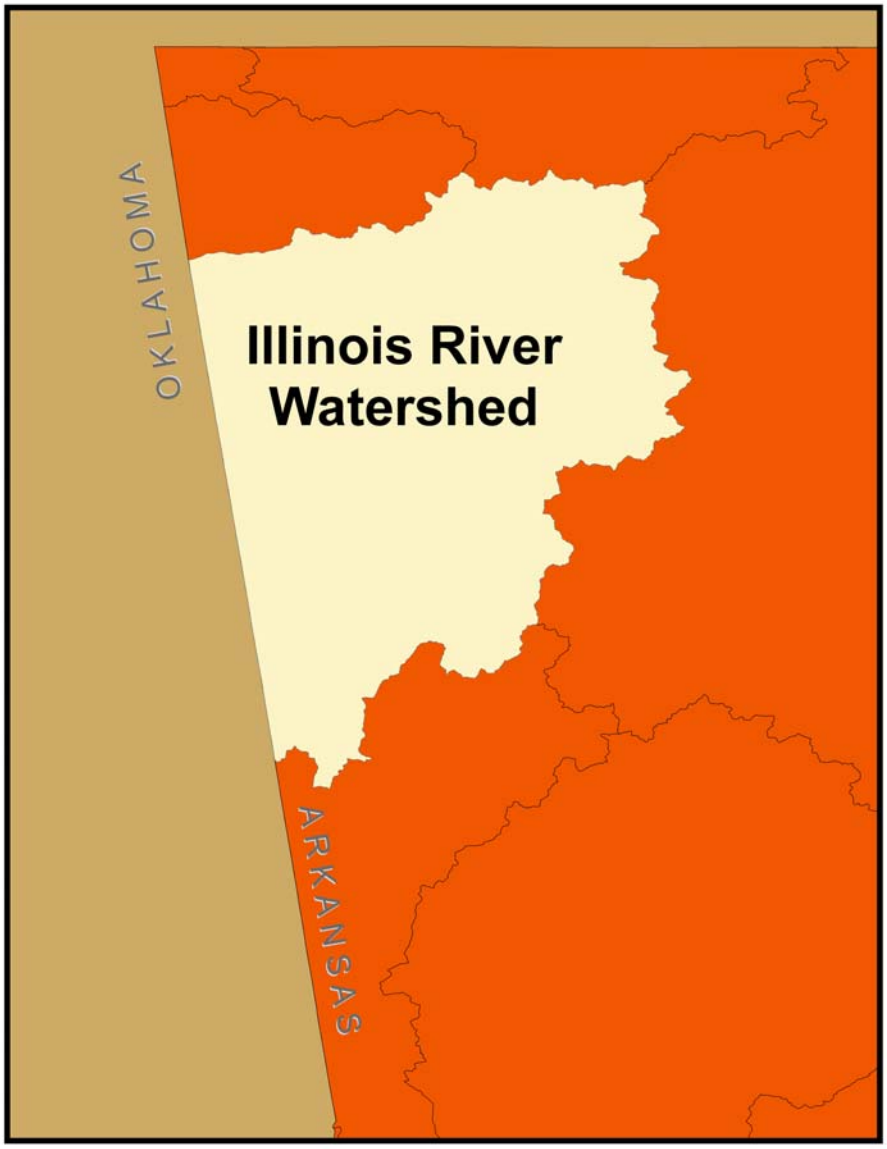
The communications plan will describe the development and/or use of the following tools and materials:

- Door-to-door presentations and phone calls
- Brochures,
- Fact Sheets,
- Riparian Management Handbook,
- Press releases, newspaper articles, radio spots,
- Signs,
- Events, activities, tours, presentations and displays at public meetings,
- Mail outs,
- Additional tools as determined by the Watershed Advisory Group, and
- Links from agency, NGO, and local web sites to the mentioned information in electronic form.

Attachment A

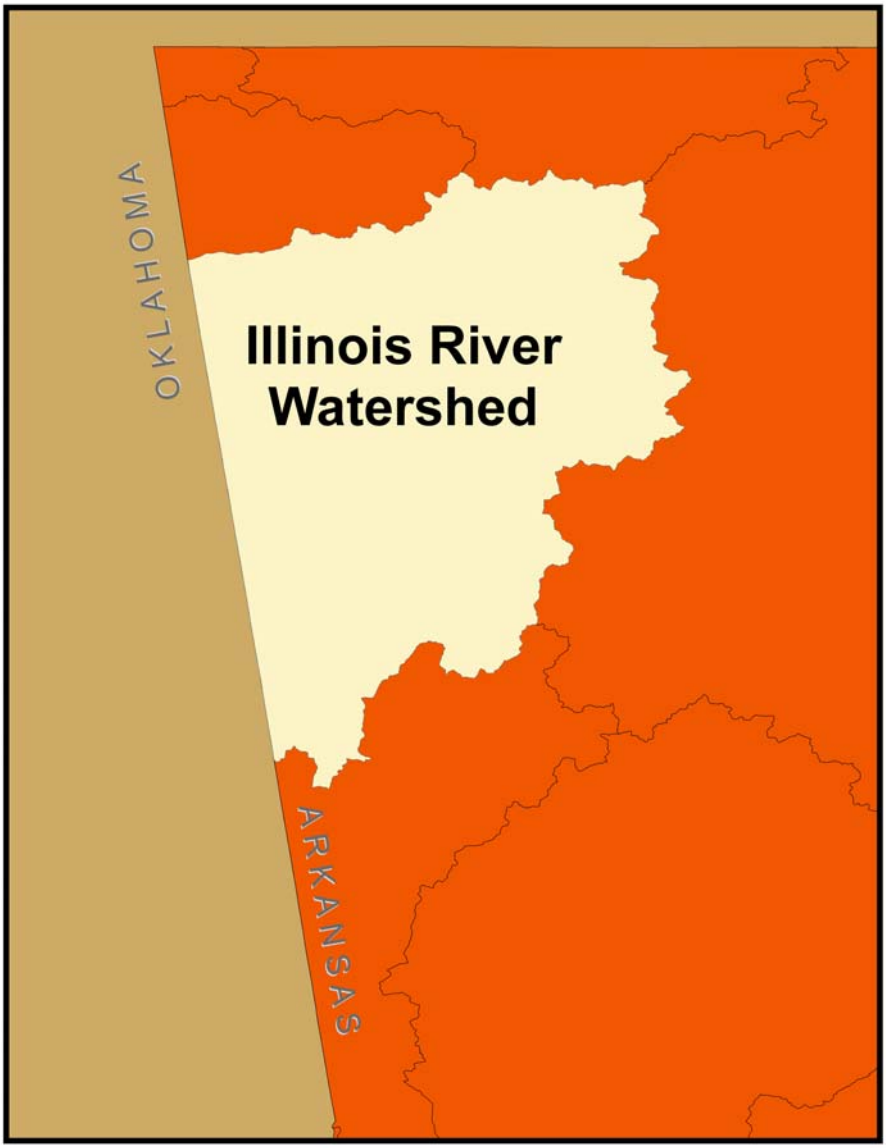
2006 Program Cost List

(Not included in draft)



Attachment B

Illinois River CREP Program Procedure



Step	Implementers	Responsibilities
1	FSA, NRCS	FSA explains the program and the practices to the landowner. NRCS may assist with an explanation of technical aspects of practices as requested by applicants (including State Tax Credit options).
2	Producer	The producer is responsible for indicating the area offered for the program and estimated acres, identifying the application area as near as can be determined on aerial photography.
3	FSA	FSA determines: producer eligibility (See Paragraph 82); basic land and practice eligibility criteria (See Paragraph 112); and program policy and practice requirements (See Exhibit 9). This eligibility determination is not a determination of final approved acres. If all these are not met, then FSA does not forward the CRP-2C to NRCS.
4	FSA	FSA fills in all items on the CRP-2C except items 2, 3B, 6, 14A-F on cropland, and 17A-F on cropland (See Paragraph 138C).
5	FSA	FSA subdivides fields where partial field practices are offered according to existing policy (see Paragraph 138C, CRP-2C Item 22). Assigned field numbers will be indicated on a map and the CRP-2C.
6	FSA, NRCS	FSA forwards completed CRP-2C to NRCS along with an aerial photograph (arc-view maps are preferable where capability exists) delineating the acres initially determined to be eligible. Only areas eligible for the continuous CRP practices should be included (See Paragraph 138C Item 24B). The area marked should identify the partial field area being offered as specifically as possible so that NRCS employees will know which parts of a field are to be evaluated. Those practices that have a limited width that cannot be exceeded without documentation by NRCS should indicate only the initial width (i.e. 180 ft. for CP-22). A producer signature on CRP-2C is not authorized prior to forwarding the form to NRCS at this point since final eligibility, needs, location, and acreage have not yet been established. Note: Both **FSA and NRCS** should notify the producer that NRCS may identify additional eligible area if the producer desires, and the additional area is needed to address resource concerns.
7	NRCS	NRCS will consult with the producer to establish the final width where appropriated and notify FSA of any changes in width by providing a written memo. Where no changes are to be made, an NRCS employee may either initial next to each eligible acreage in item 24B or provide notice in a written memo that acres were reviewed and no changes are indicated.

8	NRCS, TSP (Technical Service Provider)	NRCS or TSP (Arkansas Game and Fish Commission or Arkansas Forestry Commission) makes a mandatory site visit to determine whether: the offered land is suitable for the practice offered; the practice offered is needed and feasible to solve the resource concern (See Exhibit 9); and whether the existing cover is functioning as the practice offered.
9	NRCS	When evaluating a site for CP-22 or CP-29, NRCS may determine an additional width is needed for water quality purposes. NRCS employees may also observe reasons why the offered acreage may not be eligible for the practice or the eligible acres need to be adjusted. The changes will be clearly communicated to FSA by written memo, or by making notations of additional widths on the map provided by FSA. Any GPS coordinates documented by NRCS for revised practice boundaries may be provided to FSA electronically by downloading directly to their computer. In order to provide accurate location information, top-of-bank will be identified for these practices, using either GPS coordinates or marking with flags.
10	NRCS	NRCS may provide information to FSA to aid in conducting a measurement service on all partial field practices. This can be accomplished by downloading GPS coordinates directly to the FSA computer to allow an in-office measurement or by flagging field boundaries using materials that will remain visible above existing vegetation so that FSA can conduct a field measurement service. A complete polygon must be provided based either on top-of-bank where other vegetation is not present, or edge of existing vegetation where it is present.
11	NRCS	Once NRCS completes their responsibilities described above, including filling in items 14A-D and 17 A-D for cropland on the CRP-2C, the form and any supporting documentation is returned to FSA.
12	FSA	FSA finalizes the measurement service and completes the remaining items on the CRP-2C and the CRP-1 with the landowner, notifies the landowner of acceptance, and explains the process for finalizing the program contract, including the need to get a conservation plan through NRCS. Final eligible acres will be indicated if necessary by correcting item 24 on the CRP-2C.
13	FSA	FSA returns a copy of the signed CRP-2C and the CRP-1 to NRCS to begin the planning process.

14	NRCS	NRCS meets with the landowner and writes the conservation plan and/or forwards a request to the appropriate TSP, if applicable, for a practice plan which will be integrated into the conservation plan (See National Planning Procedures Handbook, FOTG Sections III – V, and GM 180 Part 409). The plan will include NRCS-CPA-52 (This is not the AR-NRCS-CPA-52 used for other conservation planning) developed as a part of the planning process, and all other appropriate forms.
15	TSP, NRCS	If a TSP is used for plan development, the TSP will return the plan to NRCS. In all cases where the AGFC or AFC is writing a portion of the plan, NRCS is responsible for incorporating that information into the Conservation Plan.
16	NRCS, Conservation District	NRCS and Conservation District will approve the final conservation plan and forward the completed conservation plan with appropriate signatures to FSA
17	County Committee	The County Committee approves the final plan and the CRP-1.
18	FSA	FSA issues AD-862 to NRCS followed by an AD-245 to landowner.
19	NRCS	NRCS will, as part of its technical responsibility, assist the landowner in laying out the boundaries of practices or assist in determining the location for placement of "T" posts for CP-22 and CP-29 using the same GPS coordinates provided to FSA or as otherwise marked in the field. This will be done at a time convenient to both parties prior to practice installation. Since applicants can start implementation of a practice at their own risk prior to approval of the CRP-1, this activity could possibly be accomplished at the same time step 9 in Processing the Offer is carried out provided existing crops or other situations do not prevent it. Notice of the right to install 'T' posts prior to contract approval will be provided to the applicant by FSA.
20	NRCS, TSP	NRCS or TSP assists the landowner with practice installation, documents the conservation plan, and completes the AD-862 for FSA.
21	FSA	FSA processes the payment request from the landowner.
22	FSA	FSA provides copies of CRP-1, CRP-2, AD-862, AD-245, CRPO, and appropriate State paperwork (State Incentive Payment Application, Vendor Profile, W-9, and optional Direct Deposit Authorization form) to producer.

23	Producer	Receives project documentation from FSA and sends copies of: CRP-1, CRP-2, AD-862, AD-245, CRPO, bills, State incentive paperwork (State Incentive Payment Application, Vendor Profile, W-9, optional Direct Deposit Authorization form), and Tax Credit Application (if applicable) to ANRC for processing.
24	ANRC	Enters final contract information into State CREP database and processes State Tax Credit paperwork if applicable. Forwards appropriate paperwork to Department of Finance and Administration (DF&A) so State Incentive Payment and State Tax Credit can be issued to producer(s).
25	DF&A	Processes paperwork and makes State Incentive Payment to producer(s).
26	NRCS	County Office makes spot checks according to 2-CRP for CRP-1compliance, and notifies FSA of contract violations.
27	FSA	Issues annual rental payments when authorized and after final status review. Informs ANRC of contract violations, and other significant changes to CREP contracts.
28	ANRC	By January 1st of each year, beginning in 2008, ANRC provides a report to the USDA FSA summarizing the status of enrollments under CREP and progress on fulfilling the other commitments of this program.

APPENDIX B
RELEVANT LAWS AND REGULATIONS

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APPENDIX B—RELEVANT LAWS AND REGULATIONS

This following is a non-exclusive and brief discussion of the relevant laws and regulations that form the basis of the programmatic environmental analysis for the proposed Conservation Reserve Enhancement Program agreement for the Illinois River Watershed in Arkansas.

Clean Air Act

The *Clean Air Act* (42 *United States Code* [USC] parts 7401 et seq., 1999) regulates air emissions from area, stationary, and mobile sources, and authorizes the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. Sections 107 and 110 of the *Clean Air Act* give each State responsibility for ensuring that pollution levels within their borders are consistent with NAAQS.

Clean Water Act

The *Clean Water Act* (CWA) (33 USC parts 1251 et seq., 2000), formally known as the *Federal Water Pollution Control Act*, was passed to restore and protect the waters of the U.S. CWA established the basic structure for regulating discharges of pollutants into the waters of the U.S. It continued requirements to set water quality standards for all contaminants in surface waters and gave EPA the authority to implement pollution control programs. In addition, CWA recognized the need for planning to address the critical problems posed by non-point source pollution, such as that generated by agricultural production (e.g., runoff and leaching of pesticides and fertilizers).

Endangered Species Act

The *Endangered Species Act* (ESA) (16 USC parts 1531 et seq., 1988) was enacted to conserve threatened and endangered species and the critical habitats in which they exist. When a species is designated as threatened with extinction, a recovery plan that includes restrictions on cropping practices, water use, and pesticide use is developed to protect the species from further population declines. All Federal agencies are required to implement ESA by ensuring that their actions do not jeopardize the continued existence of any listed species. Section 7 of ESA requires that project areas must be checked against U.S. Fish and Wildlife Service and State listings of threatened and endangered species and critical habitat.

ESA defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range. Threatened means a species is likely to become endangered within the foreseeable future. These designations may be applied to all species of plants and animals, except pest insects. A species may be threatened at the State level, but that same designation does not necessarily apply across the U.S., as species numbers may be greater in other States. Critical habitat is defined by ESA as areas that are essential to the conservation of listed species.

Executive Order 11514, Protection and Enhancement of Environmental Quality

Executive Order (EO) 11514, *Protection and Enhancement of Environmental Quality* (35 *Federal Register* [FR] 4247, 1977), mandated the Federal government to provide leadership in protecting and enhancing the quality of the environment to sustain and enrich human life. Federal agencies are required to initiate measures needed to direct their policies, plans, and programs so as to meet national environmental goals.

Executive Order 11988, Floodplain Management

EO 11988, *Floodplain Management* (42 FR 26951, 1979), compels Federal agencies to restore and preserve the natural and beneficial values served by floodplains by: 1) avoiding short-term and long-term adverse impacts associated with the occupancy and modification of floodplains; and 2) avoiding direct and indirect support of floodplain development wherever there is a practicable alternative. Federal agencies are required to take actions that will reduce the risk of flood loss and minimize the impact of floods to human safety, health, and welfare.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 32, 1995), requires Federal agencies to make achieving environmental justice part of their mission by considering whether their programs, policies, and activities may have adverse impacts to minority or low-income populations. This EO emphasizes the importance of the public participation process, directing each Federal agency to provide opportunities for community input in the *National Environmental Policy Act* (NEPA) process by providing access to public documents and furnishing notices and hearings.

Food Security Act of 1985

The Conservation Reserve Program (CRP) was established under Title XII of the *Food Security Act of 1985* (16 USC part 3831, 1996). The purpose of CRP is to cost-effectively assist owners and operators in conserving and improving soil, water, and wildlife resources on their farms and ranches. Highly erodible and other environmentally sensitive acreage, normally devoted to the production of agricultural commodities, is converted to a long-term resource conservation cover. Conservation compliance provisions for highly erodible land are commonly referred to as *Sodbuster* provisions. Wetland conservation provisions, commonly known as *Swampbuster* provisions, help preserve the environmental functions and values of wetlands, including flood control, sediment control, groundwater recharge, water quality, wildlife habitat, recreation, and aesthetics.

The *Farm Security and Rural Investment Act of 2002*, commonly known as the *2002 Farm Bill*, authorizes CRP through 2007 and raises the overall enrollment cap to 39.2 million acres (16 USC part 3831, 1996). CREP is authorized pursuant to the *Federal Agriculture Improvement and Reform Act of 1996* and is a subset of CRP (7 USC parts 7201 et seq., 1998).

National Environmental Policy Act

NEPA is intended to help Federal officials make decisions that are based on consideration of the environmental consequences of their actions, and to take actions that protect, restore, and enhance the environment. NEPA mandates that Federal agencies consider and document the impacts that major projects and programs may have to the environment. The Council on Environmental Quality provides implementing regulations (40 *Code of Federal Regulations* [CFR] parts 1500 et seq., 2006). NEPA guidance for the Farm Service Agency is obtained through *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 CFR parts 799 et seq., 2007).

National Historic Preservation Act

The *National Historic Preservation Act* (NHPA) (16 USC part 470, 2000) establishes as Federal policy the protection of historic properties and their values. Subsequent amendments designate the State Historic Preservation Office (SHPO) or the Tribal Historic Preservation Office (THPO) as the party responsible for administering programs in the States or reservations. Federal agencies are required to consider the effects of their undertakings on historic resources, and to give SHPO/THPO a reasonable opportunity to

comment on those undertakings. NHPA implementing regulations (36 CFR parts 800.3–800.13, 2006) govern compliance with Section 106 of NHPA, which must be followed in planning any Federal agency activity and in the ongoing management of agency resources.

REFERENCES

7 CFR parts 799 et seq. 2007. "Environmental Quality and Related Environmental Concerns—Compliance with the National Environmental Policy Act." Farm Service Agency, Department of Agriculture. *Code of Federal Regulations*. U.S. Government Printing Office via GPO Access. Available via http://www.gpoaccess.gov/cfr/index.html. January 1. Accessed January 29, 2007.

36 CFR parts 800.3–800.13. 2006. "Subpart B—The Section 106 Process." Protection of Historic Properties. Parks, Forests, and Public Property. Advisory Council on Historic Preservation. *Code of Federal Regulations*. U.S. Government Printing Office via GPO Access. Available via http://www.gpoaccess.gov/cfr/index.html. July 1. Accessed August 1, 2006.

40 CFR 30 parts 1500 et seq. 2006. "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act." Chapter 5. Council on Environmental Quality, Executive Office of the President. *Code of Federal Regulations*. U.S. Government Printing Office via GPO Access. Available via http://www.gpoaccess.gov/cfr/index.html. July 1. Accessed August 1, 2006.

35 FR 4247. 1977. Executive Order 11514, as amended. "Protection and Enhancement of Environmental Quality." *Federal Register*. U.S. National Archives and Records Administration. Available via http://www.archives.gov/federal-register/codification/executive-order/11514.html. Accessed February 23, 2006.

42 FR 26951. 1979. Executive Order 11988, as amended. "Floodplain Management." *Federal Register*. U.S. National Archives and Records Administration. Available via http://www.archives.gov/federal-register/codification/executive-order/11988.html. Accessed February 23, 2006.

59 FR 32. 1995. Executive Order 12898, as amended. "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." *Federal Register*. U.S. National Archives and Records Administration. Available via http://www.archives.gov/federal-register/executive-orders/1994.html. Accessed February 23, 2006.

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16 USC parts 1531 et seq. 1988. "Endangered Species Act of 1973," as amended. *United States Code*. U.S. Government Printing Office via GPO Access. Available via http://www.gpoaccess.gov/uscode/index.html. Accessed February 23, 2006.

16 USC part 3831. 1996. "Conservation Reserve," as amended. *United States Code*. U.S. Government Printing Office via GPO Access. Available via http://www.gpoaccess.gov/uscode/index.html. Accessed February 23, 2006.

33 USC parts 1251 et seq. 2000. "Federal Water Pollution Control Act of 1972," commonly referred to as the *Clean Water Act*, as amended. *United States Code*. U.S. Government Printing Office via GPO Access. Available via http://www.gpoaccess.gov/uscode/index.html. Accessed February 23, 2006.

42 USC 85 parts 7401 et seq. 1999. "Clean Air Act," as amended. *United States Code*. U.S. Government Printing Office via GPO Access. Available via http://www.gpoaccess.gov/uscode/index.html. Accessed February 23, 2006.

APPENDIX C
SUMMARY OF CONSERVATION PRACTICES

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APPENDIX C—SUMMARY OF CONSERVATION PRACTICES

Following this paragraph is a summary of Farm Service Agency (FSA) conservation practices (CPs) for the proposed Conservation Reserve Enhancement Program (CREP) agreement for the Illinois River Watershed in Arkansas as described in *Agricultural Resource Conservation Program for State and County Offices* (FSA 2007) commonly referred to as 2-CRP (Revision 4). These National CPs have been modified specifically for the Arkansas CREP agreement as detailed in the following summary.

CP22—Riparian Buffer and CP29—Marginal Pastureland Wildlife Habitat Buffer

Description:

Detailed descriptions of CP22 and CP29 are provided in 2-CRP (Revision 4) (FSA 2007), exhibit 9 pages 86, and 135 respectively.

Modifications:

Stream bank stabilization will be implemented before riparian vegetation is restored or established and will be allowed at a cost-share rate of 50 percent.

The minimum combined width of zones 1 and 2 will be equal to 30 percent of the width of the geomorphic floodplain but never less than 50 feet or greater than 100 feet. This is the minimum width for the buffer to function properly and the landowner must install this much. The landowner can then choose to install additional buffer out to a 300-foot program maximum (CP22). Additional buffer can be enrolled under the infeasible to farm/graze definition (16 *United States Code* [USC] part 3831, 1996).

The infeasible to farm/graze definition will also apply to CP29. Producers may request a waiver to enroll infeasible to farm/graze in excess of 25 percent.

Winter feeding facilities composed of a covered heavy use area (Natural Resources Conservation Service [NRCS] Practice 588—Roof Runoff Structure) combined with a dry manure storage area (NRCS Practice 313—Waste Storage Facility) and a cement water tank will be allowed at a cost-share rate of 50 percent. These facilities will be constructed out of the geomorphic floodplain. They will be a combination of NRCS practices 561 and 313, with a roof over the heavy use area.

Alternative water sources may be developed within 1,500 feet of the edge of zone 3 with county committee approval to encourage upland pasture use for grazing and floodplain pasture use for haying.

Watering facilities will allow up to 1,500 feet of pipeline with county committee approval.

The maximum dollar amount allowed for water development, water facilities, and pipeline ($3,000, $2,000, and $2,000 respectively) will be per 0.5 mile of stream rather than per contract.

When two eligible tracts are separated by a wooded area, fence through the treed area will be allowed at a cost-share rate of 50 percent.

REFERENCE

16 USC part 3831. 1996. "Conservation Reserve," as amended. *United States Code*. U.S. Government Printing Office via GPO Access. Available via http://www.gpoaccess.gov/uscode/index.html. Accessed February 23, 2006.

FSA. 2007. *Agricultural Resource Conservation Program for State and County Offices*, Revision 4, Amendments 1 through 10, Farm Service Agency, U.S. Department of Agriculture. Washington, Available at http://www.fsa.usda.gov/Internet/FSA_File/2-crp.pdf. Accessed April 11, 2007.

APPENDIX D
NET PRESENT VALUE ANALYSIS

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APPENDIX D—NET PRESENT VALUE ANALYSIS

Data used for the net present value analysis for the proposed Conservation Resource Enhancement Program agreement for the Illinois River Watershed in Arkansas over 15 years is shown on the following page of this appendix.

Year	Discount Factor	Establishment Costs	Cost Share (FSA)	Wetlands Restoration Cost Share	SIP	PIP	TNC Incentive Payment	Rental Rate	Incentive Payment	Maintenance	Lost Jobs	Lost Farm Income	Sum	NPV
2007	1.00	-1,718,750	859,375	195,938	625,000	242,000	1,000,000	256,250	192,188	32,920	-122,000	-438,777	1,124,142	1,124,142
2008	0.95							256,250	192,188	32,920	-122,000	-438,777	-79,420	-75,449
2009	0.90							256,250	192,188	32,920	-122,000	-438,777	-79,420	-71,677
2010	0.86							256,250	192,188	32,920	-122,000	-438,777	-79,420	-68,093
2011	0.81							256,250	192,188	32,920	-122,000	-438,777	-79,420	-64,688
2012	0.77							256,250	192,188	32,920	-122,000	-438,777	-79,420	-61,454
2013	0.74							256,250	192,188	32,920	-122,000	-438,777	-79,420	-58,381
2014	0.70							256,250	192,188	32,920	-122,000	-438,777	-79,420	-55,462
2015	0.66							256,250	192,188	32,920	-122,000	-438,777	-79,420	-52,689
2016	0.63							256,250	192,188	32,920	-122,000	-438,777	-79,420	-50,055
2017	0.60							256,250	192,188	32,920	-122,000	-438,777	-79,420	-47,552
2018	0.57							256,250	192,188	32,920	-122,000	-438,777	-79,420	-45,174
2019	0.54							256,250	192,188	32,920	-122,000	-438,777	-79,420	-42,916
2020	0.51							256,250	192,188	32,920	-122,000	-438,777	-79,420	-40,770
2021	0.49							256,250	192,188	32,920	-122,000	-438,777	-79,420	-38,731
TOTAL			859,375				1,000,000	3,843,750		493,800	**-1,830,005**	**-6,581,662**	**12,258**	**351,051**
NPV per Acre														**18**

Assumptions:

1) Discount rate of 5%
2) Rental rate is 100% of established county rates
3) Maintenance fee of $4/acre
4) Maintenance fee of $6–9 for CP22
5) USDA covers 50% of establishment costs
6) An additional 25% of establishment costs provided for CP-23 and CP-23A
7) SIP is $100/acre
8) PIP is 40% of eligible cost share
9) The Nature Consurvancy provides a one-time conservation easement payment of $160/acre