UNITED STATES DEPARTMENT OF AGRICULTURE

FARM SERVICE AGENCY

FINAL

Programmatic Environmental Assessment for Implementation of the Conservation Reserve Enhancement Program Agreement for Oklahoma

July 2006

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COVER SHEET

Proposed Action: The United States Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the Conservation Reserve Enhancement Program (CREP) agreement for the State of Oklahoma. 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* 55 parts 4321 et seq., 2000), the Council on Environmental Quality implementing regulations (40 *Code of Federal Regulations* [CFR] 30 parts 1500 et seq., 2005), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 CFR 7 parts 799 et seq., 2006). 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.

Lead Agency: USDA FSA

Cooperating Agencies: USDA, Natural Resources Conservation Service, and the Oklahoma Conservation Commission

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Comments: Once this PEA is finalized, a Notice of Availability will be printed in newspapers within the vicinity of the CREP area. FSA will provide a public comment period prior to any FSA decision regarding the proposed action.

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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 State of Oklahoma. 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 United States Department of Agriculture Farm Service Agency in accordance with the requirements of the *National Environmental Policy Act* (42 *United States Code* 55 parts 4321 et seq., 2000), the Council on Environmental Quality implementing regulations (40 *Code of Federal Regulations* 30 parts 1500 et seq., 2005), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 *Code of Federal Regulations* 7 parts 799 et seq., 2006).

Purpose and Need for the Proposed Action

The purpose of the proposed action is to implement Oklahoma's Conservation Reserve Enhancement Program agreement by removing up to 19,035 acres of riparian areas from agricultural use. Under this agreement, these lands would be enhanced by creating or restoring riparian buffers and reducing livestock access to floodplains in order to improve water quality in the Illinois River/Lake Tenkiller and Spavinaw Lake watersheds.

The Conservation Reserve Enhancement Program is needed to meet the following goals in Oklahoma:

- Improve overall water quality in two high priority watersheds
- Reduce phosphorus loading by 30 percent, nitrogen loading by 32 percent, and sediment loading by 30 percent
- Reduce excess nutrients in waterways caused by runoff from poultry litter
- Establish riparian buffers to help reduce overland flow of phosphorus to streams
- Restore riparian vegetation to stabilize stream banks and help reduce bank erosion
- Restrict livestock access to floodplains to decrease overland flow of pathogens to streams, and to decrease stream bank erosion and the subsequent sediment loading of streams
- Demonstrate both short-term and long-term benefits of riparian protection so that producers and other landowners are encouraged to utilize riparian protection as a standard part of land management.

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 up to 19,035 acres from agricultural production and establish approved conservation practices on the land. Eligible land would be pasture or cropland located adjacent to waterbodies in the Illinois River/Lake Tenkiller and Spavinaw Lake watersheds.

The proposed action would provide participants with annual rental payments for the 15-year contract period. Rental payments would include a maintenance payment of $10.00 per acre and an additional maintenance fee for riparian buffers in the amount of 20 percent of the rental payment. Participants would also receive a one-time signing incentive payment of $150.00 per acre. In some cases, haying may be permitted on enrolled lands. The rental rate for lands with haying allowed would be 90 percent of the standard rental rate with no use of forage.

Participants would be compensated for conservation practice establishment costs. The Oklahoma Conservation Commission and the Farm Service Agency would pay a cost-share payment of up to 83 percent of the cost to establish the required cover. The Farm Service Agency would also issue a practice incentive payment equal to 40 percent of the practice establishment costs.

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 habitat, including that of protected species • Establishment of migration corridors for wildlife and reduce fragmentation • Increased health and persistence of fish populations • Increased vegetation diversity • Long-term beneficial impacts to wildlife and fisheries and vegetation • Long-term beneficial impacts to six of ten protected species in the region of influence; potential adverse impacts to two protected species if riparian buffers are implemented within areas they utilize for habitat; negligible impact or slight benefit to remaining two protected species • Temporary adverse impacts due to human disturbance and increased sedimentation.	• Continued loss and degradation of wildlife and fisheries habitat • Increased fragmentation of wildlife habitat • Decreased health and persistence of fish populations • Continued alteration and depletion of native vegetation • Long-term adverse impacts to wildlife and fisheries, vegetation, and protected species.

Resource	Proposed Action	No Action
Cultural Resources	• High potential for encountering both recorded and unidentified archaeological and architectural sites and traditional cultural properties • Actions to be reviewed with the Oklahoma State Historic Preservation Office on a site specific basis, as appropriate • 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 nutrients, pathogens, and turbidity in streams • Reduced stream bank erosion and sediment loading • Increased capability of surface water to retain dissolved oxygen • Greater rates of aquifer recharge • Reduced pollutants and sediments in wetlands • Improved function of floodplains • Long-term beneficial impacts to surface water, groundwater, and wetlands.	• Continued degradation of surface water, groundwater, and wetlands due to high nutrient loading, turbidity, low dissolved oxygen content, high sedimentation levels, and the presence of pathogens • Continued algae blooms and potential fish kills • Long-term adverse impacts to water resources.
Soil Resources	• Reduced wind and water erosion • Stabilization of soils and topography • No anticipated impact to paleontological resources • Temporary increase in erosion during implementation.	• Continuation of current rates of erosion and changes in topography. • No anticipated impact to paleontological resources.
Air	• Increased vegetation would reduce erosion and provide beneficial local impacts to air quality • May enhance carbon sequestration • Temporary, minor adverse impacts during implementation activities.	• No impact to existing conditions.
Recreation	• Increased opportunities for hunting, fishing, and wildlife viewing	• No impact to existing conditions.

Resource	Proposed Action	No Action
	• Improved water quality and aesthetics • Temporary displacement of wildlife may occur during implementation • Long-term beneficial impacts to recreation.	
Socio-economics	• Positive net present value for land rentals • Implementation would create total net present value of $22.0 million over 15 years • Increased recreation opportunities would generate economic activity.	• Socioeconomic conditions would continue to follow current trends.
Environmental Justice	• Loss of 72 farm worker positions (estimated cost of $424,225 per year) in poverty area • Installation and maintenance of conservation practices may create new positions • Conservation Reserve Enhancement Program payments may generate additional non-farm employment within the community.	• No impact to existing conditions.
Wild and Scenic Rivers	• Reduced nutrients, pathogens, and turbidity in scenic rivers • Reduced stream bank erosion and sediment loading • Increased capability of scenic rivers to retain dissolved oxygen • Long-term beneficial impacts to scenic rivers.	• Continued degradation of scenic rivers due to high nutrient loading, turbidity, low dissolved oxygen content, high sedimentation levels, and the presence of pathogens • Continued algae blooms and potential fish kills • Long-term adverse impacts to scenic rivers.

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ACRONYMS AND ABBREVIATIONS

AFS	American Fisheries Society
ASWM	Association of State Wetland Managers
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BMP	best management practice
BP	before present
CCC	Commodity Credit Corporation
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CWS	Canadian Wildlife Service
CP	conservation practice
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
EO	Executive Order
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FR	*Federal Register*
FRPP	Farm and Ranch Land Protection Program
FSA	Farm Service Agency
FWS	Fish and Wildlife Service
GMA	game management area
gpm	gallons per minute
GRP	Grassland Reserve Program
HFRP	Healthy Forests Reserve Program

LMBV	largemouth bass virus
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act*
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
OAS	Oklahoma Archeological Survey
OCC	Oklahoma Conservation Commission
ODEQ	Oklahoma Department of Environmental Quality
ODWC	Oklahoma Department of Wildlife Conservation
OES	Oklahoma Ecological Services
OSHPO	Oklahoma State Historic Preservation Office
OSRC	Oklahoma Scenic Rivers Commission
OWRB	Oklahoma Water Resources Board
PEA	programmatic environmental assessment
ROI	region of influence
SWCAP	Soil and Water Conservation Assistance Program
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 area

WRP Wetlands Reserve Program

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1.0 INTRODUCTION

The United States Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the Conservation Reserve Enhancement Program (CREP) agreement for the State of Oklahoma (Appendix A). This programmatic environmental assessment (PEA) has been prepared to analyze the potential environmental consequences associated with the proposed action and no action alternatives in accordance with the *National Environmental Policy Act* (NEPA) (42 *United States Code* [USC] 55 parts 4321 et seq., 2000), the Council on Environmental Quality (CEQ) implementing regulations (40 *Code of Federal Regulations* [CFR] 30 parts 1500 et seq., 2005), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 CFR 7 parts 799 et seq., 2006). 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 58 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 2007 and raises the overall enrollment cap to 39.2 million acres (16 USC 58 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 100 parts 7201 et seq., 1998). This program is based on the continuous CRP model but differs in four important ways (FSA 2006):

- 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 10 to 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 Oklahoma Conservation Commission (OCC). 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 30 parts 1500 et seq., 2005; 7 CFR 7 parts 799 et seq., 2006). 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 85 parts 7401 et seq., 1999)

- *Clean Water Act* (33 USC 26 parts 1251 et seq., 2000)

- *Endangered Species Act of 1973*, as amended (16 USC 35 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 1A part 470, 2000).

1.2 Purpose and Need for Action

The purpose of this action is to implement Oklahoma's CREP agreement to reduce nutrient and sediment loading in two high priority watersheds by restoring riparian buffers and reducing livestock access to floodplains. Under this agreement, eligible farm land would be planted in grass, shrubs, and trees.

The Oklahoma CREP agreement is needed to:

- Improve overall water quality in two high priority watersheds

- Establish riparian buffers to help reduce overland flow of nutrients to streams

- Restore riparian vegetation to stabilize stream banks and help reduce bank erosion
- Restrict livestock access to floodplains to decrease overland flow of pathogens to streams, and to decrease stream bank erosion and the subsequent sediment loading of streams
- Encourage landowners to view riparian protection as a standard practice of land management.

1.3 Objectives

CREP agreements are designed to meet specific regional conservation goals and objectives related to agriculture. The proposed agreement with Oklahoma is focused on improving water quality in two high priority watersheds in eastern Oklahoma, the Illinois River/Lake Tenkiller and the Spavinaw Lake watersheds (herein referred to as the *Tenkiller* and *Spavinaw watersheds*) (Figure 1). These watersheds were selected for participation because their water quality problems are representative of other watersheds within the region and they would serve to demonstrate the benefits of riparian protection for acceptance by landowners across the region.

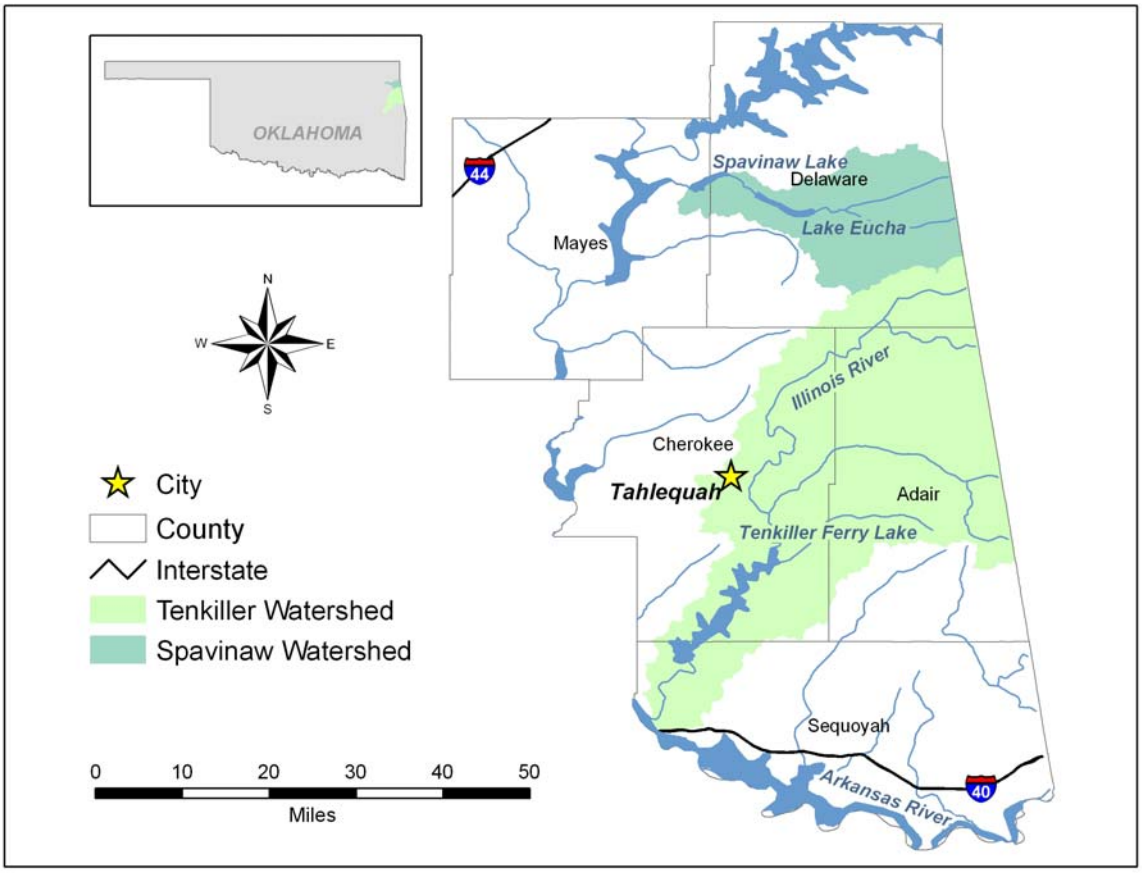

Figure 1. Oklahoma watersheds proposed for CREP enrollment.

Water quality problems in the Tenkiller and Spavinaw watersheds are due to excess nutrients, pathogenic bacteria, and sedimentation. These watersheds are major poultry growing and cattle producing areas, and a common practice has been to fertilize the soil for grazing purposes by applying poultry litter. This practice has led to the excessive buildup of phosphorus that currently pollutes waterbodies in the ROI. Excess nutrients have also caused low dissolved oxygen levels in these

waterways. Livestock access to floodplains has contributed to stream impairments from pathogenic bacteria and sedimentation.

The primary objective of the Oklahoma CREP agreement is to reduce nutrient and sediment input to specific watersheds. This would be accomplished by restoring riparian buffers to these systems and reducing livestock access to floodplains. These actions would result in less overland flow of nutrients, sediments, and pathogens to streams and less stream bank erosion. This, in turn, would result in better water quality, lower maintenance requirements to the road and highway system, and would help to preserve existing floodplain pasture. A secondary goal of CREP is to demonstrate the short-term and long-term benefits of riparian protection so that producers and other landowners will eventually accept riparian protection as a standard part of land management.

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.

The Oklahoma CREP agreement would intend on enrolling up to 19,035 acres of riparian land within the Tenkiller and Spavinaw watersheds. This would include up to 15,172 acres in the Tenkiller watershed and up to 3,863 acres in the Spavinaw watershed. These watersheds were delineated by OCC and correspond roughly to the 11-digit hydrological unit codes in Oklahoma as mapped by the U.S. Geological Survey (USGS).

As the exact location of parcels that might be enrolled in CREP is not known at this time, the region of influence (ROI) for this PEA is considered to be 805,000 acres within the following areas:

- Tenkiller watershed (575,000 acres)—in Adair, Cherokee, Delaware, and Sequoyah counties
- Spavinaw watershed (230,000 acres)—in Delaware and Mayes counties.

The specific goals and objectives for the Oklahoma CREP agreement include the following:

- Establish up to 19,035 acres of riparian buffer in two high priority watersheds
- Reduce excess nutrients in waterways caused by runoff from poultry litter
- Reduce phosphorus loading by 30 percent, nitrogen loading by 32 percent, and sediment loading by 30 percent in these watersheds
- Demonstrate short-term and long-term benefits of riparian protection so that producers and other landowners are encouraged to utilize riparian protection as a standard part of land management.

The intended outcome of the Oklahoma 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.

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.

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2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the alternatives, which include 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 Oklahoma CREP agreement would enroll up to 19,035 acres of riparian areas in CRP (Table 1). Once the CREP agreement is approved, landowners would enroll eligible lands in the program on a voluntary basis. As such, the exact location of parcels that might be enrolled is not known at this time.

To be eligible, land must be pasture or cropland located adjacent to streams, rivers, or lakes in the Tenkiller or Spavinaw watersheds. Cropland must have been planted or considered planted to a crop in two of the five previous years, and must be physically and legally capable of being used for crop production. Marginal pastureland may also be enrolled provided it is suitable for use as a riparian buffer planted to trees, wildlife habitat buffer, or wetland buffer. In addition, land must have been owned or operated by the applicant for the previous 12 months. If the land is currently enrolled in CRP, that contract must expire before the land is considered eligible for enrollment in CREP.

2.1.1 Established Conservation Practices

The CPs proposed for implementation under the Oklahoma CREP agreement are CP21—Filter Strips and CP22—Riparian Buffer. These CPs would be installed on eligible land and according to rules in *Agricultural Resource Conservation Program for State and County Offices* (FSA 2003b). A detailed description of each practice is provided in Appendix C.

Preparation of lands for installation of CPs may include removal of existing vegetation or rocks through the use of tilling, burning, or approved agricultural chemicals. Temporary covers may be installed. Earth moving equipment may be used to construct surface dikes, dams, levies, and subsurface piping and structures to regulate water flow. Fire breaks, fencing, and roads may also be installed.

Table 1. Land in farms for the counties that are partially within the watersheds proposed for CREP enrollment.

County	Watershed	Total Acres in County	Acres in Farms	Percentage of Total Land in Farms
Adair	Tenkiller	368,639	237,874	64.5
Cherokee	Tenkiller	480,638	220,739	45.9
Delaware	Tenkiller, Spavinaw	474,238	282,106	59.5
Mayes	Spavinaw	419,838	302,172	72.0
Sequoyah	Tenkiller	431,358	222,350	51.5
Source: USDA 2004, USCB 2000a				

2.1.2 Financial Support to Land Owners

The preferred alternative would provide the participant with annual rental payments for the 15-year contract period. Rental payments would include a maintenance payment of $10.00 per acre and an

additional maintenance fee for riparian buffers in the amount of 20 percent of the rental payment. Participants would also receive a one-time signing incentive payment of $150.00 per acre. In some cases, haying may be permitted on enrolled lands. The rental rate for lands with haying allowed would be 90 percent of the standard rental rate with no use of forage.

Participants would be compensated for practice establishment costs. OCC and FSA would pay a cost-share payment of up to 83 percent of the cost to establish the required conservation cover. FSA would also issue a practice incentive payment equal to 40 percent of the practice establishment costs.

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.

Public involvement commenced on March 20, 2006, with letters mailed to 21 persons and agencies. A list of those contacted is available in Chapter 8 of this document. These letters included a summary of the proposed action and alternatives and solicitation for comment. No comments were received.

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 30 parts 1500 et seq., 2005). Accordingly, several resources have been eliminated from further analysis in this PEA. These resources and the reasons for exclusion are provided in the following discussion.

Sole Source Aquifers

The 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). There are no sole source aquifers within the ROI (EPA 2005a).

Coastal Zones

There are no coastal zones in or near the ROI.

Noise

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

Traffic and Transportation

The proposed action would have no impact to existing traffic and transportation conditions in the ROI.

Human Health and Safety

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

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 1 parts 62.1–62.9, 2005). There are no national natural landmarks in the ROI.

Wilderness

A wilderness area is federally-owned land that has been designated by Congress for inclusion in the National Wilderness Preservation System. There are no wilderness areas in the ROI (16 USC 23 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 Oklahoma CREP agreement by enrolling up to 19,035 acres of riparian areas in the Tenkiller and Spavinaw watersheds in CRP. Filter strips and riparian buffers would be installed on eligible land to reduce nutrient and sediment input and improve overall water quality in the watersheds. Participants would receive annual rental and maintenance payments for the 15-year contract periods, as well as one-time signing incentive payments.

2.4.2 Alternative B—No Action

Alternative B, the no action alternative, would involve not implementing the Oklahoma CREP agreement. No land would be enrolled in CRP, and the goals for the Oklahoma CREP would not be met. This alternative would result in a continuation of current agricultural practices and the degradation of water quality due to excess nutrients and sediments.

2.5 Comparison of Alternatives

2.5.1 Identification of Geographical Boundaries

The proposed project area (i.e., ROI) is riparian land in the Tenkiller and Spavinaw watersheds. These high priority watersheds are located in the northeastern portion of Oklahoma (Figure 1). The Oklahoma CREP agreement would intend on enrolling up to 15,172 acres within the Tenkiller watershed, and up to 3,863 acres within the Spavinaw watershed. These watersheds encompass portions of Adair, Cherokee, Delaware, Mayes, and Sequoyah counties. There are no major cities within the proposed project area.

2.5.2 Identification of Temporal Boundaries

Agricultural land owners that participate in CREP would enroll lands for contracts of 15 years. It is anticipated that all eligible contracts would be signed within 3 years of the project opening date, which would roughly establish the year 2024 as the temporal boundary for the purposes of this analysis.

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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 watersheds or by counties, 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 includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.1.1.2 Affected Environment

3.1.1.2.1 Wildlife

The Oklahoma Department of Wildlife Conservation (ODWC) has full and complete authority to manage the wildlife of Oklahoma. This includes approximately 51 species of amphibians, 356 species of birds, 175 species of fish, 58 species of invertebrates, 106 species of mammals, and 83 species of reptiles (ODWC 2005a). ODWC sets the hunting regulations for game species in Oklahoma, which include white-tail deer, elk, feral hogs, small game, upland game, furbearing animals, waterfowl and webless birds (Tables 2 and 4) (ODWC 2005b). ODWC also has authority over non-game species (i.e., species that are not hunted, fished or trapped).

Table 2. Common and scientific names of game species in the ROI.

Common Name	Scientific Name	Common Name	Scientific Name
Badger	*Taxidea taxus*	Mourning dove	*Zenaida macroura*
Beaver	*Castor canadensisis*	Muskrat	*Ondatra zibethicus*
Bobcat	*Lynx rufus*	Nutria	*Myocastor coypus*
Bobwhite quail	*Colinus virginianus*	Opossum	*Didelphis virginiana*
Common snipe	*Gallinago gallinago*	Pheasant	*Phasianus colchicus*
Cottontail rabbit	*Sylvilagus floridanus*	Prairie dog	*Cynomys ludovicianus*
Coyote	*Canis latrans*	Raccoon	*Procyon lotor*
Crow	*Corvus brachyrhynchos*	Scaled Quail	*Callipepla squamata*
Eastern gray squirrel	*Sciurus carolinensis*	Striped skunk	*Mephitis mephitis*
Eastern fox squirrel	*Sciurus niger*	Swamp rabbit	*Sylvilagus aquaticus*
Eurasian collared dove	*Streptopelia decaocto*	Turkey	*Meleagris gallopavo*
Feral hog	*Sus scrofa*	Weasel	*Mustela sp.*
Gray fox	*Urocyon cinereoargenteus*	White-tail deer	*Odocoileus virginianus*

Common Name	Scientific Name	Common Name	Scientific Name
Jackrabbit	*Lepus townsendii*	White-winged dove	*Zenaida asiatica*
Mink	*Mustela vison*	Woodcock	*Scolopax minor*
Source: ODWC 2005b			

White-Tail Deer

White-tail deer hunting is the most popular season in the State. These deer, once nearly extirpated from the State, can now be found in all 77 Oklahoma counties. Surveys indicate that the average buck in Oklahoma weighs between 80 and 105 pounds. Average doe weight is 74 to 98 pounds. Largely due to the production of hard mast and excellent and diverse habitat, over 100 deer checked in during the 2002 hunting season weighed 200 pounds or more (Lambeth 2002).

White-tail deer, both bucks and does, can be taken by bow, gun, or primitive muzzleloader. There were 11,248 deer (6,530 bucks and 4,718 does) taken in the Tenkiller and Spavinaw watersheds in 2004 (Table 3) (ODWC 2004a). Cherokee County had the highest take of all Oklahoma counties in the 2004 season.

Table 3. White-tail deer take in the ROI in 2004.

County	White-Tail Deer		
	Total	Bucks	Does
Adair	1,618	984	634
Cherokee	3,405	1,882	1,523
Delaware	2,240	1,269	971
Mayes	1,798	1,059	739
Sequoyah	2,187	1,336	851
Source: ODWC 2004a			

Feral Hogs

The three types of wild hogs in Oklahoma are feral hogs, Eurasian (Russian) wild boars, and a hybrid cross of the two (Stevens 1999). Feral hogs are found throughout many Oklahoma counties and may be found within the ROI. Feral hogs can generally adapt to any habitat, but they prefer moist bottomlands and streams and rivers. Feral hogs are omnivorous, with a vast diet that can include grasses, forbs, roots, tubers, grapes, plums, pears, acorns, mushrooms, hard and soft mast, birds, snails, insects, eggs, worms, carrion, and agricultural crops such as peanuts, oats, wheat, soybeans, and corn (Stevens 1999).

Small Game

Small game hunting in Oklahoma includes the take of rabbits and squirrels. The three species of rabbits in the State are cottontails (*Sylvilagus floridanus*), swamp rabbits (*Sylvilagus aquaticus*), and jackrabbits (*Lepus townsendii*) (ODWC 2005b). ODWC allows the hunting of two species of squirrel; the eastern fox squirrel (*Sciurus niger*) and the eastern gray squirrel (*Sciurus carolinensis*) (ODWC 2005b). All of these small game species have the potential to occur in the ROI.

Upland Game

Upland game species in Oklahoma include wild turkey, bobwhite quail, scaled quail, and pheasants (ODWC 2005b). Though once thought to be nearly extirpated from the State, wild turkeys are currently

turkey (*Meleagris gallopavo intermedia*) occurs in the western portion of Oklahoma. The eastern turkey (*Meleagris gallopavo silvestris*) occurs more in the eastern portion of the State. ODWC sets regulations for fall and spring turkey seasons.

Wild turkey habitat includes locations that provide roosting areas, nesting cover, water, food, escape cover, and brood rearing areas (Bidwell 2005). Roosting trees should have open canopies and large horizontal limbs. Nesting cover is normally located in thick ground cover such as grass, shrubs, alfalfa fields, huckleberry bushes, and grape vines, and areas around stream banks. Turkeys forage on a variety of items, such as berries, seeds, green leaves, insects, snails, and soft mast (Bidwell 2005). Feeding areas must have escape cover to protect the birds during foraging. Brood rearing areas are vicinities with grass or crop stubble, where insects are numerous and protective cover is available. Turkeys require water every day. If standing water is not available, turkeys will glean water off vegetation to fulfill their daily requirements (Bidwell 2005).

There are two subspecies of bobwhite quail that occur in Oklahoma; the eastern bobwhite (*Colinus virginianus virginianus*) and the plains bobwhite quail (*Colinus virginianus taylori*) (ODWC 2005b). Eastern bobwhites occur in only the extreme southeast corner of the State, and probably not within the ROI. Plains bobwhites can be found throughout the State and in the ROI. Bobwhite quail habitat includes areas of warm season grasses with clumps of low, brushy, woody vegetation. Populations have been found to thrive in edge habitats, which are transition areas between two different vegetation types (e.g., forest to grass).

Scaled quail occur mostly in the Oklahoma panhandle and are unlikely to be found in the ROI (ODWC 2005b). Their habitat includes arid grassland and desert scrub areas.

Ring-neck pheasants occur mostly in the north-central and northwestern portions of Oklahoma, and are unlikely to be found in the ROI (ODWC 2005b). Pheasants prefer agricultural farmlands, such as cultivated fields surrounded by fence rows or shrubby vegetation, as primary habitat. The ring-neck pheasant diet includes waste grains, insects, and weed seeds.

Furbearing Animals

Furbearer harvest in Oklahoma includes the take of raccoon, badger, mink, muskrat, opossum, weasel, bobcat, beaver, nutria, striped skunk, coyote, and gray fox (ODWC 2005b). These species have the potential to occur within the ROI. Participating in furbearer harvest in Oklahoma requires a hunting license and trapping license; however furbearing animals found destroying livestock or poultry may be taken at any time (ODWC 2005b).

Waterfowl and Webless Birds

ODWC sets the regulations for waterfowl and migratory bird hunting, which encompasses the take of ducks, geese, and other webless game birds (Table 4) (ODWC 2005b). Oklahoma is within the Central Flyway Zone that includes Montana, Wyoming, Colorado, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, Alberta, Saskatchewan, and the Northwest Territories.

Non-Game Species

Oklahoma has over 900 non-game species within the State such as bats, voles, gophers, and mice. Non-game migratory species include owls, hawks, and songbirds. Black bear, mountain lion, red fox, river otter, swift fox, spotted skunk, and ringtail were all game species at one time in Oklahoma; however, population declines limited them throughout the State and led ODWC to close hunting seasons year round for these species (ODWC 2005b). The ROI is rich in non-game species such as bats and songbirds.

Table 4. Common and scientific names for waterfowl and webless game bird species in Oklahoma.

Common Name	Scientific Name	Common Name	Scientific Name
American widgeon	*Anas americana*	Lesser scaup	*Aythya affinis*
Black rail	*Laterallus jamaicensis*	Mallard	*Anas platyrhynchos*
Blue-winged teal	*Anas discors*	Northern pintail	*Anas acuta*
Bufflehead	*Bucephala albeola*	Northern shoveler	*Anas clypeata*
Canada goose	*Branta canadensis*	Red-breasted merganser	*Mergus serrator*
Canvasback	*Aythya valisineria*	Redhead	*Aythya americana*
Cinnamon teal	*Anas cyanoptera*	Ring-neck duck	*Aythya collaris*
Coots	*Fulica atra*	Ross goose	*Chen rossii*
Common goldeneye	*Bucephala clangula*	Ruddy duck	*Oxyura jamaicensis*
Common loon	*Gavia immer*	Sandhill crane	*Grus canadensis*
Common merganser	*Mergus merganser*	Snow goose	*Chen caerulescens*
Common moorehen	*Gallinula chloropus*	Sora	*Porzana*
Gadwall	*Anas strepera*	Virginia rail	*Rallus limicola*
Greater scaup	*Aythya marila*	White-fronted goose	*Anser albifrons*
Hooded merganser	*Lophodytes cucullatus*	Wood duck	*Aix sponsa*
King rail	*Rallus elegans*		
Source: ODWC 2005a			

3.1.1.2.2 Fisheries

ODWC safeguards and makes regulations for management of approximately 175 fish species that occur throughout the State (Appendix D). Game fish include species such as bass, catfish, crappie, walleye, and trout (Table 5) (American Fisheries Society [AFS] 2005). Oklahoma supplements its game fish population with hatchery-raised fish from four State hatcheries and one national hatchery managed by the U.S. Fish and Wildlife Service (FWS). The Durant, Holdenville, Byron, and J.A. Manning State hatcheries and the Greer's Ferry National Fish Hatchery provide anglers with increased fishing opportunities, as well as provide fish to private pond owners.

Waterways within the ROI have been inflicted with such impairments as excess nutrients, low dissolved oxygen content, the presence of pathogens, and high levels of turbidity. These impairments may limit the variance of aquatic life (EPA 2002a). Algae blooms due to phosphorus loading in waterways have been a contributor to summer fish kills.

Table 5. Popular game fish in Oklahoma.

Common Name	Scientific Name	Common Name	Scientific Name
Bass, largemouth	*Micropterus salmoides*	Crappie, white	*Pomoxis annularis*
Bass, smallmouth	*Micropterus dolomieu*	Sauger	*Sander canadense*
Bass, spotted	*Micropterus punctulatus*	Saugeye	*Stizostedion canadense x Stizostedion vitreum vitreum*
Bass, stripped	*Morone saxatilis*	Shadowbass	*Ambloplites ariommus*

Common Name	Scientific Name	Common Name	Scientific Name
Bass, white	*Morone chrysops*	Sunfish, green	*Lepomis cyanellus*
Bass, yellow	*Morone mississippiensis*	Sunfish, longear	*Lepomis megalotis*
Bluegill	*Lepomis macrochirus*	Sunfish, redear	*Lepomis microlophus*
Catfish, blue	*Ictalurus furcatus*	Trout, brown	*Salmo trutta*
Catfish, channel	*Ictalurus punctatus*	Trout, rainbow	*Oncorhynchus mykiss*
Catfish, flathead	*Pylodictis olivaris*	Walleye	*Stizostedion vitreum*
Crappie, black	*Pomoxis nigromaculatus*		
Source: AFS 2005			

In 2000, the largemouth bass virus (LMBV) was found for the first time in Oklahoma in Lake Tenkiller. LMBV has been found in other species, such as other bass and sunfish, but the virus is only fatal in largemouth bass (ODWC 2004b). Since the discovery of this virus in Oklahoma, ODWC has tested for LMBV in 26 other lakes. LMBV virus was found in 21 of the 26 lakes, including Tenkiller and Eucha lakes, both of which are in the ROI (ODWC 2004b).

3.1.2 Vegetation

3.1.2.1 Description

Vegetation includes native and introduced plant species. The ROI for this resource analysis includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and 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. A Roman numeral hierarchy is used to denote different levels of ecoregions (Woods et al. 2005). 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.

Oklahoma is divided into 12 Level III Ecoregions. Ecoregions within the ROI are the Arkansas Valley, Boston Mountains, and the Ozark Highlands. Level III Ecoregions are further subdivided into Level IV Ecoregions or, for the purposes of discussion in this analysis, *subregions* (Table 6, Figure 2). The potential natural vegetation of the subregions within the ROI as described by Woods et al. (2005) is discussed in the following subsections.

3.1.2.2.1 Arkansas Valley

The Tenkiller watershed contains portions of three different Level III Ecoregions, one of which is the Arkansas Valley ecoregion. The Tenkiller watershed lies within the Arkansas River Floodplain of this ecoregion. The Arkansas River Floodplain subregion is typified by floodplains and low terraces along the Arkansas River. Common features are those typical of floodplain areas, such as oxbow lakes, swamps, natural levees, scars, and swales. Vegetation includes deciduous forest species such as oak (*Quercus sp.*),

sycamore (*Platanus sp.*), sweetgum (*Liquidambar styraciflua*), willow (*Salix sp.*), cottonwood (*Populus deltoids*), green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis laevigata*), pecan (*Carya illinoinensis*), and elm (*Ulmus sp.*), with some understory grasses. Much of this subregion has been cleared for crop production.

Table 6. Level III and Level IV Ecoregions in the ROI.

Watershed	Level III Ecoregion	Level IV Ecoregion (Subregion)
Tenkiller	Arkansas Valley	Arkansas River Floodplain
	Boston Mountains	Lower Boston Mountains
	Ozark Highlands	Springfield Plateau, Dissected Springfield Plateau—Elk River Hills
Spavinaw	Ozark Highlands	Springfield Plateau, Dissected Springfield Plateau—Elk River Hills
Source: Woods et al. 2005		

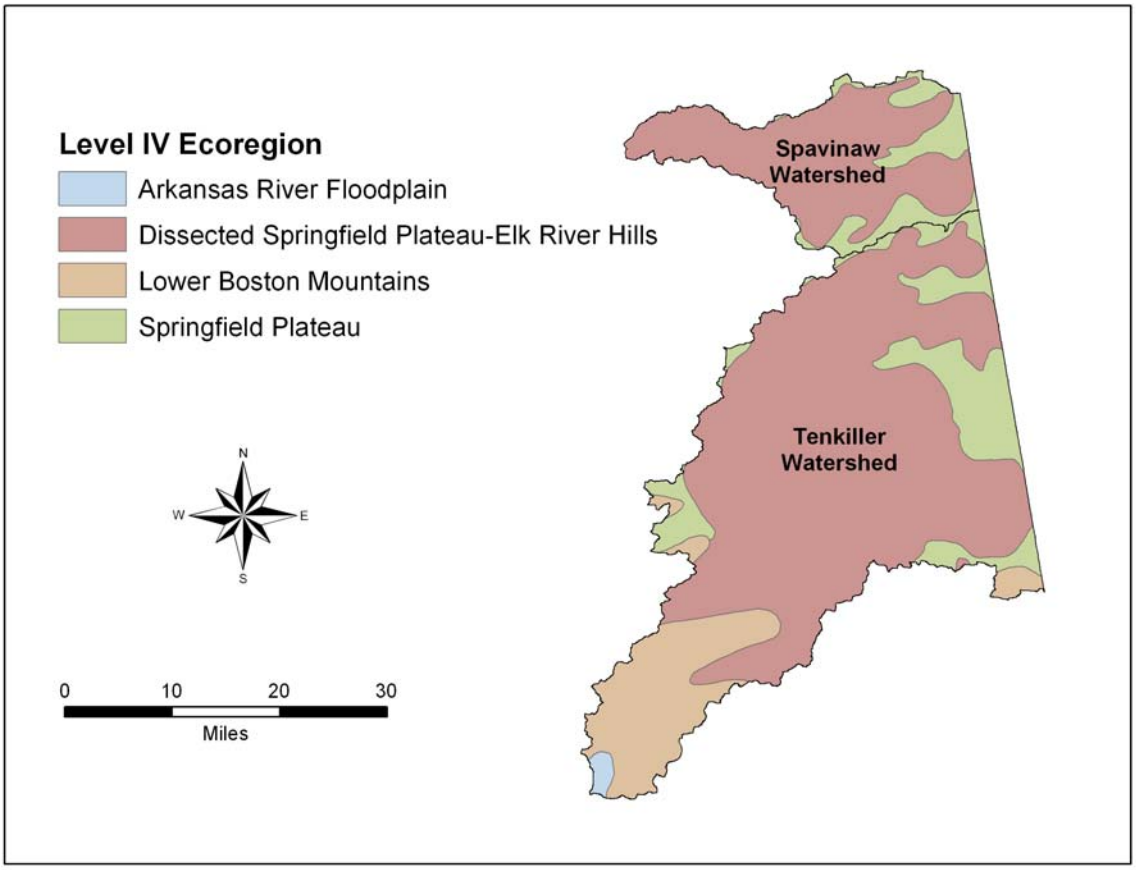

Figure 2. Level IV Ecoregions in the ROI.

3.1.2.2.2 Boston Mountains

The Tenkiller watershed is also within the Lower Boston Mountains of the Boston Mountains ecoregion. The Lower Boston Mountains subregion is characterized by rounded, high hills or low mountains, and benches. Vegetation in this subregion consists of mostly hardwood forests. Species within hardwood

forests may include blackjack oak (*Quercus marilandica*), post oak (*Quercus stellata*), black hickory (*Carya texana*), sugar maple (*Acer saccharinum*), white oak (*Quercus alba*), chinquapin oak (*Quercus muehlenbergii*), mockernut hickory (*Carya tomentosa*), birch (*Betula sp.*), sycamore (*Platanaceae sp.*), elms (*Ulmus sp.*), willows (*Salix sp.*), bitternut hickory (*Carya cordiformis*), and cottonwood (*Populus deltoides*).

3.1.2.2.3 Ozark Highlands

Both the Tenkiller and Spavinaw watersheds are located within two subregions of the Ozark Highlands ecoregion. These subregions are the Springfield Plateau and the Dissected Springfield Plateau—Elk River Hills. The Springfield Plateau subregion is characterized by level to rolling landscapes that are relatively undissected. Caves and sinkholes are common. Vegetation includes oak-hickory forests, mixed deciduous forests, and oak-hickory-pine forests. Historically, savannas and tall grass prairies were common and managed by fire. Current species within the Springfield Plateau may include black oak (*Quercus velutina*), white oak (*Quercus alba*), blackjack oak (*Quercus marilandica*), post oak (*Quercus stellata*), winged elm (*Ulmus alata*), hickories (*Carya sp.*), willow (*Salix sp.*), maple (*Acer sp.*), birch (*Betula sp.*), American elm (*Ulmus americana*), and sycamore (*Platanaceae sp.*). Primary land uses within this subregion are agriculture, including the growing of small grains, grapes, orchard fruit, or vegetables; construction of residential areas; and pastureland.

The Dissected Springfield Plateau—Elk River Hills subregion displays rolling landscapes similar to those of the Springfield Plateau subregion, but is moderately to highly dissected. Dissection is due to steep valleys and narrow ridgetops. Vegetation within the Dissected Springfield Plateau—Elk River Hills includes oak-hickory forests, oak-hickory-pine forests, mixed deciduous forests, mixed deciduous-pine forests, and bottomland deciduous forests. Species may include black oak (*Quercus velutina*), white oak (*Quercus alba*), blackjack oak (*Quercus marilandica*), hickories (*Carya sp.*), shortleaf pine (*Pinus echinata*), post oak (*Quercus stellata*), sugar maple (*Acer saccharinum),* northern red oak (*Quercus rubra*), American elm (*Ulmus americana*), and sycamore (*Plantanaceae sp.*). Primary land uses within this subregion are livestock and poultry farming, logging, grazing, and recreational activities.

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 of 1973*, as amended (16 USC 35 parts 1531 et seq., 1988). Critical habitats are specific geographic areas that are essential for conservation of a particular species and that have been formally designated by Federal rule.

The ROI for this resource analysis includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3. There is no critical habitat in the immediate vicinity of the ROI.

3.1.3.2 Affected Environment

FWS lists 28 protected species in Oklahoma (Table 7) (FWS 2005). Four mammals, one insect, five birds, and three mussels are listed as endangered. One reptile, two mammals, five fish, two birds, and two plants are listed as threatened. One fish, one bird, and one mussel are candidate species for listing. In addition, ODWC lists three species that the State considers threatened or endangered, but are not federally listed (Table 7) (ODWC 2005c).

Table 7. Protected species in Oklahoma.

Species	Federal Status*	State Status*	Species	Federal Status*	State Status*
Alligator, American (*Alligator mississippiensis*)	T	T	Madtom, Neosho (*Noturus placidus*)	T	T
Bat, gray (*Myotis grisescens*)	E	E	Mapleleaf, winged (*Quadrula fragosa*)	E	---
Bat, Indiana (*Myotis sodalis*)	E	E	Mucket, Neosho (*Lampsilis rafinesqueana*)	C	E
Bat, Ozark big-eared (*Corynohinus townsendii ingens*)	E	E	Mussel, scaleshell (*Leptodea leptodon*)	E	E
Bear, grizzly (*Ursus arctos horribilis*)	T	---	Orchid, eastern prairie fringed (*Platanthera leucophaea*)	T	---
Beetle, American burying (*Nicrophorus americanus*)	E	E	Orchid, western prairie fringed (*Platanthera praeclara*)	T	---
Cavefish, Ozark (*Amblyopsis rosae*)	T	T	Plover, piping (*Charadrius melodus*)	T	T
Crane, whooping (*Grus americana*)	E	E	Pocketbook, Ouachita rock (*Arkansia wheeleri*)	E	E
Crayfish, cave (*Cambarus zophonastes*)	---	E	Prairie-chicken, lesser (*Tympanuchus pallidicinctus*)	C	---
Curlew, Eskimo (*Numenius borealis*)	E	---	Shiner, Arkansas river (*Notropis girardi*)	T	T
Darter, Arkansas (*Etheostoma cragini*)	C	---	Tern, least interior population (*Sterna antillarum*)	E	E
Darter, blackside (*Percina maculate*)	---	T	Trout, bull (*Salvelinus confluentus*)	T	---
Darter, leopard (*Percina pantherina*)	T	T	Vireo, black-capped (*Vireo atricapilla*)	E	E
Darter, longnose (*Percina nasuta*)	---	E	Wolf, gray (*Canis lupus*)	E	---
Eagle, bald (*Haliaeetus leucocephalus*)	T	T	Woodpecker, red-cockaded (*Picoides borealis*)	E	E
Lynx, Canada (*Lynx Canadensis*)	T	---			

**Status Codes: E = Endangered; T = Threatened; C = Candidate*
Source: FWS 2005, ODWC 2005c

Not all of the species listed by FWS occur within the ROI. Of the 28 federally-listed species, 10 have historically used or currently use habitat within or near the ROI (Table 8).

Table 8. Protected species in the ROI.

Common Name	Watersheds of Potential Occurrence
Bat, gray	Tenkiller, Spavinaw
Bat, Indiana	Tenkiller, Spavinaw
Bat, Ozark big-eared	Tenkiller, Spavinaw
Beetle, American burying	Tenkiller, Spavinaw
Cavefish, Ozark	Spavinaw
Darter, Arkansas	Tenkiller, Spavinaw
Eagle, bald	Tenkiller, Spavinaw
Mucket, Neosho	Tenkiller, Spavinaw
Plover, piping	Tenkiller, Spavinaw
Tern, least interior	Tenkiller
Source: Oklahoma Ecological Services (OES) 2005a	

Gray Bat

The gray bat was first listed as endangered on April 28, 1976. This species is presently thought to occur in Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Missouri, Oklahoma, Tennessee, Virginia, and West Virginia (41 FR 83, 1976). This species may occur within the Tenkiller and Spavinaw watersheds (Adair, Cherokee, and Delaware counties) (OES 2005a).

Gray bats are invertivores that roost in certain caves during different seasons. Caves have specific dimensions that will either keep the cave cold in the winter or warm in the summer, depending on the needs of this species. Most summer caves are located near rivers or streams where the gray bat will go to feed. The biggest factor affecting the decline of this species is human disturbance at roosting sites. Pesticides, such as those used in agricultural practices, may also be affecting the species.

Indiana Bat

The Indiana bat was first listed by FWS on March 11, 1967, and is currently considered endangered throughout its entire range. The species is presently thought to occur in Alabama, Arkansas, Georgia, Iowa, Illinois, Indiana, Kansas, Kentucky, Maryland, Michigan, Missouri, Mississippi, North Carolina, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Virginia, Vermont, and West Virginia (32 FR 4001, 1967). This species may occur within the Tenkiller and Spavinaw watersheds (Adair, Delaware, and Mayes counties) (OES 2005a).

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 Ozark big-eared bat was listed as endangered throughout its entire range on November 30, 1979. This species is presently thought to occur in Arkansas, Missouri, and Oklahoma (44 FR 232, 1979). These bats

may occur within the Tenkiller and Spavinaw watersheds (Adair, Cherokee, Delaware, and Sequoyah counties) (OES 2005a).

The Ozark big-eared bat feeds primarily on moths and forages mostly in edge habitats, between open areas and forested habitat (FWS 1995). This species utilizes cliffs, caves, and rock ledges; often set in well-drained Ozark forests.

American Burying Beetle

The American burying beetle was first listed as endangered on July 13, 1989. This species is thought to occur in Arkansas, Massachusetts, Michigan, Nebraska, Ohio, Oklahoma, Rhode Island, South Dakota, and areas in Canada (54 FR 133, 1989). There have been confirmed occurrences of American burying beetles in the Tenkiller watershed (Cherokee and Sequoyah counties), and unconfirmed occurrences in the Spavinaw watershed (Adair and Delaware counties) (OES 2005a). Unconfirmed occurrences are those instances in which the species has been sighted by a reliable source, but not an FWS biologist or entomologist (OES 2005a).

American burying beetles require carrion to persist. These beetles will bury carrion underground and then lay eggs on the carrion. They stay in the same location to rear their young. Current habitat types include areas of coastal moraine grasslands, pastureland, and shrub thickets. Although it is generally agreed upon that suitable top soil and humus to bury decaying carrion is a habitat requirement, it is not known what makes the components suitable. The availability of carrion is a more important limiting factor to the American burying beetle than other habitat requirements.

Ozark Cavefish

Ozark cavefish were initially listed on November 1, 1984, and are currently considered as threatened throughout their entire range (49 FR 213, 1984). They are presently known to occur in Arkansas, Missouri, and Oklahoma. Ozark cavefish may occur within the Spavinaw watershed (Mayes County) (OES 2005a).

Ozark cavefish occupy cave streams that have pool areas. Because cave streams have limited access to sunlight, energy supply for the streams comes from other sources, such as leaf debris or bat guano (FWS 1988). Most cavefish-occupied cave streams are fed from underground aquifers rather than by surface water supply. Ozark cavefish have low metabolic requirements and have adapted to the low dissolved oxygen content found in cave streams. Areas that Ozark cavefish inhabit are usually of high water quality. Human disturbance, over-collecting, water pollution, and a low reproductive rate are the major contributors to the decline of this species (FWS 1988).

Arkansas Darter

The Arkansas darter is currently listed as a candidate species for the Federal threatened and endangered species list. The darter is known to occur only in Arkansas, Colorado, Kansas, Missouri, and Oklahoma (FWS 2004a). This species may occur within the Tenkiller and Spavinaw watersheds (Cherokee, Delaware, and Mayes counties) (OES 2005a).

Arkansas darter habitat includes areas of pebble or sand bottom pools in small streams and marshes. Streams are often spring fed and contain cool water and aquatic vegetation (FWS 2004a). Water depletion from agricultural and municipal development is the one of the biggest factors inhibiting survival of this species. Arkansas darters are poor competitors that do not thrive in habitats with great fish diversity (FWS 2004a).

Bald Eagle

FWS first listed bald eagles as endangered in 1967 but, after great conservation efforts, reclassified the species to threatened on July 12, 1995 (60 FR 133, 1995). Bald eagles are currently known to occur in all of the lower 48 States (60 FR 133, 1995). This species may occur within the Tenkiller and Spavinaw watersheds (Adair, Cherokee, Delaware, Mayes, and Sequoyah counties) (OES 2005a).

Bald eagle habitat is primarily focused around aquatic ecosystems that provide a substantial food base (60 FR 133, 1995). Aside from food base, habitat selection for the bald eagle is based on the availability of perching areas and sufficient nesting areas.

Neosho Mucket

Neosho muckets, currently listed as a candidate species for the Federal threatened and endangered species list, are known to occur in Arkansas, Kansas, Oklahoma, and Missouri (FWS 2004b). They may occur within the Tenkiller and Spavinaw watersheds (Adair, Cherokee, and Delaware counties) (OES 2005a).

Neosho mucket habitat includes waterways with stable runs, riffles with gravelly bottoms, shoals, and moderate currents (FWS 2004b). Detailed habitat and ecology information for this species is limited. Young Neosho mucket larvae are obligate parasites and will attach to fish for hosts. In Oklahoma, a population of Neosho muckets was found along a stretch of the Illinois River, from Okalahoma to the Arkansas State line down to the headwaters of Tenkiller Lake (FWS 2004b). Little evidence of recruitment was found within the Illinois River population. Loss of habitat due to dams, sedimentation, and agricultural pollution is the largest limiting factor affecting Neosho mucket populations (FWS 2004b). In the past, commercial over-harvesting for the pearl button industry decreased Neosho mucket populations (FWS 2004b).

Piping Plover

Piping plovers were listed as threatened on December 12, 1985 (FWS 1996). They are still listed as threatened, except in the Great Lakes watershed, where they are listed as endangered. Within the U.S., the piping plover is known to occur in Alabama, Colorado, Connecticut, Delaware, Florida, Georgia, Iowa, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Maine, Minnesota, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Rhode Island, South Carolina, South Dakota, Texas, Virginia, and Wisconsin. Piping plovers may occur within the Tenkiller and Spavinaw watersheds (Cherokee, Delaware, Mayes, and Sequoyah counties) (OES 2005a).

Piping plovers migrate through Oklahoma in the spring and fall. This species utilizes sandy beaches, usually along lakes or oceans, for nesting. When nesting around rivers, piping plover habitat consists of bare sandbars and islands. The number one reason for population decline is the loss and modification of habitat.

Least Interior Tern

The least interior tern, first listed by FWS on May 28, 1985, is currently designated as endangered throughout its range (50 FR 102, 1985). Least interior terns are known to occur in Arkansas, Colorado, Iowa, Illinois, Indiana, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Dakota, Nebraska, New Mexico, Oklahoma, South Dakota, Tennessee, and Texas (50 FR 102, 1985). This species may occur in the Tenkiller watershed (Sequoyah County) (OES 2005a).

Least interior tern habitat is fairly consistent throughout their range. Nesting areas include riverine areas that are sparsely vegetated, salt flats along river shorelines, and gravel bars located within unobstructed river channels (50 FR 102, 1985). Habitat selection is based on the presence of sparsely vegetated alluvial

islands, favorable water levels during nesting, and the availability of food. In Oklahoma, least interior terns have been found nesting on barren flats within saline lakes and ponds (50 FR 102, 1985). Loss of habitat and insufficient formation of new habitat is the most limiting factor to their persistence. Construction of dams and reservoirs disrupts natural erosion processes and eliminates the formation of islands. Human disturbance in nesting habitat has also been found to be a significant limiting factor to the interior least tern (50 FR 102, 1985).

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 includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.2.1.2 Affected Environment

The rich cultural history of Oklahoma is illustrated by the numerous archaeological sites throughout the State. There are presently 18,219 archaeological sites in Oklahoma, 450 of which occur within or near the ROI (Table 9) (National Register of Historic Places [NRHP] 2006).

3.2.1.2.1 Prehistoric Periods (12,000–500 years present [BP])

The study of paleoecological, ethnographic, historic, and archaeological work within Oklahoma and the surrounding areas has resulted in a better understanding of the past 12,000 years of human occupation and culture within the region. It is useful to organize this information into cultural periods based on time, diagnostic artifacts or artifact assemblages from the archaeological record, and the environmental conditions that affected human adaptation to the landscape. The following is a generalized summary of the highlights of the cultures of what is now the State of Oklahoma (Oklahoma Archeological Survey [OAS] 2006).

PaleoIndian Period (12,000–8,000 years BP)

The people of this period were mobile hunters of large mammals, such as mammoth and giant bison, that are now extinct. Archaeological cultures from this period include Clovis, Folsom, and Dalton, among others. These cultures were defined on the basis of their signature stone spear points and tool assemblages.

Archaic Period (8,000–2,000 years BP)

Hunters were gradually becoming less mobile during this period. The early Archaic period people were probably as nomadic as their PaleoIndian ancestors, with later Archaic people inhabiting more permanent camps. During the early Archaic period, spear points similar to that of the PaleoIndian period were still used. However, the giant bison of the PaleoIndian period was probably already extinct going into the early Archaic period. The people of the late Archaic period had begun using bows and arrows rather than spears, and were also using rock ovens and grinding stones to grind plant food in their semi-permanent camps. During this period, the climate was much like it is today in Oklahoma.

Woodland Period (2,000–1,200 years BP)

The Woodland period is a time of transition in American Indian cultures. In this period, pottery was introduced and bows and arrows almost entirely replaced spears. The lifestyle of the Woodland period was more sedentary; people would move camp when local resources were depleted. The first sign of plant

domestication is evidenced during the Woodland period. Native plants and grasses were probably tended and harvested.

Villager Period (1,200 –500 years BP)

The people of the Villager period lived mainly in permanent villages on fertile stream valley soils. Hunting was predominately for bison and deer, with fish and mussels being important dietary additions. Farming villages harvested foods such as corn, beans, and squash, along with tobacco. During this time, the people of what is now eastern Oklahoma composed a highly-ranked religious society that was supported by farming. The people who inhabited what is now western Oklahoma were farmers that built concentrated villages along the Washita River and its tributaries. Aside from farming, bison was another primary food source and the villages used the entire animal for food, tools, and clothing.

3.2.1.2.2 Protohistoric and Historic Periods (500 years BP–Present)

The protohistoric period in what is now considered Oklahoma was marked by European contact with the 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.

Oklahoma was not as impacted by foreign born settlers as other States were due to the manner in which the land was opened to settlement. Land was distributed by lotteries, which made it difficult for extended families to find plots together (Baxter 1986). Early historic settlement by western and northern European immigrants began in the late 18th and early 19th centuries.

European settlement of the ROI portion of Oklahoma occurred around this same time period and was predominantly by Czechs, Germans, Poles, and Mennonites from Russia (Baxter 1986). Not all settlers were interested in farming, and many took to other occupations such as railroad work, coal mining, oil industry work, and ore smelting.

Table 9. Archeological sites within the ROI.

County	Watershed	Number of Archaeological Sites by Prehistoric Period
Adair	Tenkiller	PaleoIndian (2), Archaic (30), Woodland (9), Villager (9)
Cherokee	Tenkiller	PaleoIndian (2), Archaic (69), Woodland (19), Villager (23)
Delaware	Tenkiller, Spavinaw	PaleoIndian (0), Archaic (23), Woodland (17), Villager (63)
Mayes	Spavinaw	PaleoIndian (1), Archaic (35), Woodland (25), Villager (31)
Sequoyah	Tenkiller	PaleoIndian (1), Archaic (41), Woodland (15), Villager (35)
Source: OAS 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 includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.2.2.2 Affected Environment

Architectural resources in Oklahoma include structures such as schools, mills, homesteads, hotels, seminaries, libraries, armories, and churches. Architectural properties in Oklahoma are mostly focused

around the lifestyles and cultures of Euro-American exploration, American Indian culture, railroad construction, oil industry, and mining towns. There are 18 architectural sites within the ROI that are listed in NRHP (Table 10) (Oklahoma State Historic Preservation Office [OSHPO] 2005a).

Table 10. Properties within the ROI listed in NRHP.

County	Watershed	Number of Properties	NRHP Property and Location
Adair	Tenkiller	4	Stilwell: Adair County Courthouse, Golda's Mill Westville: Buffington Hotel, Opera Block
Cherokee	Tenkiller	14	Park Hill: Murrel Home Tahlequah: Alston-Bedwell House, Cherokee Female Seminary, Cherokee National Capitol, Cherokee National Jail, Cherokee Supreme Court Building, Dr. Irwin D. Loeser Log Cabin, First Cherokee Female Seminary Site, French-Parks House, Indian University of Tahlequah, Joseph M. Thompson House, Leonard M. Logan House, Tahlequah Armory, Tahlequah Carnegie Library
Source: OSHPO 2005a			

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 8 parts 800.3–800.13, 2005) 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 includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.2.3.2 Affected Environment

There are four TCPs within the ROI that are recognized by NRHP (Table 11). The grave of Reverend Jesse Bushyhead, a significant religious and political leader of the Cherokee Nation, was listed in 2004. Ross Cemetery, listed in 2002, is the burial place of Chief John Ross, who was a principal Chief of the Cherokee Nation during the Civil War. The Illinois Campground was listed in 2004 and designates the point on the Trail of Tears at which Chief Ross disbanded his detachment. The Polson Cemetery, located near the town of Jay, was listed in 1977 because it contains the stone marker of Confederate General Stand Watie.

Table 11. TCPs within the ROI.

County	Watershed	Number of Properties	Traditional Cultural Properties
Adair	Tenkiller	1	Westville: Reverend Jesse Bushyhead Grave
Cherokee	Tenkiller	2	Park Hill: Ross Cemetery Tahlequah: Illinois Campground
Delaware	Spavinaw	1	Jay: Polson Cemetery
Source: OSHPO 2005a			

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 land within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.3.1.2 Affected Environment

Section 303(d) of the *Clean Water Act* establishes water quality standards and every two years States must compile a list of waterbodies within their jurisdiction that do not meet these standards (33 USC 26 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 2005b). Impairments to waterways within the ROI include the presence of phosphorus and nitrates, low dissolved oxygen content, pathogens, and high levels of turbidity (Table 12). A listing of all waterbodies within the ROI is provided in Appendix E.

The number one cause of water impairments within the ROI is excessive nutrient loading (EPA 2002a). This is due in large part to the practice of fertilizing grazing land by applying poultry litter. Within the Tenkiller watershed, Baron (Barren) Fork, Caney Creek, Flint Creek, Illinois River, and Tenkiller Ferry Lake are listed as impaired due to an excess of phosphorus, and Sager Creek is impaired due to excess nitrates (Table 12). Lake Eucha and Spavinaw Lake in the Spavinaw watershed are also impaired due to high levels of phosphorus (Table 12) (EPA 2002a). The loading of nutrients can instigate eutrophication, which causes waterways to age in succession prematurely and triggers excess plant growth, such as algae blooms and aquatic weeds. Algae blooms occur naturally but with more frequency and severity in the presence of nutrients (NRCS 1994). When the algae die, they sink to the bottom of the waterway which often stimulates an increase in bacteria and other decomposers. As these decomposers increase in numbers, they deplete the dissolved oxygen supply within the waterway (NRCS 1994). Sometimes the respiration from the algae growth creates enough oxygen to offset the use of the oxygen by the decomposers. If there is not a balance, eutrophication can occur. An excess of nutrients can contribute to a variety of other water quality issues, such as decreased water clarity, fish kills, and a bad taste and odor to the water (NRCS 1994).

Table 12. Surface water impairments in the ROI.

Watershed	Waterbody	Impairment	Priority
Tenkiller	Baron (Barren) Fork	Phosphorus, pathogens	High
	Caney Creek	Phosphorus, turbidity	High
	Chicken Creek	Unspecified*	High
	Flint Creek	Phosphorus, pathogens	High
	Illinois River	Phosphorus, pathogens, turbidity	High
	Sager Creek	Nitrates, pathogens	High
	Stillwater City Lake	Low dissolved oxygen content	High
	Tahlequah Creek, Town Branch	Pathogens	High
	Tenkiller Ferry Lake	Phosphorus, low dissolved oxygen content	High
Spavinaw	Beaty Creek	Pathogens	High
	Lake Eucha	Phosphorus, low dissolved oxygen content	High
	Spavinaw Lake	Phosphorus, low dissolved oxygen content	High

**The water quality standard for warm water aquatic community beneficial use is not attained. Chicken Creek is impaired by an unspecified pollutant(s) and requires a TMDL. Establishment of TMDL(s) is scheduled for 2009 (Oklahoma Department of Environmental Quality [ODEQ] 2002a).*

Source: EPA 2002a

Dissolved oxygen is necessary for fish and other aquatic species to live. Stillwater City Lake and Tenkiller Ferry Lake in the Tenkiller watershed are listed as impaired due to low dissolved oxygen content (Table 12). Within the Spavinaw watershed, Lake Eucha and Spavinaw Lake are impaired due to low dissolved oxygen (Table 12) (EPA 2002a). Dissolved oxygen content can be altered by any number of factors such as volume, velocity, temperature, altitude, aquatic species present, vegetation, nutrient loading, and total dissolved solids within the waterway (EPA 1997). Low dissolved oxygen levels within the ROI may occur from the fast growth of vegetation and nutrient loading that result from organic pollution (e.g., poultry litter). When high levels of vegetation and other organic matter is introduced to the waterway, it increases the number of decomposers. The increased populations of decomposers require more oxygen than what was previously needed, thus the dissolved oxygen in the water decreases (EPA 1997). Fluctuating dissolved oxygen levels may cause some aquatic species to die or leave their current habitat.

Pathogens can enter waterways through numerous sources such as untreated sewage and livestock feces. Within the Tenkiller watershed, Baron Fork, Flint Creek, Illinois River, Sager Creek, and Tahlequah Creek are listed as impaired due to the presence of pathogens (Table 12). Beaty Creek in the Spavinaw watershed is also listed as impaired due to pathogens (Table 12) (EPA 2002a). The presence of pathogens may include bacteria, protozoa, viruses, and helminthes (i.e., parasitic worms) (EPA 2002b). Bacteria pathogens have been linked to typhoid fever and cholera. Protozoan pathogens have been linked to *Giardia lamblia* and *Cryptosporidium parvum* (EPA 2002b). Viruses are the cause of Hepatitis A and polio. All forms of pathogens can be infectious to those drinking, swimming, or handling pathogen-polluted waters. Surface water is usually tested for the presence of bacteria that indicate the presence of

human or animal waste. These water quality indicators include bacteria such as fecal coliforms, total coliforms, and *Escherichia coli* (EPA 2002b).

Turbidity is a measure of water clarity, which is affected by the presence of sediments suspended in the water column (EPA 1997). In the Tenkiller watershed, Caney Creek and the Illinois River are listed as impaired due to high turbidity (Table 12) (EPA 2002a). Waterways with heavy suspended sedimentation loads have lower dissolved oxygen contents because the suspended particles reduce light penetration, affecting photosynthesis. Water temperature is warmer in waters with high turbidity because the suspended particles absorb heat; warmer water also lowers dissolved oxygen content (EPA 1997). Turbidity can affect aquatic species reproduction when sediments smother eggs and larvae on slow moving stream or river bottoms. High turbidity can be a result of events such as soil erosion, excessive algae growth, and waste discharge (EPA 1997).

3.3.2 Groundwater

3.3.2.1 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 land within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.3.2.2 Affected Environment

The Tenkiller and Spavinaw watersheds are within the Oklahoma Water Resources Board (OWRB) Northeast Planning Region (OWRB 1995). Two of the four major groundwater basins within this region are in the Tenkiller and Spavinaw watersheds. One, the Roubidoux aquifer, is a fractured dolomite aquifer that yields 150–600 gallons per minute (gpm) of moderately hard water (OWRB 1995). The other, the Keokuk-Reed Springs aquifer, is formed of residual chert, clay, and cherty limestone. Surface springs within this aquifer can yield 600–3,500 gpm, while wells from the formation yield on average 1–10 gpm (OWRB 1995).

3.3.3 Wetlands

3.3.3.1 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 land within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.3.3.2 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 3 part 328.3, 2005)

At one time Oklahoma landscapes held roughly 2,842,600 acres of wetlands, approximately 67 percent more then the current acreage (Association of State Wetland Managers [ASWM] 2004). Most wetland

areas have been converted to agricultural croplands or have been degraded due to channelization, streamflow regulation, and impoundments. Only 949,700 acres of wetlands remained in Oklahoma as of 2004 (ASWM 2004). Most wetlands within Oklahoma are palustrine wetlands and comprised of bottomland-hardwoods, marshes, and wet meadows (ASWM 2004). Wetlands may occur within the ROI.

3.3.4 Floodplains

3.3.4.1 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 land within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.3.4.2 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 the Oklahoma CREP agreement would intend to enroll riparian lands, 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 Description

For the purposes of this analysis, soil resources are topography, soil, and paleontological resources. The ROI for this resource analysis includes land within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.4.2 Affected Environment

3.4.2.1 Topography

The three major physiographic regions in Oklahoma are the Atlantic Plain, the Interior Plains, and the Interior Highlands (National Park Service 2000, Ryder 1996). The Atlantic Plain lies along the southeastern edge of the State and is the flattest of the provinces. The Interior Plains account for the largest area of Oklahoma. This province also appears relatively flat, but actually slopes gently to the east.

The ROI lies within the Interior Highlands, which lie along the eastern portion of the State. This region is divided into two provinces that display similar landform characteristics. The Ozark Plateau to the north is characterized by broad, flat-topped hills and narrow river valleys. The Ouachita province to the south consists of the Arkansas River Valley and the Ouachita Mountains, a series of steeply folded ridges and

valleys. The Tenkiller and Spavinaw watersheds are located primarily within the Ozark Plateau, with the southern portion of the Tenkiller watershed reaching into the Ouachita province (Figure 3).

Figure 3. Physiographic provinces of Oklahoma (modified from Ryder 1996).

3.4.2.2 Soil

For this analysis, soils are described by Level IV Ecoregion (Woods et al. 2005, University of Idaho 2006) (Figure 2, Table 13). Soils in the ROI include mollisols, entisols, inceptisols, vertisols, alfisols, and ultisols. Mollisols are the typical soils of grassland ecosystems and are characterized by a thick, dark surface horizon. They are rich in organic materials and thus very productive agriculturally. Mollisols are common to every ecoregion within the ROI.

Entisols are very diverse and are developed in unconsolidated parent material. They usually lack genetic horizons except an A horizon. Ecoregions that contain entisols include the Arkansas River Floodplain and the Dissected Springfield Plateau-Elk River Hills.

Inceptisols exhibit minimal horizon development and can occur in a wide range of ecological settings. This soil type is found in the Arkansas River Floodplain and Lower Boston Mountains.

Vertisols are clay-rich soils that shrink and swell with changes in moisture content, and thus tend to lack distinct, well-developed horizons. Vertisols are found in the ROI only within the Arkansas River Floodplain.

Alfisols are relatively fertile and tend to be very productive for both agriculture and silviculture. Ecoregions with these soil types are the Dissected Springfield Plateau-Elk River Hills and the Springfield Plateau.

Ultisols 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. These soils are found in the Dissected Springfield Plateau-Elk River Hills, Lower Boston Mountains, and the Springfield Plateau.

Table 13. Common soils in the Level IV Ecoregions of the ROI.

Level IV Ecoregion	Watershed	Order	Common Soil Series
Arkansas River Floodplain	Tenkiller	Mollisols, Entisols, Inceptisols, and Vertisols	Severn, Moreland, Coushatta, Choska, Kiomatia, Oklared, and Roebuck
Dissected Springfield Plateau-Elk River Hills	Tenkiller, Spavinaw	Ultisols and Alfisols on hillsides, ridgetops, and dissected uplands; Entisols, Alfisols, and Mollisols on floodplains and low terraces	Bodine, Baxter, Clarksville, Etowah, Sallisaw, Elsah, Staser, and Huntington
Lower Boston Mountains	Tenkiller	Ultisols and Inceptisols on uplands; Inceptisols and Mollisols on floodplains and low terraces	Hector, Linker, Nella, Enders, Mountainburg, Steprock, Rosebloom, Mason, Huntington, and Ennis
Springfield Plateau	Tenkiller, Spavinaw	Ultisols, Alfisols, and Mollisols on uplands; Mollisols on floodplains and low terraces	Bodine, Baxter, Eldorado, Craig, Jay, Captina, Etowah, and Huntington
Source: Woods et al. 2005			

3.4.2.3 Paleontological Resources

Paleontological resources are closely associated to geologic settings. Geological settings can be used to predict the occurrence of fossils, their type, abundance, and quality of preservation. As described by USGS (2004), the Interior Highlands of Oklahoma are ancient, eroded mountains composed of carbonate and other sedimentary rocks that were originally deposited on the sea floor and eventually contorted by folds and faults.

Oklahoma geologic strata yield plant, invertebrate, vertebrate, and trace fossils from the relatively recent Pleistocene Epoch (10,000 years to 1.6 million BP) back through the Cambrian Period (505–570 million years BP). Vertebrate fossils include those from fish, amphibians, reptiles, dinosaurs, birds, and mammals (Bureau of Land Management 2005).

Paleontological resources 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.

3.5 Air

3.5.1 Description

Although the *Clean Air Act* (42 USC 85 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 respirable particulates (particulate matter less than 10 microns in diameter).

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 counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.5.2 Affected Environment

The ODEQ air quality division is responsible for ensuring that the air quality in Oklahoma meets or exceeds the levels required by Federal and State standards. To ensure Oklahoma is meeting NAAQS, ODEQ operates an air quality network. This network monitors ambient air quality with 62 monitors at 37 sites throughout the State (ODEQ 2003). There are no air quality monitors within the ROI.

Oklahoma has relatively clean air and meets all State and Federal ambient air quality standards. There are no non-attainment areas within the ROI or the State (EPA 2006b).

3.6 Recreation

3.6.1 Description

Recreational resources are those activities or settings, either 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, canoeing, and other water-related activities. The ROI for this resource includes land within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and 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 includes nine State parks, three wildlife management areas (WMAs), and two game management areas (GMAs). A WMA is land owned, licensed, leased, or under the management of ODWC (ODWC 2005b). WMAs are managed based on certain objectives such as game management, public hunting, waterfowl refuge, wetland development, or migratory bird refuge. GMAs are very similar in function to WMAs, but hunting and public uses in these areas are more strictly regulated (ODWC 2005b).

Portions of the 15,469-acre Cookson WMA, the 31,360-acre Cherokee GMA, the 2,590-acre Tenkiller WMA, and the 566-acre Sparrowhawk WMA lie within the Tenkiller watershed (ODWC 2005d). The 14,316-acre Spavinaw GMA lies within the Spavinaw watershed (ODWC 2005d). All WMAs and GMAs 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, requires an Oklahoma State license. A discussion of the economics associated with hunting, fishing, and other recreational activities is provided in Sections 3.7 and 4.7.

There is one national wildlife refuge (NWR), the Ozark Plateau NWR, within the Tenkiller watershed portion of the ROI. However, to protect fragile bat habitat, this NWR is not open to the public.

3.7 Socioeconomics

3.7.1 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 includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.7.2 Affected Environment

The total population within the ROI was 177,977 people in 2000, which was a 20.5 percent increase from the population of 1990 (USCB 1990a, 2000b). Approximately 26.5 percent of the total population was located in urban areas, and 73.5 percent of the population was located within rural areas (USCB 2000c). This was an increase of 2.4 percent from the 1990 urban population (USCB 1990b).

3.7.2.1.1 Non-Farm Employment and Income

Between 1993 and 2002, the non-farm labor force within the ROI ranged from 71,261 in 1993 to 80,341 in 2002 (Bureau of Labor Statistics [BLS] 2005). Non-farm employment also ranged during this period from a low of 66,227 positions in 1993 to a high of 76,488 positions in 2001 (BLS 2005). The unemployment rate within the ROI varied from a high of 3.8 percent in 1993 to a low of 2.0 percent in 2000 (BLS 2005). Within the ROI, Sequoyah County has experienced the highest average non-farm unemployment rate for the period (6.9 percent), with the highest rate occurring in 1998 (9.1 percent) (BLS 2005).

Median household income in 1999 ranged significantly within the ROI. The highest median household income in the ROI was $31,125 in Mayes County, and the lowest median household income was $24,881 in Adair County (USCB 2000b).

3.7.2.1.2 Farm Employment and Income

As reported by the *2002 Census of Agriculture* (USDA 2004), there were 4,769 farm workers on 1,298 worked farms within the ROI in 2002, accounting for a payroll of $28.1 million. Table 14 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 $23.3 million, which was 8.4 percent of total production costs. In 2002, the total hired farm and contract labor costs were $30.5 million, which was 10.6 percent of total production costs.

Approximately three-fourths of farm cash receipts in Oklahoma are from livestock and livestock products, while crops account for the remaining one-fourth (USDA 2003). Oklahoma ranked third in the U.S. for both cattle production and winter wheat in 2002 (USDA 2003). The Bureau of Economic Analysis (BEA) (2005) reported a realized net farm income in excess of $116 million within the ROI in 2002. This was a decrease of 45.3 percent as compared to the 1992 net farm income. BEA (2005) also reported that total government payments to farms within the ROI exceeded $6.5 million in 2002, an increase of 400 percent from 1992. Farm wages and perquisites in 2002 in the ROI were approximately $22.9 million, which was a 4.3 decrease from those in 1992. These costs were a significant contributor to the 48.0 percent reduction in net farm proprietors' income within the ROI from 1992.

Table 14. Hired farm and contract labor as a percentage of total production expenses for 1997 and 2002.

Area	2002				1997			
	Hired Farm Labor ($1,000)	Contract Labor ($1,000)	Total Production Expenses ($1,000)	Labor as a Percent of Total Production Expenses	Hired Farm Labor ($1,000)*	Contract Labor ($1,000)*	Total Production Expenses ($1,000)*	Labor as a Percent of Total Production Expenses
Oklahoma	237,162	38,838	4,069,112	6.8	191,754	29,679	3,784,514	5.9
Adair	1,760	460	62,595	3.5	1,686	404	62,186	3.4
Cherokee	20,333	355	63,871	32.4	14,933	322	55,998	27.2
Delaware	3,448	545	97,845	4.1	2,215	316	87,065	2.9
Mayes	1,240	408	41,486	4.0	1,287	148	30,217	4.7
Sequoyah	1,318	602	21,681	8.9	1,244	742	40,284	4.9

**Value in 2002 dollars*
Source: USDA 2004

3.7.2.1.3 Farm Production Expenses and Returns

In 2002, farm production expenses exceeded $287 million within the ROI. This was a decrease over the 1992 figure of $325 million (adjusted to 2002 dollars) (USDA 2004, BEA 2005). Using the 2002 acreage in active farm production (1,265,241 acres), the average cost per acre within the ROI in 2002 was $227.21 (USDA 2004). Using 2002 cropland, the cost per acre of agricultural chemicals inputs, including fertilizers and lime, was $7.84 (USDA 2004). Average net cash return per farm within the ROI was $14,389 in 2002 (USDA 2004). The average net cash receipts per acre within the ROI in 2002 were $73.80 (USDA 2004). Table 15 lists the average farm production expenses and return per dollar of expenditure in 2002 for each county in the ROI. Table 16 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 15. 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 ($)
Oklahoma	404	48,859	121	8,220	20	0.17
Adair	211	55,394	263	15,582	74	0.28
Cherokee	181	52,139	288	23,250	128	0.45
Delaware	203	70,190	346	23,646	116	0.34
Mayes	195	26,696	137	5,999	31	0.22
Sequoyah	177	17,221	97	3,468	20	0.20

Source: USDA 2004

Table 16. 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 ($)	Average Value of Machinery and Equipment per Farm ($)
Oklahoma	404	285,730	42,155
Adair	211	240,360	35,214
Cherokee	181	229,729	29,573
Delaware	203	276,410	30,518
Mayes	195	254,562	35,960
Sequoyah	177	186,643	32,755
Source: USDA 2004			

3.7.2.1.4 Agricultural Land Use

In 2002, there were 1,265,241 acres of land in farms including cropland, woodland, pastureland and rangeland, and house lots, etc. This was a 10.6 percent decrease from 1997 (USDA 2004). Table 17 lists the acreage for different agricultural land uses in 1997 and 2002 and the percent change during that period.

In 1997, there were 1,024,267 acres in Oklahoma enrolled in either CRP or the Wetlands Reserve Program (WRP). Of that amount, 6,485 acres were located within the ROI. Five years later (in 2002), enrollment had increased statewide to 1,103,520 acres, while enrollment within the ROI decreased to 2,991 acres. As of December 2005, a total of 1,057,291 acres in Oklahoma were enrolled in CRP (FSA 2005). The average value of Oklahoma cropland in 2005 was estimated at $745 per acre (USDA 2005).

Table 17. Agricultural land uses in 1997 to 2002 and the percent change experienced during that period.

Land Use	Acres in 1997	Acres in 2002	Percent Change
Cropland [1]	648,405	561,415	-13.4
Woodland [2]	249,452	237,459	-4.8
Pastureland and rangeland [3]	470,748	418,674	-11.1
House lots, ponds, roads, wasteland, etc.	46,231	47,693	3.2
CRP and WRP [4, 5]	6,485	2,991	-53.9
Total Land in Farms [6]	1,414,836	1,265,241	-10.6

[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 Sequoyah County 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.

Source: USDA 2004

3.7.2.1.5 Recreation Spending

According to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (NSFHWAR), 838,000 State residents of ages 16 and older participated in hunting or fishing-related activities in Oklahoma in 2001. In that same year, approximately 1.1 million residents participated in some sort of wildlife viewing (e.g., observing, photographing, or feeding wildlife) (FWS and USCB 2001).

Oklahoma waters lured roughly 774,000 anglers to the State in 2001. Of that total, 84 percent were residents of Oklahoma and 16 percent were non-residents. Total fishing-related expenditures in 2001 were in the range of $476 million from residents and non-residents. The NSFHWAR established that approximately $212 million went to trip-related expenses, such as food, lodging, and transportation; while $250 million went to equipment for the trip, such as rods, reels, and lines. The remaining $14 million went to other related costs such as membership dues, stamps, permits, and licenses. The 2001 survey data indicated that fishing in Oklahoma decreased by approximately 150,000 anglers from 1996. The 2001 survey also showed that the most popular species among anglers were catfish and bullheads, followed by walleye, sauger, and various panfish (FWS and USCB 2001).

Resident and non-resident hunters totaled 261,000 in the 2001 survey. Residents accounted for 92 percent of those individuals, while non-residents accounted for 8 percent. Hunting-related expenditures amounted to $284 million dollars for the State. Of that amount, $97 million went to trip-related items, $130 million went to equipment-related expenses, and $57 million went to other expenditures such as membership dues and licenses. The NSFHWAR reported the number of hunters in Oklahoma decreased from 297,000 hunters in 1996 to 261,000 hunters in 2001. Of the hunters surveyed in 2001 to determine the preference of species hunted, 212,000 preferred big game species, 131,000 preferred small game species, and 81,000 preferred migratory bird hunting (some individuals hunted in more than one category) (FWS and USCB 2001).

According to the 2001 survey, wildlife viewing activities in Oklahoma were enjoyed by 1.1 million individuals. Wildlife-viewing includes non-consumptive activities such as photographing, feeding, or observing wildlife. These activities created revenue of $193 million in Oklahoma in 2001. Trip-related expenses including transportation, food, and lodging amounted to approximately $69 million; while equipment-related expenses, such as film, cameras, and binoculars, amounted to $111 million. Donations, contributions, memberships, and other related expenses amounted to $13 million. The 2001 survey indicated that the majority of wildlife-viewers leaving their home environment to observe wildlife went most often to woodlands, lakes, and streams (FWS and USCB 2001).

3.8 Environmental Justice

3.8.1 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 the U.S. Census Bureau (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 includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.8.2 Affected Environment

As reported by USCB for year 2000 (2000b), demographics for the non-Hispanic ROI population were 64.3 percent White, 0.8 percent Black or African American, 25.8 percent American Indian or Alaska Native, 0.2 percent Asian, less than 0.1 percent Native Hawaiian or Pacific Islander, and 8.8 percent all other races or combination of races. Hispanic or Latino of any race accounted for 2.6 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 19.7 percent and varied from a high of 23.2 percent in Adair County to a low of 14.3 percent in Mayes County (USCB 2000b). Because approximately 20 percent of the residents are considered poor, the ROI is considered to be a poverty area.

In 2002, American Indians or Alaskan Natives operated 1,281 farms within the ROI; Spanish, Hispanic, or Latino persons operated 137 farms; Blacks or African Americans operated 23 farms; Asians operated 11 farms; Native Hawaiians or Pacific Islanders operated 6 farms; and 298 farms were operated by persons reporting more than one race (USDA 2004). The ROI accounts for 16.1 percent of all minority farm operators within the State of Oklahoma, while these 1,756 farms account for 26.8 percent of the total number of farms within the ROI (USDA 2004).

3.9 Wild and Scenic Rivers

3.9.1 Description

The *Wild and Scenic Rivers Act* established the Wild and Scenic Rivers System to protect rivers that:

> "…with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." (16 USC 28 parts 1271–1287, 1968)

The ROI for this resource analysis includes land within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.9.2 Affected Environment

There are currently no federally designated wild and scenic rivers within the ROI; however, the Illinois River and its two major tributaries, Baron Fork and Flint Creek, are being studied for inclusion in the National Wild and Scenic Rivers System (Oklahoma Scenic Rivers Commission [OSRC] 1999). In the meantime, Oklahoma legislators have designated six rivers in Oklahoma as scenic rivers. These are the Illinois River, Baron Fork, Flint Creek, Upper Mountain Fork River, Lee Creek, and Little Lee Creek. The Illinois River, Baron Fork, and Flint Creek are in the ROI. These rivers, designated and protected by the *Oklahoma Scenic Rivers Act*, possess unique beauty and resources that provide present and future benefit to the people of the State (82 *Oklahoma Statutes* 21 part 1452, 1970).

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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 the preferred alternative would result in long-term, beneficial impacts to both wildlife and fisheries throughout the ROI. Current and historical agricultural practices have limited some of these species, and displaced others from their historical range. By removing portions of land from agricultural production, planting filter strips and riparian forest buffers, and limiting livestock access to riparian floodplains, the proposed CPs would increase the quality and abundance of wildlife and fisheries habitat.

4.1.1.2.1 Wildlife

Wildlife habitat would be restored or enhanced by implementing the proposed CPs. This would result in a beneficial impact to terrestrial and avian wildlife species that frequent the ROI. Establishing filter strips (CP21) would create narrow bands of grasses that would be suitable habitat for ground nesting bird species. Filter strips would provide thermal and nesting cover for ground nesting species, as well as foraging areas for grazing wildlife. Filter strips would also provide nectar and pollination areas for insects. Bermuda and fescue grass may be planted with native species within filter strip areas to create vegetative diversity. Filter strips may require mowing to stimulate vegetative growth. Mowing should take place before or after the nesting time for ground nesting birds, which varies among species.

Establishment of riparian forest buffers (CP22) would significantly benefit terrestrial and avian wildlife within the ROI. Riparian forest buffers would create corridors for wildlife to travel between different habitat types. These travel corridors would also be used for daily and seasonal migration. Riparian forest buffers representing bottomland hardwood forest species would be extremely beneficial to migratory birds, which use these areas for breeding grounds, wintering, and feeding (Anderson and Masters 2004). Hard and soft mast produced in these buffers would provide food, as well as covered feeding areas, for game species such as turkeys, white-tail deer, and squirrels. Riparian forest buffers may be attached to pre-existing vegetation, such as windbreaks or shelterbelts. By attaching buffers to existing vegetation, habitat area would be maximized and fragmentation reduced.

The encroachment of woody vegetation on grasslands has been found to increase predation and brood parasitism on non-game neotropical migrant grassland nesting species. Therefore, woody vegetation such as that in riparian forest buffers should not be planted in grasslands that currently do not contain woody vegetation.

As buffers mature, periodic harvesting of some trees may be necessary. Such harvests may temporarily disrupt daily migration patterns of resident wildlife. The use of best management practices (BMPs) would help ensure these impacts would be minor and temporary.

4.1.1.2.2 Fisheries

Implementation of the proposed CPs would restore and enhance aquatic species habitat as well as improve overall water quality. Establishing filter strips would reduce the amount of sediment, nutrients, and pesticides entering waters (NRCS 2000). Pollutants would be taken up by the vegetation comprising the filter strip, while sediment would settle to the bottom of the strips rather than into water sources. A major impairment to waters within the ROI is turbidity (EPA 2002a). Turbidity, a measure of water clarity, is directly affected by the amount of sedimentation suspended within the waterway. Within slow moving waterways, the settling of sediment can interfere with the feeding and reproduction of some fish. Sedimentation can also limit the hatch of aquatic insects, which are a major component of the food chain (Anderson and Masters 2004). High turbidity can also increase water temperature, which is unfavorable to some aquatic species. Filter strips adjacent to waterways would decrease the amount of sedimentation entering the water; thereby decreasing turbidity. Filter strips would also reduce phosphorus loading by limiting the amount of nutrients entering waterways. An excess of phosphorus, a major impairment to some waterways within the ROI, can cause algae blooms that deplete the waters of dissolved oxygen content (EPA 2002a, NRCS 1994).

Riparian forest buffers would establish woody and non-woody vegetation around water sources within the ROI. Once fully mature, this vegetation would fall over and into waterways and create fish habitat. In small streams, up to 75 percent of the organic food base within the water is provided by detritus, including limbs, leaves, fruit, and insects falling from overhanging branches (Welsch 1991). Downed trees within waterways provide cover areas and create pools, riffles, and gravel beds for spawning areas. Buffer vegetation would filter nutrients and pesticides before they reach the waterways, as well as stabilize stream banks which would limit sedimentation.

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 would 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 continue to be exposed to harmful pathogens and 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

The preferred alternative would enhance vegetation by establishing CPs, resulting in a beneficial impact to vegetation within the ROI. Vegetation within the ROI has been altered and depleted due to farming, logging, and overgrazing. Filter strips (CP21) would create narrow bands of native vegetation as well as fescue and Bermuda grasses which, although not native to the State, are not invasive. Filter strips would be placed adjacent to streams, ponds, lakes, wetlands, water-filled ditches, groundwater recharge areas, and sinkholes (FSA 2003b).

Riparian forest buffers (CP22) would enhance shrubs, trees, and grasses adjacent to riparian areas. This vegetation would be planted adjacent to perennial or intermittent steams, lakes, wetlands, ponds, seeps, and areas of groundwater recharge (FSA 2003b). Native plants species would be used in the riparian buffers, thus enhancing present vegetation within the ROI. Zone three of the riparian buffer (filter strip area) may also be planted with fescue and Bermuda grasses.

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.

4.1.2.3 Alternative B—No Action

Under the no action alternative, lands eligible for CREP enrollment would remain in agricultural production. 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 their defined habitat.

4.1.3.2 Alternative A—Preferred

Nine of the ten protected species in the ROI rely on riparian areas for some sort of habitat. Of the ten species, there would be a beneficial impact to six and a potential adverse impact to two resulting from implementation of the preferred alternative. The remaining two species would either be unaffected or may benefit slightly.

The proposed CPs would benefit Ozark cavefish, Arkansas darter, and Neosho mucket. Ozark cavefish and Neosho mucket populations have been limited due to water quality degradation, and filter strips and riparian forest buffers would improve water quality within the ROI. These CPs would also decrease sedimentation within waterways and improve water clarity. Sedimentation has caused high turbidity impairments within the Illinois River, where populations of Neosho muckets are found. In addition, these species would profit from cooler water temperature due to the shade provided by the overhanging vegetation of mature riparian forest buffers.

Installation of riparian forest buffers would benefit gray bats, Indiana bats, and bald eagles. Gray bats and Indiana bats require riparian areas for foraging habitats. Indiana bats forage more on aquatic insects than terrestrial ones, and feed around mature trees that overhang waterways for protection. Riparian forest buffers would provide habitat for the bald eagle, which primarily feeds in riparian ecosystems, and mature woody vegetation would offer perching and nesting sites.

Piping plover and least interior tern habitat consists of bare or sparsely vegetated banks of rivers and lakes, thus implementation of the proposed CPs may have an adverse impact to these species. Even if riparian forest buffers are not installed directly within piping plover and least interior tern habitat, buffers in the habitat vicinity may create an influx of avian and terrestrial predators. Therefore, areas that are certain to support piping plover or least interior tern populations should not be planted with riparian forest buffer vegetation.

The preferred alternative is unlikely to impact the American burying beetle as their habitat is based primarily on the availability of carrion. However, precautions should be taken to ensure that the burying beetle is not present prior to CP implementation.

Ozark big-eared bats would be mostly unaffected by the proposed CPs, but may benefit slightly when the riparian forest buffers are mature. These bats occupy edge areas between grasslands and forest areas to feed, and they may utilize the edge created by the forest buffers if other habitat requirements are met nearby.

To comply with the requirements of Section 7 of the *Endangered Species Act* (16 USC 35 parts 1531 et seq., 1988), FSA would ensure that all conservation plans consider whether threatened, endangered, or candidate species or critical habitat are present within each specific site. FSA must also consult with the appropriate FWS staff on a programmatic level to determine what level of site specific review may be necessary.

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 harmful pathogens and 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.

4.2.1.2 Alternative A—Preferred

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

As the Oklahoma CREP agreement does not address specific sites, detailed cultural resources information can not be offered in this PEA. All actions would be reviewed with OSHPO during the planning and implementation phases of the proposed action. When specific sites 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 archaeological 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.

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 have impacts to recorded and unidentified architectural resources.

As the Oklahoma CREP agreement does not address specific sites, detailed cultural resources information can not be offered in this PEA. All actions would be reviewed with OSHPO during the planning and implementation phases of the proposed action. When specific sites 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 archaeological resources, any change in these activities that would disturb previously intact areas may result in impacts to known or unidentified archaeological 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.

4.2.3.2 Alternative A—Preferred

There is the potential that TCPs would be encountered during implementation of the preferred alternative. Activities associated with CP installation may have impacts to recorded and unidentified TCPs.

As the Oklahoma CREP agreement does not address specific sites, detailed cultural resources information can not be offered in this PEA. All actions would be reviewed with OSHPO during the planning and implementation phases of the proposed action. When specific sites 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 TCPs.

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 a long-term beneficial effect on surface water quality throughout the ROI. Filter strips established on areas adjacent to water resources would reduce the runoff of sediments, nutrients, pesticides, and other contaminants by slowing the velocity of runoff. A decrease in velocity would allow sediments to settle and soluble pollutants to be taken up by vegetation before reaching waterbodies. Research indicates that filter strips can reduce sediment loading by 56–95 percent (Leeds, Brown, Sulc, and VanLieshout 1994). Filter strip efficiency depends on rainfall, runoff conditions, soil characteristics, slope, width of the filter strip, and the species of vegetation planted.

Removing land from agricultural production would reduce erosion and sedimentation of waterways because there would be less tillage to produce crops. Less sediment entering the waterways would reduce turbidity, a major impairment to some waters within the ROI. Reduced turbidity would allow aquatic vegetation to persist, and this may increase the dissolved oxygen content within the water. Low dissolved oxygen content is another impairment of waterways within the ROI.

Though filter strips are more efficient at trapping sediment than soluble nutrients, they will trap sediment-bound nutrients, such as phosphorus and ammonium, with some efficiency (Leeds et al. 1994). Removing phosphorus and nitrogen from water sources reduces algae blooms that deplete the oxygen content in surface water.

The implementation of riparian forest buffers would improve water quality throughout the ROI by reducing the effects of pollution, nutrients, and sedimentation runoff. Phosphorus loading would be reduced, and the shade provided by overhanging vegetation would cool water temperatures and increase the capability of the water to retain dissolved oxygen. Decreasing sedimentation would reduce the chance of flooding. Large deposits of sediments can build up the floor of waterways and reduce the amount of water that can be held, which greatly increases the potential for flooding in high risk flooding areas (Welsch 1991).

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 mitigation practices and compliance with local and State regulatory requirements, such as obtaining stormwater pollution permits for construction sites over 1 acre, would reduce these impacts (ODEQ 2002b).

4.3.1.3 Alternative B—No Action

Under the no action alternative, rivers, streams, and lakes throughout the ROI would continue to be subject to impairments such as high nutrient loading, turbidity, low dissolved oxygen content, high sedimentation levels, and the presence of pathogens.

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

Groundwater resources within the ROI would benefit from the preferred alternative. Groundwater is directly connected to surface water, and much of the groundwater contamination throughout the U.S. is connected to surface water contamination (Welsch 1991). Therefore, reducing contaminants in surface water may have a beneficial effect on the groundwater with which it is connected. In addition, vegetation within the filter strips and riparian forest buffers would slow the rate of rainwater flow over the ground, creating greater rates of aquifer recharge.

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 nutrients and the presence of pathogens. 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 may have a beneficial effect on any wetlands located adjacent to lands enrolled in CREP. Wetlands rely on groundwater flow for seasonal recharge. By reducing the amount of pollutants and sediments entering surface water and groundwater in the ROI, there would be a beneficial effect on the water quality of adjacent wetlands.

The removal of some land from agricultural use may affect the number and size of 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 sedimentation levels, excess nutrients, and the presence of pathogens.

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 minor beneficial effect on floodplains. Restricting livestock access to floodplains would decrease stream bank erosion and improve overall function of the floodplains.

4.3.4.3 Alternative B—No Action

Under the no action alternative, livestock access to floodplains, and the resulting overland flow of pathogens to streams and stream bank erosion, 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, permanently increase erosion and sedimentation, or alter or destroy paleontological resources.

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. Limiting livestock access to floodplains would reduce stream bank destabilization, resulting in reduced rates of erosion. Establishing permanent vegetation on former croplands would reduce erosion by wind and water.

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. Although managed haying may be conducted on enrolled CREP lands, the amount of land used for these activities is unlikely to change from current conditions. There would be negligible effects to paleontological resources.

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. There would be negligible effects to paleontological resources.

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 Alternative A would result in the establishment of filter strips and riparian buffers. These CPs would minimize the amount of exposed soil, which would have a beneficial impact to local air quality. Oklahoma has relatively clean air and it is not expected that implementing either of the proposed CPs would result in significant impacts to air quality.

CPs may also enhance carbon sequestration, which is the storage of carbon in its stable form. The planting of new vegetation would remove and sequester carbon dioxide from the atmosphere and help reduce greenhouse gases.

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. 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. 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 proposed CPs would promote good water quality, which would support more abundant and healthier fish populations in the ROI as well as downstream. This would result in increased fishing opportunities.

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 Socioeconomics

4.7.1 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.

4.7.2 Alternative A—Preferred

Implementation of the preferred alternative would result in a maximum of 19,035 acres of land being conserved for a 15-year period. This would result in a positive net present value for the land rentals.

This action would result in a maximum loss of 19,035 acres of agricultural land. In 2002, there were 4,769 farm workers on the 1,265,241 acres of farms within the ROI, accounting for a payroll of $28.1 million (USDA 2004). Removing 19,035 acres from agricultural production would decrease the land in farms to 1,246,206 acres and may result in the loss of 72 farm worker positions at an estimated cost of $424,225 per year when all 19,035 acres are under contract. The loss of these positions would account for approximately 1.5 percent of the farm worker positions available in 2002. The loss of production on 19,035 acres would reduce the amount of total farm production expenditures, less hired and contract labor, by $3.87 million per year, or 1.3 percent of the total 2002 farm production expenditures (USDA 2004).

Based on average Oklahoma rental rates, CREP enrollment is estimated at an average of $73.50 per acre for the 19,035 acres proposed (Appendix A). In addition, a maintenance payment of $10.00 per acre and a maintenance fee for riparian buffers in the amount of 20 percent of the rental payment would be provided to participants for an estimated average of $98.20 per acre per year. Participants would receive a one-time signing incentive fee of $150.00. OCC and FSA would cost share with producers for up to 83 percent of the eligible reimbursable costs of all approved CPs, and FSA would also issue a practice incentive payment equal to 40 percent of the CP establishment costs. On average, this establishment cost is anticipated to be $1,156 per acre. The total net present value is $22.0 million over 15 years (Appendix F).

Hines, Sommer, and Petrulis (1991) noted that enrolling lands into CRP adversely 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 Oklahoma, these would include an estimated $12.14 per acre for wildlife viewing and $0.29 per acre for freshwater recreation activities for a total consumer surplus per acre from CRP of $12.43. Total annual consumer surplus attributable to CRP for the U.S. equated to $13.45 or about twice that of the consumer surplus generated by CRP activities in

the Southern Plains Region, which includes Oklahoma. 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.

4.7.3 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, Oklahoma, and Southern Plains Region of the U.S.

4.8 Environmental Justice

4.8.1 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.

4.8.1.1 Alternative A—Preferred

The ROI would be considered a poverty area because approximately 20 percent of the residents fall below the poverty threshold. The preferred alternative would remove up to 19,035 acres from agricultural production. Extrapolating from the total number of farm workers per total acres in Oklahoma, the removal of 19,035 acres may result in the loss of 72 farm workers. It is likely that these 72 farm workers are included in the low-income population of the ROI.

The preferred alternative is expected to generate other non-farm employment activities within the ROI. For example, the initial installation of CPs may create temporary jobs. CP maintenance activities required over the life of each CREP contract may also create positions that would take the place of those lost when lands are removed from production.

Research has shown that CRP rental payments are often spent on other commodities within the local community, replacing the farm expenditures that are lost when land is removed from production for CRP (Hines, Sommer, and Petrulis 1991). Therefore, CREP payments are anticipated to create additional non-farm employment within the community.

Under NEPA, the identification of a low income or minority population does not preclude the proposed action from going forward. It does, however, compel Federal agencies to pay special attention to mitigation strategies, monitoring needs, and preferences expressed by the affected population.

4.8.1.2 Alternative B—No Action

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

4.9 Wild and Scenic Rivers

4.9.1 Level of Impact

Significant impacts to wild and scenic rivers would include those activities that alter, degrade, or diminish any river within the National Wild and Scenic Rivers System. Although no such rivers are present within the ROI, there are three State-designated scenic rivers in the ROI.

4.9.2 Alternative A—Preferred

Implementation of the preferred action would have a long-term beneficial effect on surface water quality throughout the ROI as detailed in Section 4.3.1., *Surface Water*. This includes the scenic rivers protected by the *Oklahoma Scenic Rivers Act* (82 *Oklahoma Statutes* 21 part 1452, 1970), which are the Illinois River, Baron Fork, and Flint Creek in the ROI. In addition, implementation of the preferred action would prevent construction of buildings on lands enrolled in CREP for the term of the contract.

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 the water quality of the scenic rivers. The use of temporary filter fencing or similar mitigation practices would reduce these potential impacts.

4.9.3 Alternative B—No Action

Under the no action alternative, the scenic rivers in the ROI would continue to be subject to impairments such as high phosphorus loading, turbidity, low dissolved oxygen content, high sedimentation levels, and the presence of pathogens.

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 30 part 1508.7, 2005)

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 includes land within the Tenkiller and Spavinaw watersheds 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 Oklahoma 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.

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) provides technical, financial, and educational assistance for farmers and ranchers to address natural resources concerns on their private working lands. EQIP promotes agricultural production and environmental quality as compatible national goals and provides up to 75 percent cost-share assistance of certain CPs. Oklahoma received over $7.5 million in 2002 from NRCS for EQIP; however, funding has not kept pace with requests for cost-share assistance (NRCS 2006).

Farm and Ranch Land Protection Program

The Farm and Ranch Land Protection Program (FRPP) (formerly the Farmland Protection Program) is a voluntary program that aids farmers in keeping their lands in agricultural production (NRCS 2006). This program provides matching funds to local, tribal, or State government entities and some non-governmental organizations with existing farm and ranch land protection programs to purchase conservation easements. A minimum of 30 years is required to be qualified for an easement; however, priority is given to applications with perpetual easements. Landowners involved with this program agree not to convert their land to non-agricultural uses, and to implement a conservation plan for any highly erodible land.

Grassland Reserve Program

The Grassland Reserve Program (GRP) is a voluntary program that allows landowners to restore rangeland, pastureland, shrubland, and some other lands to grassland, while retaining these areas as grazing lands (NRCS 2006). GRP emphasizes support for grazing operations, plant and animal biodiversity, and grasslands most vulnerable to conversion to cropland, urban development, or other uses.

Healthy Forests Reserve Program

The Healthy Forests Reserve Program (HFRP) is a voluntary program that aides in restoring and enhancing forest ecosystems to improve biodiversity, promoting the survival and persistence of protected species, and enhancing carbon sequestration (NRCS 2006). This program is authorized to be carried out until 2008. Eligible lands must be privately owned and have the potential to host protected species or their habitat, improve biological diversity, or increase carbon sequestration.

Soil and Water Conservation Assistance Program

The Soil and Water Conservation Assistance Program (SWCAP) is a voluntary program that provides incentive payments and cost-share payments to ranchers and farmers who actively address threats to water, soil, and other resources such as grazing lands, wildlife habitat, and wetlands (NRCS 2006). Eligible lands must be owned or controlled by the land owner and may be enrolled in 5 to 10 year contracts.

Wetlands Reserve Program

WRP is a voluntary program that provides financial and technical assistance to landowners who are actively addressing wetland, soil, water, wildlife habitat, and related issues. This program enrolls eligible lands in 30-year easements or cost-share agreements. As of 2001, there were a total of 122 contracts in Oklahoma encompassing over 28,171 acres (NRCS 2006).

Wildlife Habitat Incentives Program

The Wildlife Habitat Incentives Program (WHIP) is a cost-share program that assists landowners in developing and improving wildlife habitat on their private lands (NRCS 2006). Plans are established with the help of NRCS and local conservation districts to fulfill the landowner's goals for improving wildlife habitat. Eligible land must be owned or controlled by the landowner, and may not enrolled in other specified programs.

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, and recreation in the watersheds proposed for CREP enrollment and in waters downstream (Table 18). No adverse cumulative impacts to any other resource discussed in Chapter 3.0 are expected.

Table 18. Cumulative effects matrix.

Resource	USDA Programs: EQIP, FRPP, GRP, HFRP, SWCAP, 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 and vegetation 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. OSHPO review, as appropriate, of all proposed actions prior to implementation helps to ensure that cultural resources are protected and preserved.	The proposed action has the potential to impact cultural resources. Consultation with OSHPO would be conducted prior to implementation activities to ensure cultural resources are not adversely impacted. Because the proposed action and USDA programs both require OSHPO 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 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.	The focus of the proposed action is on improving water quality in the ROI. The amount of pollutants and sediments entering waterways would be reduced by planting grasses, trees and shrubs. 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, 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.	Vegetation planted under 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. Oklahoma already has air quality that meets or exceeds Federal and State standards.
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	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

Resource	USDA Programs: EQIP, FRPP, GRP, HFRP, SWCAP, WRP, and WHIP	Cumulative Effects when combined with the Proposed Action
	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.	and USDA programs may result in cumulative impacts that benefit recreation.
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 use practices.	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.
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 low income or minority workers in the ROI 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 for low income or minority workers in the ROI.
Wild and Scenic Rivers	Programs designed to enhance surface water quality also provide long-term beneficial impacts to wild and scenic rivers.	The overall goal of the proposed action is to improve water quality, and as such, water quality of the scenic rivers within ROI would also be improved. When combined, the proposed action and USDA programs would result in cumulative impacts that benefit scenic rivers.

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 30 parts 1500 et seq., 2005). 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, FWS would provide guidance to ensure that actions do not jeopardize or destroy threatened, endangered, or candidate species or their habitat. OSHPO and tribal agencies with cultural resources oversight 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, air, and scenic rivers.

Biological Resources

- Current or historical grassland areas presently devoid of woody vegetation should not be entered into contracts that involve the planting of woody vegetation. Doing so would increase brood parasitism and predation on grassland nesting species and some neotropical migrant species by creating perch sites for avian predators, such as hawks and owls. It would also create travel corridors for terrestrial predators, such as skunks and raccoons.

- Factors affecting American burying beetle habitat selection are the presence or absence of carrion, and top soil and humus suitable for burying carrion. Therefore, it will be difficult to determine the presence or absence of this species on lands that may be enrolled in CREP. Since 1992, there have been confirmed sightings of American burying beetles in Cherokee and Sequoyah counties (OES 2005b). There have been unconfirmed sightings (defined as a likely sighting, but one that has not been confirmed by an entomologist or a FWS biologist) of the species since 1992 in Delaware and Adair counties. Consultation with FWS and the completion of project evaluation forms will need to be conducted prior to implementation of any CREP activities on lands that may hold American burying beetles (OES 2005b).

- The encroachment of vegetation on piping plover nesting areas due to habitat modification is a major factor affecting this species. Areas of known seasonal piping plover inhabitance should not be planted with any vegetation either on or in the vicinity of potential nesting areas.

- If riparian buffers are to be harvested periodically to restore productivity, some dead or dying snags should be left for cavity nesting species such as woodpeckers that may inhabit the area. Timing of harvests should not coincide with the breeding or rearing times of any sensitive species. It is expected that periodic harvesting would temporarily interrupt daily migration patterns of resident wildlife.

- CP implementation that requires the use of herbicides, pesticides, fertilizers, lime, or any other

such applications, as well as the timing of CP implementation, should be conducted in accordance with conservation plan recommendations to ensure no harm occurs to any fish or wildlife species, or to their associated habitats. Application of herbicides, pesticides, fertilizers, or lime would be strictly according to label instructions.

Cultural Resources

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

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 mitigation practices and compliance with local and State regulatory requirements, such as obtaining stormwater pollution permits for construction sites over 1 acre, would reduce these impacts (ODEQ 2002b).

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.

Scenic Rivers

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

Environmental Justice

- Approximately 20 percent of the residents in the ROI fall below the poverty threshold, classifying the ROI as a poverty area. Removing lands from agricultural production may eliminate some farm worker positions; however, the preferred alternative is expected to generate other non-farm employment activities within the ROI. When contracts with farmers and ranchers are prepared, efforts should be made to identify displaced farm workers. These individuals should be preferentially hired to support CP establishment and maintenance.

7.0 LIST OF PREPARERS

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8.0 PERSONS AND AGENCIES CONTACTED

Table 19 shows the Federal, State, and local agencies; American Indian tribes; and interest groups contacted for the CREP PEA.

Table 19. CREP PEA consultation.

Name	Title	Agency
Bales, Sara	Regional Wildlife Biologist	Pheasants Forever and Quail Forever, Oklahoma Chapters
Birdwell, James	President	Oklahoma Cattlemen's Association
Brabander, Jerry	Field Supervisor	U.S. Fish and Wildlife Service
Brooks, Robert L.	State Archaeologist	Oklahoma Archeological Survey
Brown, Billie	Conservation Organizer	Sierra Club, Oklahoma Chapter
Dunbar, Damon	Environmental Director	Cheyenne-Arapaho Tribes
Hatfield, Suzette	Coordinator	Oklahoma Family Farm Alliance
Heisch, Melvena	Deputy State Historic Preservation Officer	Oklahoma State Historic Preservation Office
Horne, James E.	President	The Kerr Center for Sustainable Agriculture
Johanntoberns, Troy	Director of Environmental Programs	Wichita and Affiliated Tribes
Jones, Jeanne C.	President	The Wildlife Society, Southeast Section
Kennington, John	President	Tulsa Audubon Society
Kisling, Keith	Chairman	Oklahoma Wheat Commission
Kouplen, Steve	President of State Board of Directors	Oklahoma Farm Bureau
Ludgate, Sandy	Director of Environmental Programs	Caddo Nation
McDaniels, Andy	Executive Director	Oklahoma Wildlife Federation
Parrish, D.J.	Director of Agricultural Environmental Management Services	Oklahoma Department of Agriculture, Food, and Forestry
Pruett, Jay	Director of Conservation	The Nature Conservancy, Oklahoma Chapter
Quay, Steve	State Chairman	Oklahoma Ducks Unlimited
Smith, Chadwick 'Corntassel'	Principal Chief	Cherokee Nation
Vogele, Louis	Planning, Environmental, and Regulatory Division	U.S. Army Corps of Engineers, Tulsa District
Wanger, Rod	Conservation Program Specialist	Farm Service Agency, Oklahoma State Office
Wasinger, Jennifer	President	Oklahoma Clean Lakes and Watersheds Association
Wulf, Ray L.	President	Oklahoma Farmer’s Union

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9.0 GLOSSARY

Agricultural Pollution—Wastes, emissions, and discharges arising from farming activities. Causes include runoff and leaching of pesticides and fertilizers; pesticide drift and volatilization; erosion and dust from cultivation; and improper disposal of animal manure and carcasses. Some agricultural pollution is point source (e.g., large feedlots), but much is non-point source, meaning that it derives from dispersed origins.

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.

Carbon Sequestration—The net removal or fixation of carbon dioxide (CO_2) from the atmosphere or in a carbon sink into long-lived pools of carbon through biological or physical processes. These pools can be living, aboveground biomass (e.g., trees), products with a long, useful life created from biomass (e.g., lumber), living biomass in soils (e.g., roots and microorganisms), or recalcitrant organic and inorganic carbon in soils and deeper subsurface environments.

Coliform—Bacteria common to the intestinal tract of warm-blooded animals, including humans.

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 Easement—Acquisition of rights and interest to a property to protect identified conservation or resource values using a reserved interest deed.

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.

Easement—A landowner sells or surrenders the right to develop a portion of the property, usually in return for a payment or some other benefit.

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.

Endangered Species—A species that is 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.

Eutrophication—A process where more organic matter is produced than existing biological oxidization processes can consume.

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.

Filter Strip—An area of vegetation, generally narrow and long, that slows the rate of runoff, allowing sediments, organic matter, and other pollutants that are being conveyed by the water to be removed.

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

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.

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.

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 Grasses—Various regional and national grasses that were original to particular areas of the U.S.; regional with regards to soils, acidity or alkalinity, climate, diseases, and symbiotic coexistence with other plants in the surrounding area.

Neotropical Migrants—Bird species that annually migrate to the tropics during the northern winter months.

Nitrate—The nitrogen ion, NO_3-, is derived from nitric acid and is an important source of nitrogen in fertilizers. Nitrate pollution of drinking water, shallow wells being particularly vulnerable, is of concern because infants are especially sensitive.

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

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 NRI, includes land that has a vegetative cover of grasses, legumes, and/or forbs, regardless of whether or not it is being grazed by livestock.

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 cover/land use category on which the climax or potential plant cover is composed principally of native grasses, grass-like plants, forbs, or shrubs suitable for grazing and browsing, and introduced forage species that are managed like rangeland. For the NRI, grasslands, savannas, many wetlands, some deserts, and tundra were considered to be rangeland.

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 water entering a stream or other conveyance channel shortly after a rainfall.

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 that is likely to become an endangered species 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.

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.

10.0 REFERENCES

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APPENDIX A
OKLAHOMA CONSERVATION RESERVE ENHANCEMENT PROGRAM AGREEMENT

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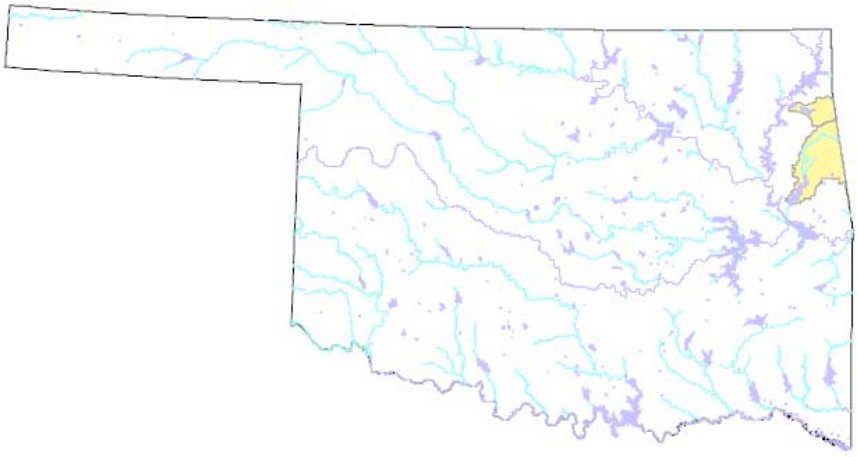
APPENDIX A—OKLAHOMA CONSERVATION RESERVE ENHANCEMENT PROGRAM AGREEMENT

The following pages of this appendix contain scanned images of the *Conservation Reserve Enhancement Program (CREP) Proposal for Spavinaw Lake and Illinois River/Lake Tenkiller Watersheds*. This draft agreement, dated January 2006, is between the U.S. Department of Agriculture Commodity Credit Corporation and the State of Oklahoma.

Conservation Reserve Enhancement Program (CREP) Proposal for Spavinaw Lake and Illinois River/Lake Tenkiller Watersheds

State of Oklahoma

Cherokee, Delaware, Sequoyah, Adair, and Mayes Counties



Section 1- Abstract

Project Area Description

Oklahoma has chosen two high priority watersheds in the eastern portion of the State as the focus of a CREP program. These watersheds were chosen because they are high priorities 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.

Illinois River, Cherokee County, Oklahoma.

The Spavinaw Lake and Lake Tenkiller (Illinois River) Watersheds lie within the Ozark Plateau. 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 Oklahoma for recreation and water supply. The reservoirs in particular are important water supplies for much of eastern Oklahoma including the greater Tulsa metropolitan area. A large recreational industry exists on the Illinois River and its main tributaries, the Baron Fork River and Flint Creek.

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

The watersheds of Spavinaw and Tenkiller Lakes constitute a major poultry growing and cattle producing area. 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 waterbodies to the point that they are now considered impaired by nutrients. The Illinois River is impaired by phosphorus and many of the area streams are impaired by pathogenic bacteria. Downstream reservoirs are impaired by phosphorus (high chlorophyll-a concentrations) and low dissolved oxygen levels, primarily due to excess nutrients.

This program will attempt to protect 4,700 – 19,035 acres of riparian area in the two watersheds (depending on available non-federal match), with a total riparian area of approximately 118,000 acres (2,060 square miles of total watershed area). Practices to be used include CP21 and CP22 with modifications.

Total project cost is estimated between $15,227,500 and $54,619,702 of which approximately 20% will be bourn by non-federal partners.

Section 2 – Existing Conditions and Impacts to be Addressed

Existing Conditions

Lake Spavinaw and upstream Lake Eucha provide approximately 50% of the drinking water for the greater Tulsa Metropolitan area and were constructed and operated for that purpose. Water quality has been steadily deteriorating as algal growth has increased over the years. The Tulsa Metropolitan Utility Authority has recorded increasing numbers of taste and odor complaints with their finished water and concomitant increased treatment costs. They recently sued several of the large poultry integrator companies who contract with the poultry growers of the watershed. The suit was settled with the result that there is now less poultry waste spread in the watershed but the water quality problems persist. Computer modeling highlights the need for riparian buffers to fully address this problem.

Algae bloom on Spavinaw Lake

Aside from the above-mentioned problems with drinking water produced from this lake, the lake itself does not meet water quality standards because of excess phosphorus in the streams feeding it. Large portions of the lake are now anoxic for much of the summer and taste and odor problems due to blue green algae blooms are now occurring. It is feared that fish kills may follow and that toxic algae blooms could be a possibility. Aside from the loss of the fishing resource and additional problems for the water treatment plant that would occur if this were to happen, large fish kills would be detrimental to the area in general. 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.

Lake Tenkiller is a large multipurpose reservoir operated by the Army Corps of Engineers on the Illinois River. The lake is one of the most popular recreation destinations in the state and there is a sizeable associated tourism industry. The lake was once popular with SCUBA divers, but declining water clarity has dramatically reduced that activity. The lake has recently been classified as impaired due to anoxia that is occurring. The Illinois River and its two major tributaries, Flint Creek and Baron Fork River, are Scenic Rivers, considered by Oklahomans to be among the finest rivers in the state. They support a very large recreational industry in the form of canoeing, rafting, and camping. The Illinois River, Flint Creek and the Baron Fork River are all violating water quality standards for phosphorus and the State Attorney General has recently submitted a notice of intent to sue five poultry integrator companies for their role in polluting these rivers.

Oklahoma has adopted a 0.037 mg/L phosphorus standard for the Illinois and other State Scenic Rivers. Arkansas, in a show of good faith to help meet the standard, agreed to upgrade sewage treatment for the cities of Siloam Springs, Springdale, Fayetteville, Bentonville, and Rogers to meet 1 milligram per liter phosphorus limits. The two states are working cooperatively to develop a joint monitoring strategy and a joint watershed plan for the Scenic River watersheds. As a result of these efforts, point sources in the watershed have been largely addressed; remaining efforts must focus on reduction of nonpoint source pollution.

In addition to the phosphorus pollution, the scenic rivers are impaired by pathogenic bacteria, many of which wash into the streams from poultry litter applied to pastures or cow manure deposited on floodplains or in streams. Additional potential sources of bacteria include septic systems and wildlife. The Clean Water Act demands that the state take action to remove this impairment and the state strongly wishes to do so by voluntary means.

The deterioration of water quality in our scenic rivers, major reservoirs and now a lawsuit has polarized our state into agricultural interests versus recreational interests, environmental and drinking water interests. The State of Oklahoma has entered negations with the State of Arkansas to avoid another threatened lawsuit that Oklahoma feels it may be forced to file if water quality upstream of the state boundaries doesn't improve. This discord has a negative impact on the State's agricultural industry that could result in irreparable harm. Modeling has shown that with properly functioning riparian buffers in place, we can substantially reduce inputs of pollutants to streams and rivers and ultimately, to the reservoirs. Riparian buffers, coupled with upland nutrient reduction practices and nutrient reduction technology applied to wastewater treatment plants should be able to solve the problem.

Map of the Area

The proposed CREP program would focus on riparian area in the Oklahoma portion of two eastern high priority watersheds.

The State believes that demonstrating the efficiency of riparian buffers in these two high priority watersheds 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.

Description of Human Activities and Landuses

The Illinois River and its major tributaries are Scenic Rivers that host a significant recreational industry in the form of canoe and raft rentals as well as camping, fishing and swimming. Other than this recreational use, activities and landuses in the Illinois River and Spavinaw watersheds are the same and they can be discussed as one unit.

Hunting is an important activity throughout the upland areas of forest, which are mostly privately owned. Cleared land is almost exclusively devoted to pastures of Bermuda grass and Fescue. Acres of cropland in the watersheds have steadily declined, with most of the cropland converted to pasture. Compared to the 1984 landuse coverages detailed in the following table and maps, currently, there are only a few hundred acres of cropland in the Oklahoma portion of the two watersheds, most of which are in soybeans as well as minor amounts of orchards.

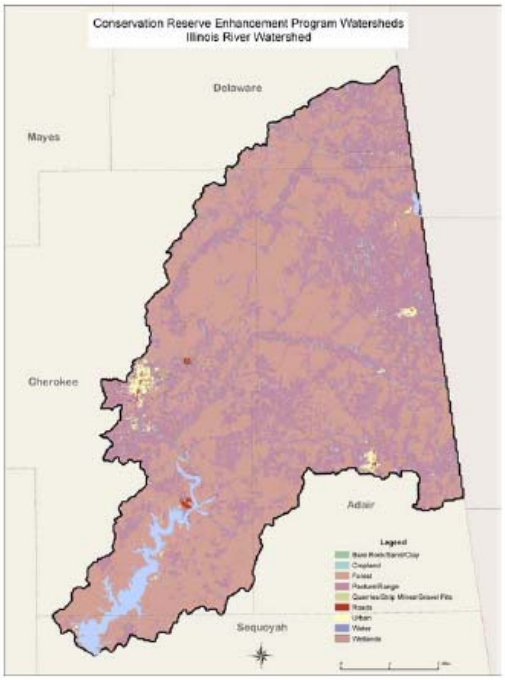
Poultry and cattle production are the base of most of the agricultural economic activity in the area. The two watersheds together produce over 10,000,000 birds/year (2000 Ag. census), and the litter resulting from their production, when applied to land, allows the nutrient poor soils to grow abundant grass for cattle grazing. Oklahoma Department of Agriculture, Food, and Forestry permitting records suggest that the two watersheds have a total of 190 houses with a combined capacity of over 14,000,000 birds/yr . Both beef and dairy cattle are important agricultural products of the area. Approximately 180,000 and 13,000 respectively of beef and dairy cattle are produced annually in the watersheds.

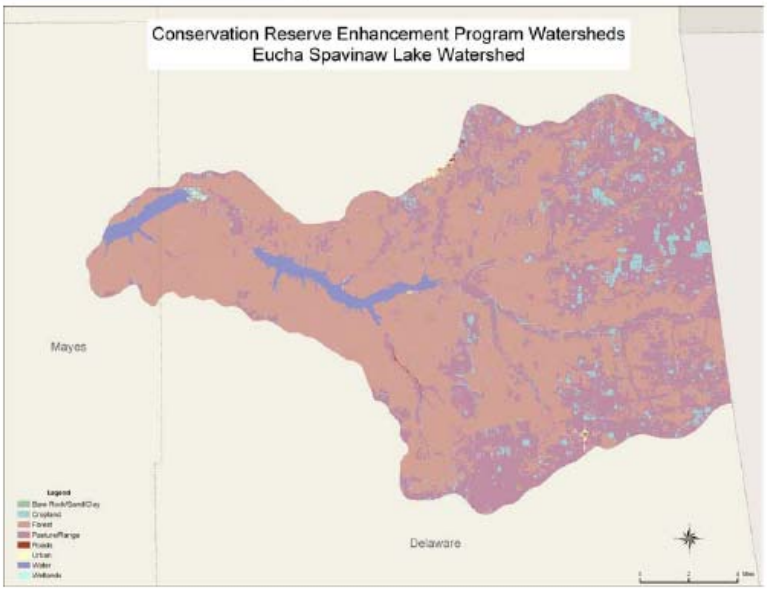
Tahlequah (2000 population: 14,458) is the only urban center in the Oklahoma portion of the Illinois River watershed. Tahlequah is the county seat of Cherokee County, Oklahoma. Jay, Oklahoma, situated on the ridgeline of the Spavinaw Lake Watershed, is the county seat of Delaware County and has a population of 7,332 (2000 census).

Further illustration of landuse distribution in the watersheds can be seen in the following landuse table and maps.

Landuse Summaries in Proposed CREP Watersheds (1984 USGS Land Use Data).

Land Use	Illinois River- OK portion (acres)	Eucha/Spavinaw – OK portion (acres)
Bare rock / Sand / Clay	266	160
Cropland	11,022	8,140
Forest	324,758	101,878
Pasture/Range	213,539	57,494
Gravel Pits	34	0
Roads	1,966	142
Urban	6,099	298
Water/Wetlands	18,346	5,257
Total	576,030	173,369





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Farm Demographics- 2002 Agricultural Census

Item	Adair	Cherokee	Delaware
Number of Farms	1,130	1,221	1,393
Average Size of Farms (acres)	211	181	203
Average Farm Production Expenses	$55,394	$52,139	$70,190
Average Farm Net Income	$15,582	$23,250	$23,646
Average age of operator	54.6	55.7	54.7
Farming	619	683	794
Other	511	538	599
Male	1,021	1,103	1,255
Female	109	118	138
Cattle	59,033	45,573	74,719
Chickens	2,695,327	688,523	6,748,447
Swine			
Sheep			
Turkey		184,250	
Horses	2,077	2,591	
Forage	38,312	38,450	59,484
Wheat	1,642		2,868
Vegetables	402		
Peanuts			
Grain Sorghum			642
Corn	195		
Nursery Stock		1,270	
Pecans		446	
Soybeans			1,790
Field & Grass Seed			590
Berries		28	
Rye			

Environmental Factors

Average precipitation in the Tenkiller and Spavinaw Lake watersheds 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 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 of treated effluent.

The area is mantled by quaternary cherty clay solution residuum. Most areas are underlain by Mississippian age limestone and chert with Devonian age limestones and shales exposed in the deeper valleys. Common soil series on uplands include Bodine, Baxter, Eldorado, Craig, Jay, Captina, Clarksville and Etowah. Common series on floodplains include Huntington, Staser, Elsah and Sallisaw. Soils on slopes can be very cherty.

The area includes the Springfield Plateau and the Dissected Springfield Plateau Ecoregions. 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. Three of the state's five scenic rivers are contained in this area and have large well-developed recreational industries centered on canoeing, rafting, swimming, and camping. Lake Tenkiller is one of the two highest recreational use lakes in the state and there are many vacation and summer homes in the area. Spavinaw Lake and upstream Lake Eucha provide nearly 50% of the water for the Tulsa metropolitan area as well as to the town of Jay. Tahlequah draws its water directly from the Illinois River and many other towns and rural water districts throughout the area draw water from Lake Tenkiller and the rivers that feed it.

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, the Gray Bat, Ozark Big-eared Bat, and the Bald Eagle.

Section 3 - Agricultural Related Environmental Impacts

Throughout the last several decades, the poultry industry has achieved remarkable success in this area of Oklahoma and in northwestern Arkansas where these 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 of the poultry industry. Pastures fertilized with poultry litter are highly productive. Many floodplain forests have been converted to pasture in order to increased forage production, and in the process, many streamside riparian areas have been cleared and converted to pasture also.

Over the years, water quality in Tenkiller, Spavinaw, and Eucha lakes has declined for reasons related to excessive algal growth. Clarity has declined dramatically, oxygen levels have fallen, and taste and odor complaints about finished water produced from these reservoirs have increased. Lake Tenkiller and the entire Illinois River are on the state's 303d list of impaired waters with excessive phosphorus listed as the cause of the problem as are Lakes Eucha and Spavinaw for the same reason.

Causes of Impairments (303(d) Listed Waters) in the Illinois River and Spavinaw Watersheds (2002 Integrated Report).

OKWBID	NAME	Watershed	Cause(s) of Impairment
OK121600050020_00	Spavinaw Lake	Eucha/Spavinaw	low DO, phosphorus
OK121600050070_00	Eucha Lake	Eucha/Spavinaw	low DO, phosphorus
OK121600050160_00	Beaty Creek	Eucha/Spavinaw	pathogens
OK121700020020_00	Tenkiller Ferry Lake	Illinois River	low DO, phosphorus
OK121700020110_00	Chicken Creek	Illinois River	causes unknown (poor fish collection)
OK121700030010_00	Illinois River	Illinois River	pathogens, phosphorus
OK121700030040_00	Tahlequah Creek (Town Branch)	Illinois River	pathogens
OK121700030280_00	Illinois River	Illinois River	phosphorus
OK121700030350_00	Illinois River	Illinois River	pathogens, phosphorus, turbidity
OK121700040010_00	Caney Creek	Illinois River	pathogens, turbidity
OK121700050010_00	Illinois River, Baron Fork	Illinois River	pathogens, phosphorus
OK121700060010_00	Flint Creek	Illinois River	pathogens, phosphorus
OK121700060090_00	Sager Creek	Illinois River	nitrate, pathogens

Clean Water Act (CWA) section 314 Clean Lakes Studies have been completed on both Tenkiller and Eucha as well as several other similar studies. The watersheds have been intensively monitored and both systems have been modeled. The results are clear: poultry litter and cattle manure are a significant source of the phosphorus that is causing the problems in these waterbodies. A series of lawsuits and threatened lawsuits have resulted in agreements to substantially reduce the phosphorus content of the wastewater discharged to these two watersheds from point sources. A lawsuit wherein the City of Tulsa sued the poultry integrator companies has reduced the amount of litter that is spread in the Eucha/Spavinaw watershed and the EQIP program and the State's EPA CWA 319 program have helped install many best management practices (BMPs) to reduce the phosphorus content in water running off of farms in the watersheds. At this time, over $3 million dollars of state, federal and landowner monies have been spent in these two watersheds through the 319 program. The USDA has also contributed $3,366,692 to reduce nutrient runoff through the EQIP federal programs. However, much remains to be done to restore these waterbodies so that they are attaining water quality standards.

Currently, the entire length of the Illinois River from Tenkiller Lake to the Arkansas state line is shown as impaired on Oklahoma's 2002 303(d) List of waters not attaining water quality standards. A majority of the river is listed for excessively high levels of phosphorus and human pathogens (fecal indicator bacteria). Flint Creek and the Baron

Fork are listed for pathogens and phosphorus in their entirety. Spavinaw and Beaty Creeks, the two main tributaries of Lake Eucha, are listed for pathogens and Spavinaw Creek is listed for phosphorus. Point source dischargers are under heavy scrutiny in the area and most have upgraded to tertiary treatment. This investment in point source upgrades has been accompanied by increasing pressure to address nonpoint sources of pollution in the watersheds.

During the first half of the 20th century, agricultural land use in both the Illinois River and the Spavinaw Creek basins was farming of corn, wheat, and oats and dairy production. Apple and Peach orchards were abundant. Nearly 80% of the area was in timber during this time. During the last half of the 20th century, crop farming has virtually disappeared and commercial poultry has become the dominant industry today with the production of beef cattle running second. Timber currently comprises about 50% of the land area. Most of the decrease in timber area is due to creation of pasture for livestock.

Section 4 - Project Objectives

The primary objective of a CREP program in these State priority watersheds would be to reduce nutrient and sediment inputs to these waterbodies through restoration of riparian buffers. The State has implemented 319 projects in both of these watersheds and demonstrated that landowners were receptive to riparian buffers. In addition, water quality monitoring associated with one of these programs has shown a reduction in phosphorus loading due to the implementation of practices.

The table below provides an estimate of the load reductions for each individual watershed, and for the two watersheds in total, that could result from implementation of this CREP program. These estimates were calculated using EPA's Spreadsheet Tool for Estimating Pollutant Load (STEPL) and represent a conservative estimate of the load reduction that could result from protecting at least 30% of the riparian area in these watersheds, as proposed by this program. When other factors such as the increase in contiguous protected riparian area, additional, complimentary practices that could be implemented using WRP, EQIP, and other similar programs that can be promoted by the technical support staff included in this proposal, we expect the result will be greater loading reductions than those shown below.

Potential Loading Reductions Due to Proposed CREP program in Oklahoma

Watershed	Phosphorus Reduction		Nitrogen Reduction		Sediment Reduction	
	Lbs/yr	%	Lbs/yr	%	tons/yr	%
Illinois River	138,866	30%	1,284,178	32%	17,887	29%
Lake Eucha	9,271	30%	92,765	39%	2,139	40%
Total	148,137	30%	1,376,943	32%	20,026	30%

The ultimate goal of this program is to reduce nutrient and sediment loading in the selected watersheds by the amounts described in the above table, and to establish at least 4,700 – 19,035 acres of riparian buffer in these watersheds. A secondary goal of the CREP and complimentary programs ongoing in these watersheds is to achieve a situation where producers and other landowners view riparian protection as a standard part of land management, much the way they have come to accept practices such as terracing or septic tanks. We have shown with previous programs such as 319, EQIP, and WRP that landowners in these watersheds are receptive to protecting their riparian areas and this CREP program will allow us to demonstrate to landowners the short and long-term benefits of riparian protection. Again, past performance has shown us that once landowners see real benefits, they will begin to adopt the practice on their own and we could see even greater load reductions.

Results of this program will be felt at the local level, but should also expand to have consequences outside of watershed or even State borders. All of these systems drain ultimately to the Gulf of Mexico. Hypoxia in the Gulf is a widely recognized water quality problem with far-reaching impacts on fisheries, natural resources, and the economy in general. The strategy to reduce hypoxia in the Gulf of Mexico calls for a thirty percent reduction in nitrogen loading to the gulf within the next fifteen years. Although Oklahoma is primarily concerned with phosphorus, installation of these riparian buffers will also reduce nitrogen loading originating in Oklahoma to the gulf. In addition, documented water quality improvements related to the implementation of this program will likely encourage other parts of Oklahoma, as well as other States in the region to implement programs to improve riparian buffers, further improving influent waters to the Gulf.

Section 5 - Project Description

Conservation Practices

The highest priority group of BMPs approved for cost share in all of these watersheds in the 319 programs to date is the one collectively called "riparian practices". These have been chosen as highest priority both by OCC and by local watershed advisory groups (made up of local stakeholders) assembled to recommend practices and cost-share rates for these 319 programs. These practices protect riparian buffer areas in some manner and are derived from national practices CP22 & CP21. This group also includes an additional practice of winter feeding areas necessitated by restriction of stream and ravine access to cattle. These practices include fencing to protect streams, providing stable stream crossings for livestock and in some cases equipment crossings, provision of alternative water sources away from the stream, construction of winter feeding areas to make up for lost winter shelter provided by ravines, and mechanical repair of critical stream banks that are eroding.

The federal government also has several programs whose goal is to protect water quality through protection of riparian areas. Unfortunately, these programs have not been successful as manifested by minimal enrollment on the part of eligible producers. The fact that the same producers are signing up for the state and the 319 programs is good evidence of the fact that these programs can be successful when they are modified to fit the needs of the local producers while still protecting the environment. Another important reason for the differential success of the two programs is that NRCS is limited in their ability to promote these programs due to the small size of their local staff and the multiple commitments they already have.

Using state and 319 dollars, OCC has been providing all of these practices through cost share programs in our priority watersheds for several years. We have gained valuable experience and insight into the best way to proceed given the attitude, practices and preferences of our local agricultural communities. At this point, our only limitation is lack of funds to sign up all interested agricultural producers in our programs. Initially, the practice of riparian buffer strips was not well received, but as time has passed, we have adjusted our program to fit the needs of both the environment and our producers so that it is now well accepted. Our 319 program in the Illinois River Watershed installed 1,343 acres of riparian area (approximately 2% of the degraded riparian area in the watershed) with approximately $328,000 and in a subwatershed of Eucha/Spavinaw, we installed approximately 330 acres of riparian area (approximately 5% of the degraded area in the watershed) for approximately $238,000. In several of our 319 priority watersheds, we have been sufficiently successful with demonstration and education programs such that landowners with sufficient means are installing riparian buffers without assistance from cost-share programs. However, most agricultural producers need financial assistance in order to be able to install and maintain these practices.

The CREP program allows us to tailor the program to meet the needs of both the state and the local watershed stakeholders and we believe this difference will allow us to have a very successful riparian buffer program. The proposed program will solve the manpower problem that NRCS has encountered by using state funding to hire staff in the beginning of the program that will promote the program to local producers and then write plans for those who sign up. This arrangement has proved very successful in the 319 programs. Some of our programs have had as many as 60% of the watershed landowners participate when as little as $1,000,000 was available per watershed.

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 Oklahoma CREP program, monies will be available to pay for fence and a reduced rental rate in forested components of a larger pasture.

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 will be able to overcome these obstacles.

OCC proposes a program that, based on our experience, will overcome all of these obstacles and be highly successful. The major components of the Oklahoma CREP program will be the same riparian practices that have proven to be successful in our 319 projects with some modification. We will prohibit or severely limit livestock access to the stream and provide alternative practices to the producer to provide all the services he was realizing from the stream.

Livestock access to streams will be limited through fence construction. In northeastern Oklahoma 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 loathe to take on this responsibility themselves. OCC proposes that the Oklahoma CREP program should cost share fence through these treed areas at the same rates that federal money cost shares fence in pasture.

Another other important addition to the Oklahoma CREP riparian program will be the addition of flexible riparian management. Some small producers simply do not have enough pasture that they can afford to lock any up in a restrictive riparian program. Flexible management options that allow limited haying at times when rain is unlikely and the stream bank is not especially vulnerable allow producers to utilize riparian forage while maintaining most or all of the benefits of a protected riparian corridor. Incentive payments for riparian land being used for hay production would be reduced an appropriate amount. In addition, haying helps remove nutrients from the riparian area and increases the chances that the nutrients are moved out of the watershed, either as hay or animal products.

OCC believes that the addition of winter feeding barns to this program is critical. The 2002 Ag census shows that average farm size for the three county area is less than 200 acres. Area farmers simply do not have the acreage required to move cattle from pasture to pasture throughout the winter in order to prevent overgrazing. The predominant practice is to assign one pasture to cattle for the winter and provide supplemental feed until grass begins growing again in April. By the end of the winter, these pastures are a trampled mess of mud and manure with no vegetation. The spring rains then wash this mixture into area streams.

To prevent this damage from occurring on a pasture and to shelter the cattle from the weather, winter feeding areas are usually located in the woods and often in a ravine. Through our 319 program, OCC has realized that we must provide some form of winter shelter to induce farmers to give up their winter feeding areas in or near forested areas and drainage ways. An additional benefit of winter feeding barns is that they allow manure to be stored out of the weather throughout the winter and then applied to areas that can benefit from it during the growing season.

Without these structures, many winter feeding areas will be moved out of riparian areas into nearby ravines where the manure/sediment mixture will still wash into streams when spring rains arrive.

Another crucial change is to allow substitution of fescue and Bermuda grass for native grasses in the herbaceous zone. There are no important native grasses in these floodplain and riparian areas because they would all naturally be forest. When native grass is planted, it is eventually overgrown and replaced by tall fescue. Additionally, since we will be encouraging farmers to maintain the herbaceous zone of the riparian area by early summer haying and most of them are very used to fescue and Bermuda culture, we think this substitution is important.

The final important difference is to allow the development of upland water to encourage the use of upland pastures for grazing and the use of lowland pastures for haying. Current practice is frequently just the opposite since the streams are perennial and make a convenient water source whereas the upland pastures frequently have no water.

<u>Adjustments from CP22 & CP21 critical to program adoption have been determined to be:</u>

1. Allow grasses in zone 3 to be fescue and Bermuda in addition to native grasses.
2. The combined width of zones 1, 2, & 3 will not exceed 30% of geomorphic floodplain or 100 feet, whichever is larger.
3. Allow haying from July 1 to August 15 provided that forage be kept above the minimum annual average residual height as stated in NRCS standards and specifications. Rental rate for CP22 or CP21 with haying allowed will be 90% of standard rate with no use of forage.

4. Small areas of grazed forest within larger pastures in mixed systems (up to and including areas that are 40% forested) will be eligible for enrollment in the program, with rental rates for forested areas set at 50% of average area pasture rental payments. Fencing that may run through these areas will be cost-shared at the standard rate.
5. Winter feeding facilities composed of a covered heavy use area combined with a dry manure storage area 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.
6. Alternative water sources may be developed within 1500 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.
7. Watering facilities will allow up to 1500 feet of pipeline with county committee approval.
8. Stream crossings may be installed to allow livestock and equipment movement across a stream.
9. Pasture rental rates will be 175% of average area rates to insure adequate participation.
10. The maximum dollar amount allowed for water development, water facilities and pipeline, $3000, $2000, and $2000 respectively, will be per 0.5 miles of stream rather than per contract.

State contributions to the program will be:

1. The State of Oklahoma will provide water quality monitoring for the life of the program to document project effectiveness. This will include 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. In the event that the federal funds cannot be used for this purpose, the State will provide rental payments of 50% of the average annual pasture rental payments for forested areas and reimburse for fencing through smaller areas of grazed forest that are within larger pastures in mixed systems that are up to and including areas that are 40% forest.
3. The state will pay the salaries, benefits, overhead and office rental fees of technicians that will both act as door to door program salesmen and also write farm plans that are acceptable to the State NRCS office.
4. State money remaining after the first 3 items in this list will be used to supplement floodplain pasture rental rates signed up with CRP under practices CP1, CP2 & CP10 in wide valleys where there is cropland beyond 30% of the geomorphic floodplain.
5. Oklahoma Department of Wildlife Conservation (ODWC) has an active fluvial geomorphology-based stream restoration program in these watersheds. Their program involves channel restoration and biological and water quality monitoring. Additional ODWC activities in the watershed include technical assistance to landowners to improve wildlife value of their riparian lands.
6. The Nature Conservancy owns and operates a 15,000 acre preserve in Cherokee and Adair Counties in Oklahoma. This land is incrementally being restored to native conditions. Riparian restoration during the CREP period may be documented as match to the overall program.

In summary, these practice modifications accomplish the following:

- Providing livestock water in upland pastures that had formerly been used for hay production so that flood plain pastures can now be used for hay production and upland pastures used for grazing;
- Allowing flexible management of riparian grassland so that it can be hayed at reduced incentive provided that proper vegetative height is present during and following times of litter application; (OCC has found that many producers who are unwilling to sign up for a program of total withholding of riparian land will sign up for a program that allows limited use of riparian land while still protecting riparian function.);
- Providing stable stream crossings for livestock and equipment; 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, and protect soil in the heavy use areas.

Project Size

The Oklahoma portion of the Lake Tenkiller watershed is approximately 575,000 acres in size and the Eucha Spavinaw watershed is approximately 230,000 acres. This program will attempt to restore 2,300 – 15,130 acres of degraded riparian area in the Lake Tenkiller watershed and 2,330-3,830 acres in the Eucha/Spavinaw watershed, depending on the amount of money available. Sufficient funding will allow the greater number of acres to be protected by including more of the small wooded grazed areas that are part of larger pastures to be

included in the program and just allowing more total acres to be signed up. The targeted area is land lying adjacent to perennial and intermittent streams that is currently in cropland, pasture, or is predominantly pasture.

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.

Interagency Coordination Method

The Oklahoma CREP proposal is being developed by the Oklahoma Conservation Commission (OCC) and the state offices of NRCS and FSA. The OCC is the state Conservation District agency. The Governor's office has been represented through the participation of the Secretaries of Agriculture and Environment who both approve of and support the project. Their role, along with the Governor's, is to secure the State share of the funding, and the funding is included in the Governor's recommended budget this year. Currently, the funding bill has been passed by the State Senate and awaits approval by the State House of Representatives. EPA Region 6 Nonpoint Source staff has been consulted and are supportive of the project. Their commitment to protecting and restoring water quality in the project area has been demonstrated by continued 319 funding in these watersheds. Meetings have been held with the State Department of Environmental Quality (ODEQ) and the Department of Wildlife Conservation (ODWC) and while they will have no formal role in this program, they strongly support it.

Large-scale 319 water quality projects are ongoing or recently concluded in both of the proposed watersheds. These programs are administered, staffed and planned by OCC who will also administer the proposed CREP program. Related to this proposal, the ODEQ is adjusting discharge permits to allow less phosphorus loading in these watersheds and the ODWC has been restoring stream habitat in the watersheds and has recently hired a full time stream fisheries biologist for these areas.

Monetary commitments from the State of Oklahoma will be listed in the final application at the end of the current legislative session. The State currently has $2,050,000 committed from the Oklahoma Scenic Rivers Commission and the City of Tulsa.

Technical assistance will be provided by employees of the Oklahoma Conservation Commission, the state Conservation District agency, and the technical lead agency for the state 319 program. Current employees are certified as plan writers (technical service providers) by the state office of NRCS and all new employees will be certified as well. OCC will coordinate all activity between itself, NRCS, and FSA.

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 two of the previous five 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, wildlife habitat buffer, or wetland buffer. Lands that have an existing CRP contract or an approved offer with a contract pending are not eligible for CREP until the contract expires.

Landowners interested in the program will receive a site visit from an OCC 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 ranked, along with other applications received during the sign-up period. Applications will be ranked based on cost per linear foot of restored riparian area (with lowest costs receiving higher ranks) and on increase in contiguous riparian area. These priorities will insure that more riparian area is restored and should encourage landowners to convince neighbors to participate.

Flow Chart of Application Process

The CREP application process would follow the steps proposed below:

STEP	IMPLEMENTERS	RESPONSIBILITIES
1	OCC, Conservation Districts, NRCS, FSA	**OCC will analyze current digital orthophotos of CREP watersheds to identify landowners with degraded riparian areas and these landowners will be contacted to encourage participation in the program. The program will also be advertised locally by Conservation Districts and NRCS.**

2		**Participants visit a USDA Service Center to review CREP program eligibility details and determine to proceed with CREP offer. Note: The initial contact with a CREP applicant may be done by scheduling an appointment with FSA, NRCS, Conservation District or OCC in the watershed or by walking in the front door.**
	Producer	• Visit USDA Service Center or Conservation District Office to receive information on CREP. • Complete "Record of Inquiry" when necessary • Discuss USDA eligibility requirements with USDA/OCC staff • Discuss State program options, payments, contracts, etc. with OCC/CD staff
	USDA Service Center	• Discuss CREP eligibility requirements with producers in the Illinois River and Eucha/Spavinaw Watershed areas
	Conservation District Offices and OCC	• Explain State program options, payment, contracts, optional voluntary permanent conservation easements, etc. with producers • Complete "Record of Inquiry" when necessary for interagency communications
3	OCC	**OCC plan writers will update current conservation plan or draft new plan to address the objectives of the CREP. Plan writers will also work with landowners to apply for additional USDA or similar programs to install complimentary BMPs in non-CREP eligible areas.**
4	OCC	**Applicants will be ranked based on the cost per linear foot of restored riparian area (Lowest costs getting higher ranks) and increases in contiguous riparian area (convincing neighbors to cooperate would increase ranking). Multiple sign-up periods are anticipated for the first two or three years of the program. Highest ranking applicants will be notified to pursue further action.**
5		**Producer initiates CRP-2C worksheet with FSA**
	Producer	• Initiate CRP-2C worksheet at County FSA office • File forms needed for producer eligibility determination • Specify practice and acreage offered
6		**FSA makes Participant and cropland eligibility determinations and forwards CRP-2C to applicable NRCS and Conservation District Office**
	County FSA Office	• Enter acreage offered on aerial photocopy • Discuss CREP provisions with producers in CREP area • Complete producer, land and practice eligibility determinations • Complete CRP-2C according to paragraph 138 if basic eligibility requirements are met • Send CRP-2C with attached aerial photocopy to NRCS • Send copy of CRP-2C to local Conservation District • Initiate CRP-1 (See Paragraph 140 of 2-CRP)
7		NRCS/OCC makes land eligibility determinations for designated CREP practices and completes Parts 14A-D and 17A-D of CRP-2C. FSA calculates the maximum payment rate for the offer.
	NRCS/OCC	Using Conservation Plan developed under Step 3: • Determine suitability of practice for acreage offered • Determine needs and feasibility of practice to solve the resource concerns • Complete CRP-2C, including soil map and soil acreage data. • Return completed CRP-2C to County FSA Office. Note: FSA calculates the Maximum Payment Rate
	Conservation District and OCC	• Assist NRCS with technical determinations and designs as necessary & directed by NRCS
8		**Participant visits Conservation District and FSA offices to complete and sign CRP-2C and CRP-1 and sign conservation plan. The participant will learn the consequence of a contract violation, including the possible refund of all payments and assessment of liquidated damages.**
	Producer	• Visits local CD & FSA office and signs state-local payment options

		contract, the Conservation Plan, Contract Support Document, and completes voluntary permanent easement application if applicable. • Signs completed CRP-2C and CRP-1.
	Conservation District (CD)/OCC	• CD/OCC determine that adequate acres and funds are available to meet contractual obligations. • CD Board approves and signs Conservation Plan. • Enters producer contract information into the CREP database and enters financial obligations into financial accounting system maintained by the CD. • Obtains producer signature on CPO and support documents • Supplies copies of state supplemental documents to FSA
	NRCS/OCC	• NRCS/OCC approves and signs Conservation Plan Contract Support Document • Sends copy of approved and signed Conservation Plan, and Contract Support Document to FSA Office.
	FSA	• Prepares CRP-2C & CRP-1 for producer signature • Provides copy of CRP-1 Appendix to producer • Informs producer annual rental payment period begins on the first day of the month following the month COC approves the CRP-1. (See paragraph 139 of 2-CRP) • Informs producer of length of contract period • Completes paid for measurement service, if required • Informs producer of additional requirements • Makes eligibility determinations – 1026, 502, 526, FCIC • Obtains all required producer signatures on CRP-2C and CRP-1 • Files all state supplemental documents in producers CRP folder
9		**County FSA Committee reviews documentation forwarded by CD, OCC, and NRCS before proceeding with Conservation Plan, Contract Support Document, and CRP-1 approval**
	County FSA Committee	• Reviews producer eligibility status, Conservation Plan, and Contract Support Document for approval and signatures
	County FSA Office	• Issues notice of CRP-1 approval to producer (Exhibit 50). • Issues CRP-SIP to producer, should such an incentive be available. • Issues AD-245 to producer • Sends AD-862 to NRCS for practices CP9, CP23, and CP23A only. • Sends AD-862 to SF for practices CP3, CP3A, CP31, and other practices where trees are the predominant cover. • CED shall complete Items 10 and 11 of AD-862 for any practice except CP9, CP23, CP23A, CP3, CP3A, and CP31. • Enters contract information in System 36
10		**Producer completes installation of conservation practice and provides necessary documentation.**
	Producer	• Completes practice according to Conservation Plan, practice specifications, and requirements. • Reports practice performance using page 2 of AD-245. • Certifies completion of practice on AD-862 for all SRW CREP practices except practices which needs determinations were completed by OCC, NRCS, FS, or other TSP. • Furnishes invoices, bills, and other supporting documents of practice costs to Conservation District Office
	CD/OCC	• Furnishes invoices, bills, and other supporting documents of practice costs to FSA County Office
11		**OCC certifies practice completion**
	OCC	• Completes and returns AD-862 to County FSA Office for practices CP9, CP23, and CP23A.
12		**County FSA Office calculates cost-share payment, PIP payment, and notifies CD of practice completion.**

	County FSA Office	• Calculates and issues cost-share payment to producer. • Calculates and issues PIP to producer, if applicable • Sends page 2 of AD-245 with transmittal memorandum to local CD.
13		**CD receives AD-245 and transmittal memorandum that certifies practice completion and FSA contract approval.**
	CD	• Reviews AD-245 and transmittal memorandum from County FSA Office. • Enters final contract information into CREP database. • Issues applicable local one-time incentive payment(s) to contract signatories. • Issues 1099 each tax year to those who receive payment.
14		**County FSA Office makes annual payments, compliance spot checks, and notifies CD of contract violations.**
	County FSA Office	• Issues annual rental payments when authorized. • Conducts spot checks according to 2-CRP for CRP-1 compliance after final status review. • Informs CD of contract violations, and other significant changes to CREP contracts.
	OCC/CD	• Assists County FSA with compliance spot checks
15	OCC	• By January 1st of each year, beginning in 2007, provides a report to the USDA FSA summarizing the status of enrollments under SRW CREP and progress on fulfilling the other commitments of this program.
		• By January 1st of each year, beginning in 2007, submits information summarizing the State's overall costs of the program.

Section 6 – Cost Analysis

The proposed Oklahoma CREP program is expected to cost between fifteen and fifty-four million dollars of federal, state, and local landowner monies, depending on the amount of non-federal match the State can allocate. 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. In addition, certain types of land that would not regularly qualify for inclusion in a CRP program are considered eligible for this CREP program. Oklahoma believes inclusion of these lands is critical to the success of the program in these areas such that if federal dollars cannot be used to pay for the program on these lands, the State will fund the program in these areas. In addition to funding practices in areas federal funds may not be able to fund, the State will fund 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*

CREP Type	Watershed	Targeted Acres	Cost of Installation and Maintenance	CREP Dollars	Total State Match**	Estimated Total
Mini-CREP	Illinois River	2,343	$6,334,200.00	$5,766,700.00	$1,441,675.00	**$7,208,3755.00**
Mini-CREP	Lake Eucha	2,373	$6,415,300.00	$6,415,300.00	$1,603,825.00	**$8,019,125.00**
CREP Expansion***	Illinois River	12,828	$34,675,870.51	$28,153,976.41	$7,038,494.10	**$35,170,870.51**
CREP Expansion***	Lake Eucha	1,490	$4,027,531.80	$3,359,785.44	$839,946.36	**$4,192,531.80**
Full CREP	Illinois River	15,171	$41,010,070.51	$33,920,676.41	$8,480,169.10	**$42,400,845.51**
Full CREP	Lake Eucha	3,863	$11,460,331.80	$9,775,085.44	$2,443,771.36	**$12,218,856.80**
	Total	19,034	$52,470,402.31	$43,695,761.85	$10,923,940.46	$54,619,702.31

*Further detail on estimates for individual watersheds and breakdown of match sources/categories can be found in Appendix A.
** State match includes personnel and monitoring costs in addition to state match used for implementation.
**CREP Expansion will follow allocation from State legislature (approximately $10,000,000 for CREP in Illinois River, Eucha/Spavinaw, Fort Cobb, and Sugar Creek Watersheds)

Estimated State Costs of CREP Technical Assistance.

CREP Type	Watersheds	# Personnel	Length of employment	Total costs*
Mini-CREP	Eucha/Illinois River	1*	3 yrs FT, 12 yrs PT	$501,000
CREP Expansion	Eucha/Illinois River	4	3 yrs	$688,800
Full CREP	Eucha/Illinois River	5	5 FT for 3 yrs, then 1PT for 12 yrs,	$1,189,800

* Costs include salary, benefits, and vehicle lease.
**CREP Coordinator would be full-time for the first 3 years, then part time for the remainder of the program.

Estimated State Costs of CREP Monitoring.

Item	Units	Length of Time	Total Cost
Monitoring Personnel	0.5	15 yrs	$352,500
Autosamplers	5 @$6500 each		$32,500
Lab costs	5 sites @$100/site for 64 events	15 yrs	$480,000
WQ Monitoring Meters	2sets		$12,000
Vehicle lease	$4,000/yr	15 yrs	$60,000
Survey gear for stream morphology assessment			$20,000
1 meter resolution GPS unit			$2,500
Total			$959,500

Justification for Incentive Payments

Currently, all waterbodies covered by this proposal are 303d listed for phosphorus and/or bacteria. Successful 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

Crop	Adair		Cherokee		Delaware	
	acres	yield	acres	yield	acres	yield
Corn- grain	0	0	0	0	0	0
Cotton- upland	0	0	0	0	0	0
Hay- alfalfa	100	2	267	2	467	2.5
Hay- other	13,000	2.08	20,667	1.66	52,667	2.14
Peanuts	0	0	0	0	0	0
Sorghum- grain	0	0	0	0	433	57.7
Soybeans	0	0	0	0	1,267	22.4
Wheat- all	1,200	37.6	200	38.3	3,267	38.2

Section 7 – Monitoring Program

Both watersheds will be actively monitored. Auto-samplers with stage recorders will be installed near the outlet of each watershed. These samplers will be programmed to collect continuous flow-weighted samples from the stream of interest. Samples will be composited, acidified and stored at 4° C to await weekly shipment to the laboratory. Analysis will include nitrate/nitrite, total Kjeldahl nitrogen, and total phosphorus. Grab samples collected weekly from the same sites will include the above parameters plus alkalinity, conductivity, dissolved oxygen, pH, turbidity, instantaneous discharge, *Enterrococcus* and *E. coli*. Other parameters may be added as information, science and public policy dictate. Monitors will also be installed where these streams enter Oklahoma from Arkansas so that pollutant loads added upstream of the project area can be accounted for and subtracted

from the total to arrive at the benefits seen from the proposed project. This type of monitoring has been shown to be extremely effective at detecting changes in water quality in a short time period and will allow us to detect effects of the program.

Between 7 and 15 stream reaches of 200 to 600 meters for each system will be selected and surveyed at the beginning and the end of the project and three times in between to measure changes to channel morphology that result from the project. Parameters that will be measured include bank full channel configuration including x-section and longitudinal profile, channel substrate particle size distribution, pool bottom substrate, instream cover available to fish, cobble embeddedness, and bank vegetative stability.

Fish and benthic macroinvertebrates will be collected from the above reaches at about the time of survey using a combination of electroshocking, seining and kick netting methods. Species and numbers collected will be tallied as well as the size classes of larger fish species.

All monitoring will be carried out by staff of the Water Quality Division of the Oklahoma Conservation Commission (OCC-WQ). Data will be compiled and analyzed by Commission staff as well. OCC-WQ staff will be responsible for preparing and submitting annual monitoring reports.

Because OCC has successfully carried out similar projects in all of the target areas, we anticipate that objectives will be met. Additionally, watershed modeling has predicted that implementation of this program will result in achievement of our water quality objectives. 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

As mentioned previously, OCC is operating programs very similar to the one proposed in both watersheds targeted. 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.

The Oklahoma Conservation Commission (OCC) is the state agency in charge of implementing the State's 319 program and is the State Conservation District agency. As such, we feel confident that we can sell the CREP program. From 1998 to 2005, the OCC spent over $2.5 million in the Illinois River and Spavinaw Creek watersheds implementing BMPs such as riparian area protection, pasture management systems, livestock feeding areas, alternative water sources and other practices designed to retard the flow of nutrients to area streams. An additional $1.5 million is currently being targeted to the Eucha/Spavinaw watershed.

Through trial and error and through working with watershed resident agricultural producers, a set of practices have been arrived at that are agreeable to local producers and achieve significant water quality protection. All available monies were spent on these practices and on water quality monitoring in these watersheds and there is still a long waiting list of producers who wish to participate in these programs. Unfortunately, only a limited amount of 319 and state money is available and because of EPA rules, the incentive payments are only available for 4 to 5 years.

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

OCC currently has a full time outreach staff person in these watersheds devoted to education about the sources, effects and remedies of agricultural non-point source (NPS) pollution. These people currently devote over 50% of their time towards educating agricultural producers on these issues, and stress the value of riparian buffers as a crucial and absolutely necessary component of the overall farm plan. This education takes place at commodity group meetings, on tours of demonstration sites, at booths set up at Ag shows, in Conservation District offices and on site visits of individual farms.

In addition to the specialized educator, OCC has three additional education staff that service the entire state and focus on agricultural NPS pollution issues. Beyond this, the technicians hired in the watersheds are expected to sell the program by meeting with local producers in groups and one on one. During these meetings they will educate producers on the ecological benefits of the CREP program and also on the benefits of the CREP program to the profitability of the farming operation.

The practices and cost-share rates offered through previous 319 projects were recommended by a local watershed advisory group (WAG). These WAGs were composed of stakeholders in the watershed (cattlemen, dairymen, poultry growers, wheat farmers, resident homeowners, mayor of Tulsa, etc), and chaired by Conservation District Board Members. The WAG members, recommended by Conservation Districts, were chosen because they were influential, respected members of the community who could represent community issues to the program, and water quality issues to the community. As such, the WAG members also served to promote the programs at the local level. In addition to a standard WAG, we also assembled Education Watershed Advisory Groups (EdWAGs) to design the education programs that should accompany the cost-share programs. The EdWAG was also made up of influential watershed citizens, along with area educators ranging from high school vo-ag teachers to Cooperative Extension Water Quality Specialists. These EdWAGs will be reformed to address education and communication issues related to the CREP program. They will recommend programs and activities that will be pursued by OCC education and outreach staff in these watersheds throughout the program life.

The State Cooperative Extension Service has also been a long-time promoter of the benefits of riparian buffer systems. They have developed a Riparian Area Management Handbook, a stream model trailer to demonstrate the benefits of riparian area management in education programs, and many other educational materials and programs geared at riparian area protection. They will continue to promote these practices and support education programs in these watersheds. It's expected that the above educational efforts will continue throughout the life of the project.

Section 9 – Development of Procedures

TO BE DEVELOPED BY OK FSA IN CONJUNCTION WITH FSA HEADQUARTERS AFTER ACCEPTANCE OF PROPROSAL

Section10 – Training of Staff

FSA and NRCS will train federal staff as appropriate for this project. Specific technicians will be hired by OCC to promote the program and add the CREP practices onto existing farm plans or to create new farm plans if necessary. FSA will train these technicians on all CREP procedures and the State NRCS office will provide training and certification on plan writing. Currently, OCC has one technician certified by NRCS to write comprehensive nutrient management plans and three certified for general farm plans. All of these people plus the CREP program technicians will be trained and certified by the state NRCS office to write and implement plans for the CREP program.

Section 11 – Communication Plan

An Outreach and Education Communication Plan Workgroup will be formed in each targeted watershed. These groups will be identical to the EdWAG Groups that OCC has been utilizing to implement our 319 programs. Each workgroup will consist of at least one District Board member from the District(s) in which the watershed lies. With advice from Conservation District staff, farmer/ranchers seen as community leaders representing all important facets of local agriculture will also be selected as well as a local vo-ag teacher, and someone from the local ag banking community. Additional members may represent local recreational interests and officials of towns who use the water for a drinking water supply. Master Conservancy Districts and other units of local government that deal with water quality Such as the Scenic Rivers Commission will have representation where appropriate.

This workgroup will develop the communication and education plans under the guidance of OCC with concurrence of the state FSA office.

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 ag 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 OCC CREP technicians 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,
- Additional objectives determined by the local EdWAG, once it has been reassembled.

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.

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 urban land in northeastern 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 EdWAG.

APPENDIX A:

Calculations of Funds Necessary for Proposed CREP Watersheds

Estimated Costs of CREP in Illinois River Watershed

Riparian Area in the Illinois River Watershed		108,276
Estimated Percent Degradation		50%
Estimated Restoration Area (Degraded buffer)		53,932
Estimated Degraded buffer Area that is CRP eligible (acres)		35,383
Non-CRP eligible degraded buffer area (includes some forest)		18,550
Establishment Costs per acre		
		Dollars
Cost-share to install practices (50% of $1,200)- tree planting, fencing, site prep.		$600.00
PIP (practice incentive payment) (40% of 1,200)		$480.00
Total Cost to Establish per acre		$1,080.00
Anticipated Coverage (assume 28% participation)		15,172 acres
Total Cost to Establish		$16,385,822
Cost to Maintain Fifteen Year Contract – cost per acre per year		
Rental Payment		$73.50
Riparian Buffer Installation (20% of *)		$14.70
Subtotal		$88.20
SIP (signing incentive payment)		$10.00
Maintenance payment ($7, $9, or $10)		$10.00
Total cost per acre		$108.20
Cost to maintain 15 year contract per acre		$1,623.00
Anticipated Coverage (assume 28% participation)		15,212 acres
Total Maintenance for 15 years		$24,624,249
Federal (CREP) Total for Establishment and 15 years maintenance		**$33,920,676**
CREP Required State Match (20%)		**$8,480,169**
Technical Support Personnel	$767,100	
State Match for Implementation	$7,089,394	
Monitoring Costs	$623,675	
Total Implementation Costs for Illinois River with 20% state match requirement		**$41,010,071**
Program Total		**$42,400,845.51**

*

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Estimated Costs of CREP in Spavinaw Watershed

Estimated Restoration Area (Degraded buffer)			5,913
	Estimated Degraded buffer Area that is CRP eligible (acres)		4,730
	Non-CRP eligible degraded buffer area (includes some forest)		1,183
Establishment Costs per acre			
			Dollars
	Cost-share to install practices (50% of $1,200)- tree planting, fencing, site prep.		$600.00
	PIP (practice incentive payment) (40% of $1,200)		$480.00
	Total Cost to Establish per acre		$1,080.00
	Anticipated Coverage (assume 65% participation)		3,863
Total Cost to Establish			$4,172,497
Cost to Maintain Fifteen Year Contract – cost per acre per year			
	Rental Payment*		$73.50
	Riparian Buffer Installation (20% of *)		$14.70
	Subtotal		$88.20
	SIP (signing incentive payment)		$10.00
	Maintenance payment ($7, $9, or $10)		$10.00
	Total cost per acre		$108.20
Cost to maintain 15 year contract per acre			$1,623
Anticipated Coverage (assume 30% participation)			3,863 acres
Total Maintenance for 15 years			$6,270,335
Federal (CREP) Total for Establishment and 15 years maintenance			**$9,775,085**
CREP Required State Match (20%)			**$2,443,771**
Technical Support Personnel		$404,700	
State Match for Implementation		$435,246	
City of Tulsa purchase of permanent easements		$1,250,000	
Monitoring Costs		$335,825	
Total Implementation Costs for Spavinaw Watershed with 20% state match requirement			**$11,460,332**
Total Program Costs			**$12,218,856.80**

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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 Oklahoma.

Clean Air Act

The *Clean Air Act* (42 *United States Code* [USC] 85 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 26 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 35 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 on 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 providing 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 58 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 58 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 100 parts 7201 et seq., 1998).

National Environmental Policy Act of 1969

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 on the environment. The Council on Environmental Quality provides implementing regulations (40 *Code of Federal Regulations* [CFR] 30 parts 1500 et seq., 2005). 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 7 parts 799 et seq., 2006).

National Historic Preservation Act

The *National Historic Preservation Act* (NHPA) (16 USC 1A 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 8 parts 800.3–800.13, 2005) 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.

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APPENDIX C
SUMMARY OF CONSERVATION PRACTICES

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APPENDIX C—SUMMARY OF CONSERVATION PRACTICES

Following this paragraph is a summary listing of Farm Service Agency (FSA) conservation practices (CPs) for the proposed Oklahoma Conservation Reserve Enhancement Program (CREP).

CP21—Filter Strips *

Purposes:

- Reduce pollution and protect surface water and subsurface water quality
- Reduce sediment, particulate organics, and sediment-adsorbed contaminant loadings in runoff
- Reduce dissolved contaminant loadings in runoff
- Reduce sediment, particulate organics, and sediment-adsorbed contaminant loadings in surface irrigation tailwater
- Restore, create, or enhance herbaceous habitat for wildlife and beneficial insects
- Maintain or enhance watershed functions and values.

Maintenance Standards:

- Encourage shallow sheet water flow across the filter so that the filter functions properly
- Repair channels or rills immediately
- Treat concentrated flow areas using terraces, dikes, berms, trenches, or vegetative barriers
- Remove sediment when accumulation reaches a height of 6 inches or higher and level filter so that sheet flow is re-established
- Filter strips removing bacteria or other pathogens may be closely mowed to allow sunlight and air movement to decimate entrapped pathogens
- Control all weeds, particularly noxious weeds, in the filter area
- Use pre-approved prescribed burning to manage and maintain filter strip.

CP22—Riparian Buffer *

Purposes:

- Remove nutrients, sediment, organic matter, pesticides, and other pollutants from surface runoff and subsurface flow using vegetation
- Reduce pollution and protect surface water and subsurface water quality while enhancing the ecosystem of the water body
- Provide a source of detritus and woody debris for aquatic wildlife while enhancing habitat for terrestrial wildlife

- Create shade to lower water temperatures to improve habitat for aquatic organisms
- Create wildlife habitat and establish wildlife corridors
- Reduce excess amounts of sediment, organic material, nutrients, and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow groundwater flow
- Provide a harvestable crop of timber, fiber, forage, fruit, or other crops consistent with other intended purposes
- Restore natural riparian plant communities
- Moderate winter temperatures to reduce freezing of aquatic over-wintering habitats
- Increase carbon storage in plant biomass and soils
- Increase connectivity of existing terrestrial wildlife habitats.

Maintenance Standards:

- Prevent grazing of buffers by domestic livestock
- Establish vegetation that closely matches native and historical vegetation
- Periodically harvest trees, once buffer stands mature, to maintain plant health and buffer function
- Control noxious weeds and other undesirable plants, insects, and pests
- Apply registered chemicals, strictly according to authorized and registered uses, to control unwanted vegetation and pests.

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*These National CPs have been modified specifically for the Oklahoma CREP agreement. Relevant modifications of CP21 and CP22 are as follows:

- Grasses planted in zone three may be fescue and Bermuda in addition to native grasses.
- The combined width of zones one, two, and three will not exceed 100 feet or more than 30 percent of the geomorphic floodplain, whichever is greater.
- Haying will be allowed from July 1 to August 15 if forage is kept above the minimum annual average residual heights specified by the Natural Resource Conservation Service (NRCS), which are 4 inches for cool season grasses and 10 inches for warm season grasses (FSA 2003).
- Small areas of grazed forest within large pastures of mixed systems will be eligible for enrollment (up to and including areas that are 40 percent forested). Required fencing in these areas will be cost-shared.
- Livestock must be kept out of zones one and two with temporary or permanent fencing.
- Winter feeding areas (i.e., covered heavy use areas that have dry manure storage) will be constructed outside of the geomorphic floodplain (NRCS 2002).
- Stream crossings may be installed to allow livestock and equipment movement across streams.
- Alternative water sources may be developed within 1,500 feet of the edge of zone three. County approval will be required for development of alternative water sources.
- Upon county approval, watering facilities will allow up to 1,500 feet of pipeline use.

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APPENDIX D
FISH SPECIES IN OKLAHOMA

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APPENDIX D—FISH SPECIES IN OKLAHOMA

Table D–1 lists fish species in Oklahoma. The Oklahoma Department of Wildlife Conservation (ODWC) safeguards and makes regulations for the management of approximately 176 fish species that occur throughout the State.

Table D–1. Fish species in Oklahoma.

Common Name	Scientific Name	Common Name	Scientific Name
Alabama shad	*Alosa alabamae*	Mooneye	*Hiodon tergisus*
Alligator gar	*Atractosteus spatula*	Mosquito fish	*Gambusia affinis*
American eel	*Anguilla rostrata*	Mottled sculpin	*Cottus carolinae*
Arkansas darter	*Etheostoma cragini*	Mountain madtom	*Noturus eleutherus*
Arkansas River shiner	*Noropis girardi*	Mud darter	*Etheostoma asprigene*
Arkansas River speckled chub	*Macrhybopsis tetranema*	Neosho madtom	*Noturus placidus*
Banded darter	*Etheostoma zonale*	Northern studfish	*Fundulus catenatus*
Banded pygmy sunfish	*Elassoma zonatum*	Orangebelly darter	*Etheostoma radiosum*
Bantam sunfish	*Lepomis symmetricus*	Orange-spotted sunfish	*Lepomis humilis*
Bigeye chub	*Hybopsis amblops*	Orangethroat darter	*Etheostoma spectabile*
Bigeye shiner	*Notropis boops*	Ouchita Mountain shiner	*Lythurus snelsoni*
Bigmouth buffalo	*Ictiobus cyprinellus*	Ozark cavefish	*Amblyopsis rosae*
Bigscale logperch	*Percina macrolepida*	Ozark minnow	*Notropis nubilus*
Black buffalo	*Ictiobus niger*	Paddlefish	*Polyodon spathula*
Black bullhead	*Ameiurus melas*	Pallid shiner (chub)	*Hybopsis amnis*
Black crappie	*Pomoxis nigromaculatus*	Peppered (colorless) shiner	*Notropis perpallidus*
Black redhorse	*Moxostoma duquesnei*	Pirate perch	*Aphredoderus sayanus*
Blackside darter	*Percina maculata*	Plains killifish	*Fundulus zebrinus*
Blackspot shiner	*Notropis atrocaudalis*	Prairie speckled chub	*Macrhybopsis australis*
Blackspotted topminnow	*Fundulus olivaceus*	Pugnose shiner (minnow)	*Notropis emilae*
Blackstripe topminnow	*Fundulus notatus*	Quillback	*Carpiodes cyprinus*
Blacktail shiner	*Cyprinella venusta*	Rainbow trout	*Oncorhynchus mykiss*
Blue catfish	*Ictalurus furcatus*	Red River pupfish	*Cyrinodon rubrofluviatilis*
Blue River least darter	*Etheostoma sp.*	Red River shiner	*Notropis bairdi*
Blue sucker	*Cycleptus elongates*	Redbreasted sunfish	*Lepomis auritus*

Common Name	Scientific Name	Common Name	Scientific Name
Bluegill sunfish	*Lepomis macrochirus*	Redear sunfish	*Lepomis microlophis*
Bluehead shiner	*Pteronotropis hubbsi*	Redfin darter	*Etheostoma whipplei*
Bluntface shiner	*Cyprinella camurus*	Redfin pickerel	*Esox americanus*
Bluntnose darter	*Etheostoma chlorosomum*	Redfin shiner	*Lythurus umbratilis*
Bluntnose minnow	*Pimaphales notatus*	Redspot chub	*Nocomis asper*
Bowfin	*Amia calva*	Ribbon shiner	*Lythurus fumeus*
Brindled madtom	*Noturus miurus*	River carpsucker	*Carpiodes carpio*
Brook silverside	*Labidesthes sicculus*	River darter	*Percina shumardi*
Brown bullhead	*Ameiurus nebulosus*	River redhorse	*Moxostoma carinatum*
Brown trout	*Salmo trutta*	River shiner	*Notropis blennius*
Bullhead minnow	*Pimaphales vigilax*	Rock bass	*Ambloplites rupestris*
Cardinal shiner	*Luxilus cardinalis*	Rocky shiner	*Notropis suttkusi*
Central stoneroller	*Campostoma anomalum*	Rosyface shiner	*Notropis rubellus*
Chain pickerel	*Esox niger*	Sand shiner	*Notropis stramineus*
Channel catfish	*Ictalurus punctatus*	Sauger	*Sander canadensis*
Channel darter	*Percina copelandi*	Saugeye	*Sander canadense x vitreus*
Chestnut lamrey	*Ichthyomyzon castaneus*	Scaly sand darter	*Ammocrypta vivax*
Chub shiner	*Notropis potteri*	Shoal speckled chub	*Macrhybopsis hystoma*
Creek chub	*Semotilus atromaculatus*	Shorthead redhorse	*Moxostoma macrolepidotum*
Creek chubsucker	*Erimyzon oblongus*	Shortnose gar	*Lepisosteus platostomus*
Creole darter	*Etheostoma collettei*	Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Crystal darter	*Crystallaria asprella*	Silverband shiner	*Notropis shumardi*
Cypress darter	*Etheostoma proeliare*	Silvery chub	*Macrhybopsis storeriana*
Cypress minnow	*Hybognathus hayi*	Silvery minnow	*Hybognathus nuchalis*
Dollar sunfish	*Lepomis marginatus*	Skipjack	*Alosa chrysochloris*
Dusky darter	*Percina sciera*	Slender madtom	*Noturus exilis*
Emerald shiner	*Notropis atherinoides*	Slenderhead darter	*Percina phoxocephala*
Fantail darter	*Etheostoma flabellare*	Slim minnow	*Pimephales tenellus*
Fathead minnow	*Pimephales promelas*	Slough darter	*Etheostoma gracile*

Common Name	Scientific Name	Common Name	Scientific Name
Flathead catfish	*Pylodictis olivaris*	Smallmouth bass	*Micropterus dolomieui*
Flathead chub	*Platygobio gracilis*	Smallmouth buffalo	*Ictiobus bubalus*
Flier	*Centrarchus macropterus*	Southern brook lamprey	*Ichthyomyzon gagei*
Freckled madtom	*Noturus nocturnes*	Southern red-bellied dace	*Phoxinus erythrogaster*
Freshwater drum	*Aplodinotus grunniens*	Speckled darter	*Etheostoma stigmaeum*
Ghost shiner	*Notropis buchanani*	Spotfin shiner	*Cyprinella spilopterus*
Gizzard shad	*Dorosoma cepedianum*	Spotted bass	*Micropterus punctulatus*
Golden redhorse	*Moxostoma erythrurum*	Spotted gar	*Lepisosteus oculatus*
Golden shiner	*Notemigonus crysoleucas*	Spotted sucker	*Minytrema melanops*
Golden topminnow	*Fundulus chrysotus*	Spotted sunfish	*Lepomis punctatus*
Goldeneye	*Hiodon alosoides*	Starhead minnow	*Fundulus blairae*
Goldenstripe darter	*Etheostoma parvipinne*	Steelcolor shiner	*Cyrinella whipplei*
Gravel chub	*Erimystax x-punctata*	Stonecat	*Noturus flavus*
Green sunfish	*Lepomis cynellus*	Striped bass	*Morone saxatilis*
Greenside darter	*Etheostoma blennioides*	Striped mullet	*Mugil cephalus*
Harlequin darter	*Etheostoma histrio*	Striped shiner	*Luxilus chrysocephalus*
Highfin carpsucker	*Carpiodes velifer*	Suckermouth minnow	*Phenacobius mirabilis*
Hogsucker	*Hypentelium nigricans*	Sunburst (stippled) darter	*Etheostoma punctulatum*
Hybrid striped bass	*Morone saxtilis x chrysops*	Swamp darter	*Etheostoma fusiforme*
Inland silverside	*Menidia beryllina*	Tadpole madtom	*Noturus gyrinus*
Ironcolor shiner	*Notropis chalybaeus*	Taillight shiner	*Notropis maculates*
Johnny darter	*Etheostoma nigrum*	Threadfin shad	*Dorosoma petenense*
Kiamichi shiner	*Notropis ortenburgeri*	Walleye	*Sander vitreus*
Lake chubsucker	*Erimyzon sucetta*	Warmouth	*Lepomis gulosus*
Largemouth bass	*Micropterus salmoides*	Wedgespot shiner	*Notropis greenei*
Least darter	*Etheostoma microperca*	Western sand darter	*Ammocrypta clara*
Leopard darter	*Percina pantherina*	White (sand) bass	*Morone chrysops*
Logperch	*Percina caprodes*	White crappie	*Pomoxis annularis*
Longear sunfish	*Lepomis megalotis*	White sucker	*Catostomus commersoni*
Longnose darter	*Percina nasuta*	Yellow bass	*Morone mississippiensis*

Common Name	Scientific Name	Common Name	Scientific Name
Longnose gar	*Lepisosteus osseus*	Yellow bullhead	*Ameiurus natalis*
Mimic shiner	*Notropis volucellus*		
Source: ODWC 2005			

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APPENDIX E
SURFACE WATERS

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APPENDIX E—SURFACE WATERS

Table E–1 lists surface waters within the region of influence (ROI) of the proposed Oklahoma Conservation Resource Enhancement Program, which includes lands in the Tenkiller and Spavinaw watersheds.

Table E–1. Surface waters within the ROI.

Watershed	Waterbody		
Tenkiller	Ballard Creek	Flint Creek	Smith Hollow Creek
	Baron (Barren) Fork	Green Creek	Spade Creek
	Burnt Cabin Creek	Illinois River	Tahlequah Creek
	Caney Creek	Luna Branch	Tailholt Creek
	Carters Creek	Park Hill Branch	Stillwater City Lake
	Cato Creek	Peacheater Creek	Tate Parris Branch
	Chicken Creek	Peavine Creek	Tenkiller Ferry Lake
	Crazy Creek (Glasby)	Pettit Creek	Terrapin Creek
	Deep Branch	Pine Creek	Tyner Creek
	Dry Creek	Rock Branch	Walltrip Branch
	Elk Creek	Salt Branch	Welling Creek
	Evansville Creek	Sager Creek	West Branch
	Fall Branch	Shell Branch	Winset Hollow Creek
	Fagan Creek	Sismore Creek	
Spavinaw	Beaty Creek	Cloud Creek	Rattlesnake Creek
	Black Hollow Creek	Dry Creek	Spavinaw Creek
	Brush Creek	Hog Eye Creek	Spavinaw Lake
	Cherokee Creek	Lake Eucha	
Source: U.S. Geological Survey (USGS) 2003			

REFERENCE

USGS. 2003. *State of Oklahoma: Streams*; and *State of Oklahoma: Lakes*. Geographic Information System shapefiles. U.S. Geological Survey. Available via the Oklahoma Center for GeoSpatial Information website at http://www.ocgi.okstate.edu/zipped/. Accessed February 8, 2006.

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APPENDIX F
NET PRESENT VALUE ANALYSIS

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APPENDIX F—NET PRESENT VALUE ANALYSIS

Data used for the net present value analysis for the proposed Oklahoma Conservation Resource Enhancement Program over 15 years is shown on the following page of this appendix.

Year	Discount Factor	Cost Share Implementation (FSA)	State Implementation Match	Producer Implementation Costs	Practice Incentive Payments	Tulsa Permanent Easements	State Technical Assistance	State Monitoring	Signing Incentive Payments	Rental Rate	Riparian Buffer Maintenance	Maintenance	Lost Jobs	Lost Sales	Sum	NPV
2007	1.00	11,421,000	7,524,640	-3,896,360	9,136,800	1,250,000	287,000	126,500	2,855,250	1,399,073	506,959	435,651	-476,348	-2,613,359	27,956,805	27,956,805
2008	0.95						287,000	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-401,525	-381,449
2009	0.90						287,000	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-401,525	-362,376
2010	0.86						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-566,832
2011	0.81						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-538,491
2012	0.77						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-511,566
2013	0.74						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-485,988
2014	0.70						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-461,688
2015	0.66						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-438,604
2016	0.63						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-416,674
2017	0.60						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-395,840
2018	0.57						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-376,048
2019	0.54						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-357,246
2020	0.51						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-339,383
2021	0.49						27,400	59,500		1,399,073	506,959	435,651	-476,348	-2,613,359	-661,125	-322,414
TOTAL		11,421,000				1,250,000	1,189,800	959,500	2,855,250	20,986,088	7,604,384	6,534,758	-7,145,220	**-39,200,385**	**19,220,254**	**22,002,206**
NPV Per Acre																**1,156**

Assumptions:

1) 5% discount rate
2) State match based on highest estimated cost from draft CREP agreement
3) State technical assistance based on 3 persons @ $36,000 each
4) Average rental rate of $73.50