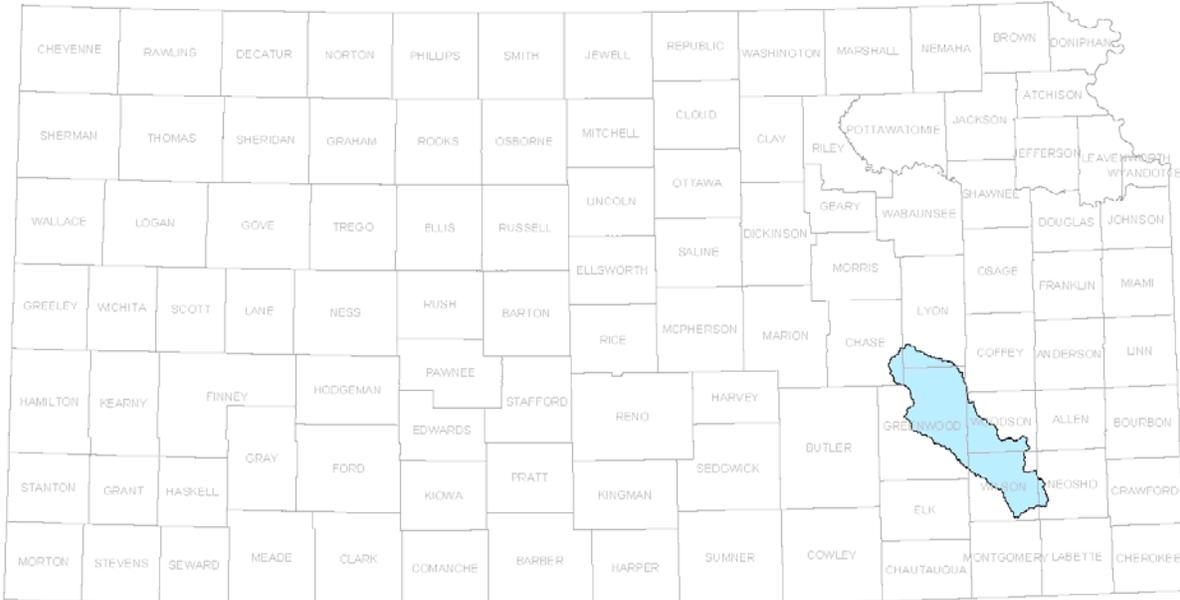


# KANSAS

## Rapid Watershed Assessment

### Upper Verdigris Watershed Hydrologic Unit Code – 11070101



**September 2006**

**Produced by:**

**United States Department of Agriculture  
Natural Resources Conservation Service  
760 South Broadway  
Salina, Kansas 67401**

**Kansas Department of Health and Environment  
Bureau of Water  
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## Resource Profile

### 1.0 Purpose

This rapid watershed assessment (RWA) organizes resource information into one document that local conservationists, units of government, and others can use to identify existing resource conditions and conservation opportunities. This will enable the user to direct technical and financial resources to the local needs in the watershed. This RWA provides a brief description of the Upper Verdigris sub-basin's natural resources, resource concerns, conservation needs, and ability to resolve natural resource issues and concerns.

### 2.0 Introduction

The Upper Verdigris 8-Digit Hydrologic Unit Code (HUC) sub-basin is comprised of 767,225 acres in southeast Kansas including Chase, Lyons, Greenwood, Neosho, Wilson, and Woodson Counties. According to the National Land Cover Data (NLCD), approximately 12 percent of the sub-basin is in grain and row crop; 78 percent is in grassland, pasture, and hay; and the rest is in other various land uses. This sub-basin is located in the Verdigris River watershed basin and drains into Toronto Reservoir and Oklahoma's Oologah Lake as it flows from northwest to south through this area of Kansas.

#### Relief Map



Resource concerns are numerous in the sub-basin. They include, but are not limited to, soil erosion, soil compaction, diminishing surface water quality, deteriorating plant conditions, and inadequate water for domestic livestock. Economic issues such as the high capital costs of crop production and farm operation, and unreliable profits may delay the acceptance and implementation of conservation on agricultural lands in the sub-basin.

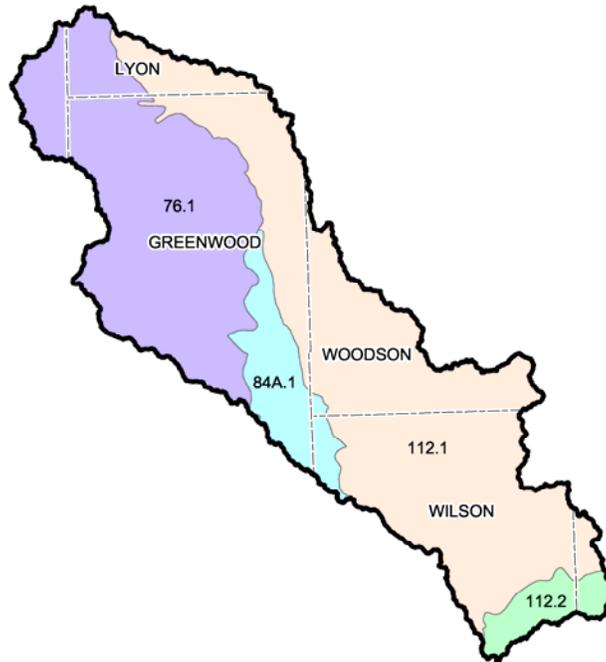
There are approximately 811 farms and 1168 operators in the Upper Verdigris sub-basin. The estimated average farm size in 2002 was 809 acres, an increase of 15 percent from the 1987 estimate.

Six Natural Resources Conservation Service (NRCS) service centers, six county conservation districts, the Upper Verdigris Watershed District, and the Flint Hills and See-Kan Resource Conservation and Development (RC&D) areas provide conservation assistance in the sub-basin.

## 3.0 Physical Description

The physical description of the Upper Verdigris sub-basin provides detailed information so the user can better understand the natural resources associated with this geographical land unit.

### 3.1 Common Resource Area (CRA) Map<sup>1</sup>



**76.1 – Bluestem Hills:** The Bluestem Hills CRA is a rolling plain interrupted by high, ragged escarpments in which limestone bedrock is regularly exposed. Local relief reaches 250 feet in the escarpment zones. Valley bottoms are narrow with steep sided slopes. Geologic parent materials are mainly thin-bedded Permian limestones and shales. Pre-settlement vegetation was tallgrass prairie. The land is in ranches.

**84A.1 –Northern Cross Timbers:** This unit consists of hilly uplands and nearly level to strongly sloping ridgetops dissected by narrow stream valleys. Loamy soils are shallow to very deep with deeper soils on ridges or foot-slope positions and shallower soils on shoulder and back-slope positions. Soils developed in sandstones and shales of Permian and Pennsylvanian age. Pre-settlement vegetation was mainly post oak and blackjack oak with mid-to tall-grass understory. Current land use is rangeland, woodland, pastureland, and cropland.

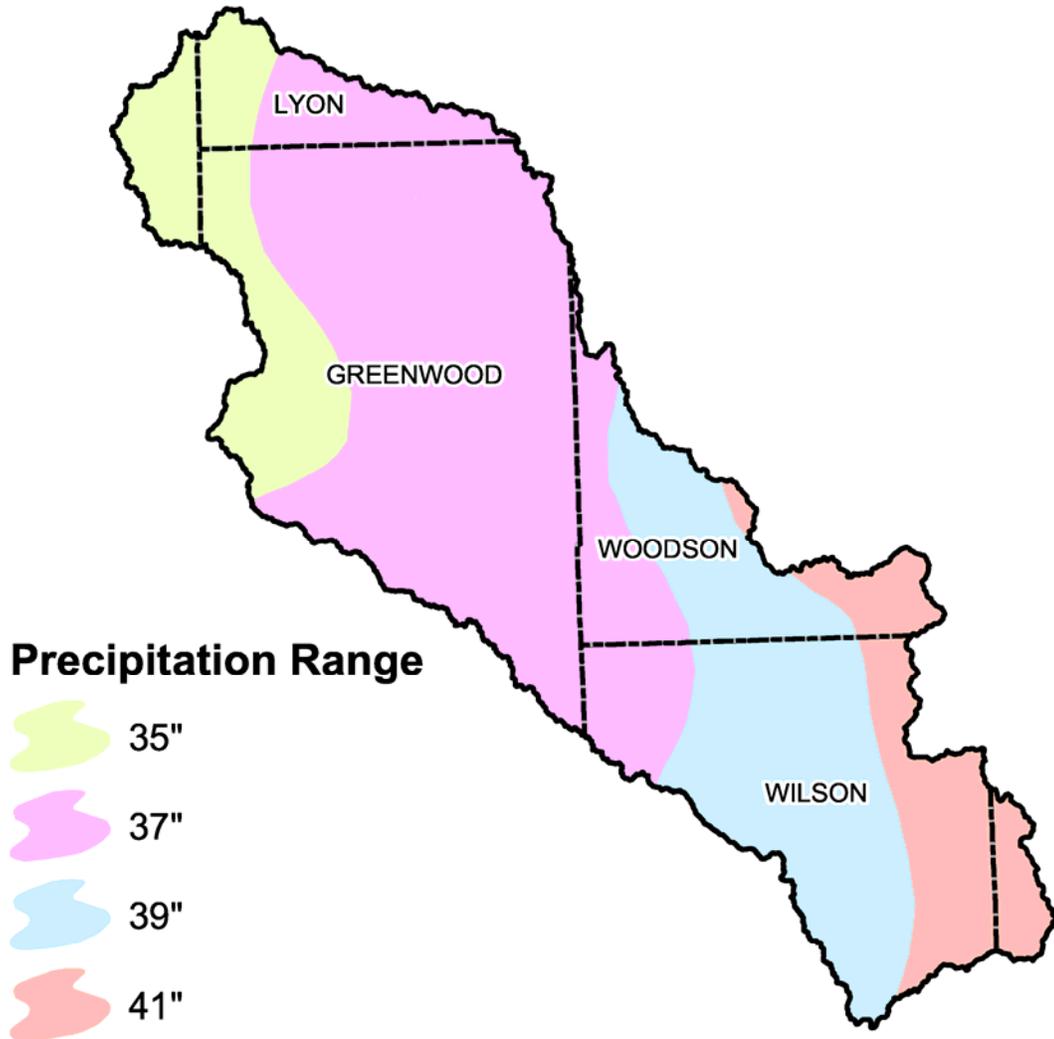
**112.1 – Scarped Osage Plains:** The Scarped Osage Plains CRA is a smooth plain interrupted by low, ragged escarpments trending southwest-northeast in which limestone bedrock is regularly exposed. Local relief reaches 150 feet in the escarpment zones but elsewhere averages less than 100 feet. Valley bottoms are exceptionally narrow for the size of the streams. Geologic parent materials are mainly thin-bedded Pennsylvanian limestones and shales. Pre-settlement vegetation was mostly prairie, with belts of scattered timber along limestone scarps and valleys. Most of the land is in farms, both pasture and cropland.

**112.2 – Cherokee Plains:** The Cherokee Plains CRA is one continuous plain of very low relief (usually less than 80 feet) mostly on Pennsylvanian sandstones and shales, but with associated thin-bedded limestones and coal. Streams have hardly dissected the surface, and valleys are topographically subdued. Wetlands are abundant throughout the wide, flat alluvial plains. Claypan soils add further distinction to the CRA. Pre-settlement vegetation was both upland and wet prairie, with timber confined to narrow strips along the stream courses. Most of the land is in farms, both pasture and cropland, with local areas of extensive strip mines. Substantial prairie remnants occur, many in conservation ownership.

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## 3.2 Precipitation Map<sup>2</sup>

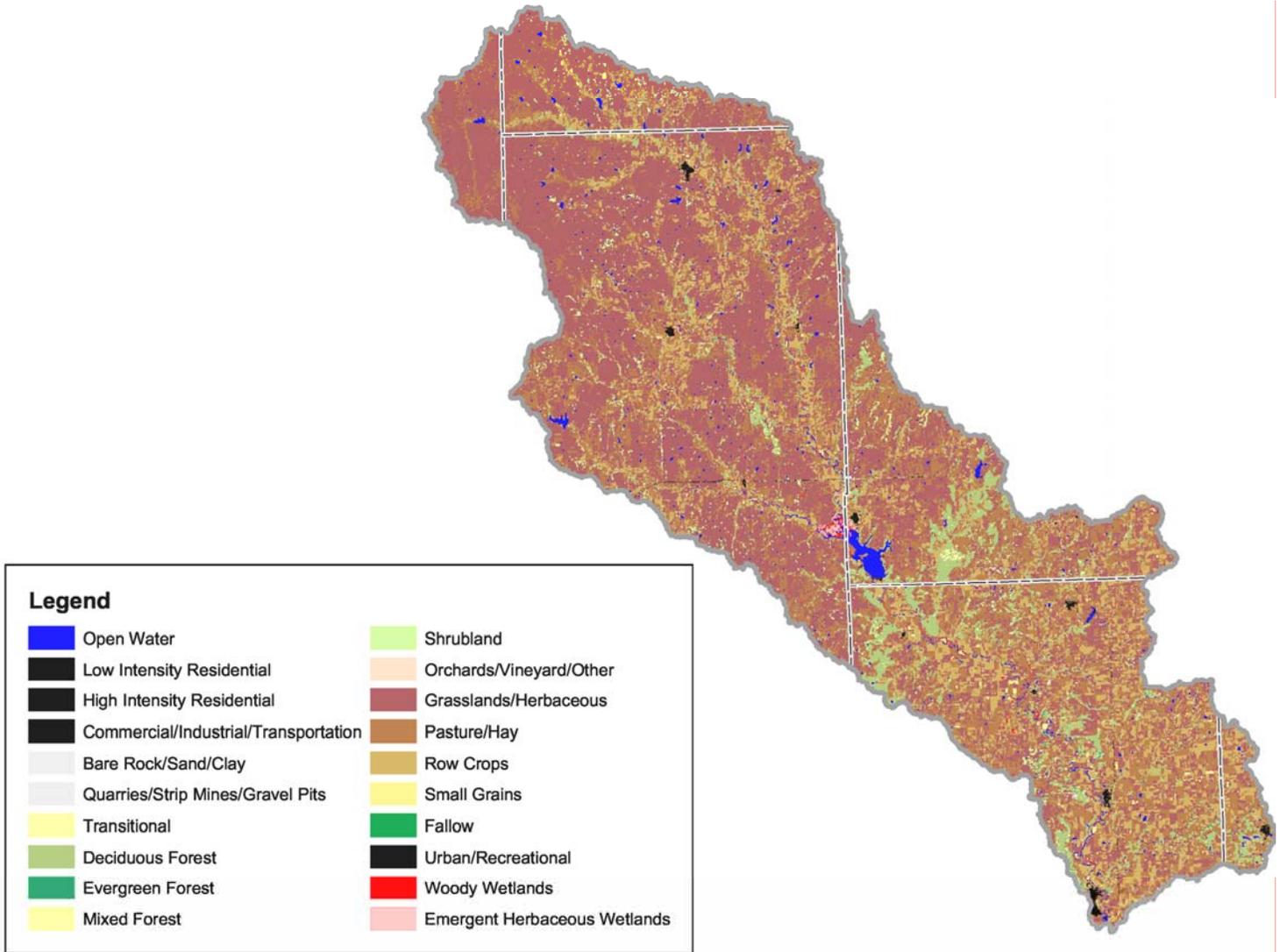
The map below depicts the average precipitation occurring within the sub-basin.



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### 3.3 Land Use and Land Cover Distribution Map<sup>13</sup>

The map below represents the distribution of land cover and land use as defined by the NLCD.



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### 3.3.1 Land Use and Land Cover Summary Table<sup>/3</sup>

Land Cover/Land Use	Ownership						Totals	%
	Public		Private		Tribal			
	Acres	%	Acres	%	Acres	%		
Open Water	3000	*	6,845	1.3	0	--	9,845	1.3
Low Intensity Residential	0	--	775	*	0	--	775	0.1
High Intensity Residential	0	--	1,030	*	0	--	1,030	0.1
Commercial/Industrial/Transportation	0	--	706	*	0	--	706	0.1
Bare Rock/Sand/Clay	0	--	16	*	0	--	16	0.0
Quarries/Strip Mines/Gravel Pits	0	--	152	*	0	--	152	0.0
Transitional	0	--	381	*	0	--	381	0.0
Deciduous Forest	1675	*	42,791	5.8	0	--	44,466	5.8
Evergreen Forest	0	--	449	*	0	--	449	0.1
Mixed Forest	0	--	1,194	*	0	--	1,194	0.2
Shrubland	0	--	10,231	1.3	0	--	10,231	1.3
Grasslands/Herbaceous	4200	*	399,498	52.6	0	--	403,698	52.6
Pasture/Hay	0	--	194,409	25.3	0	--	194,409	25.3
Row Crops	850	*	91,578	12.0	0	--	92,428	12.0
Small Grains	0	--	2,563	*	0	--	2,563	0.3
Urban/Recreational	0	--	206	*	0	--	206	0.0
Woody Wetlands	0	--	2,212	*	0	--	2,212	0.3
Emergent Herbaceous Wetlands	0	--	2,467	*	0	--	2,467	0.3
<b>HUC Totals<sup>a</sup></b>	<b>9,725</b>	<b>1.3</b>	<b>757,500</b>	<b>98.7</b>	<b>0</b>	<b>--</b>	<b>767,225</b>	<b>100</b>

\*: Less than 1 percent of total acres.

<sup>a</sup>: Totals are approximate due to rounding and small unknown acreages.

#### **Special Considerations for This 8-Digit HUC:**

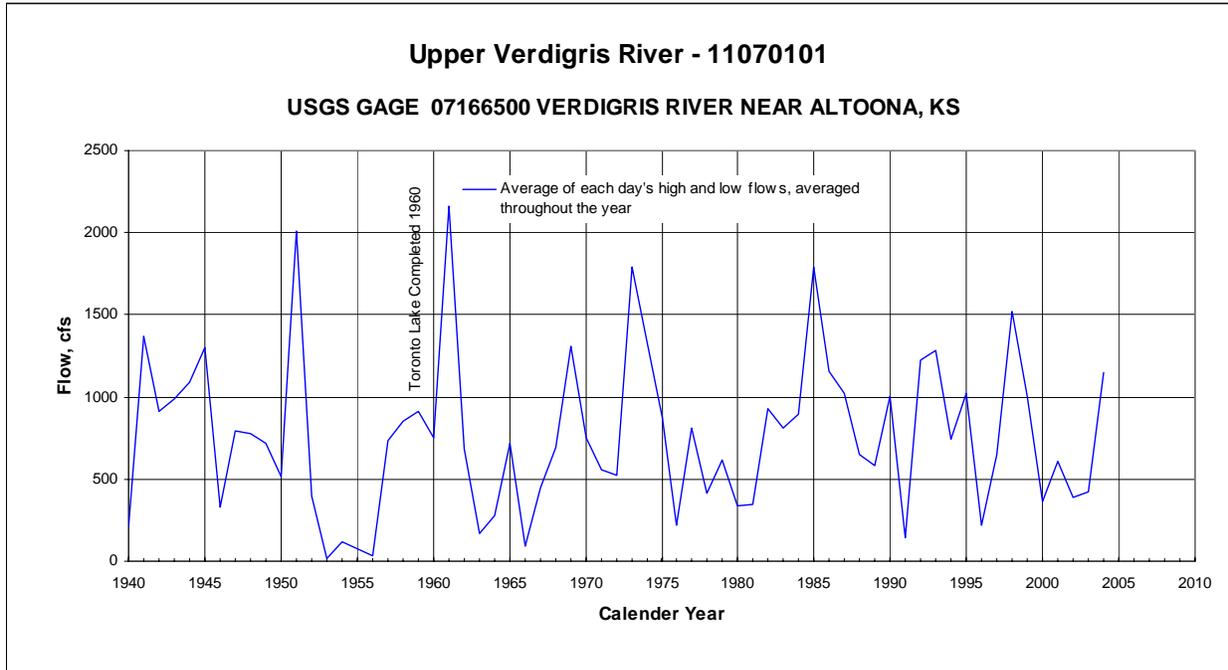
- Small grains and row crops are the predominant commodities grown in rotation on cropland.
- Grasslands/Herbaceous and Pasture/Hay make up approximately 78 percent of the watershed.
- Pasture is included on mostly beef operations as well as a few small farms and ranches.
- Urban land comprises less than 1 percent of the HUC.

Irrigated Lands <sup>/4</sup>	Percent of Cropland	Percent of HUC
	<3%	<1%

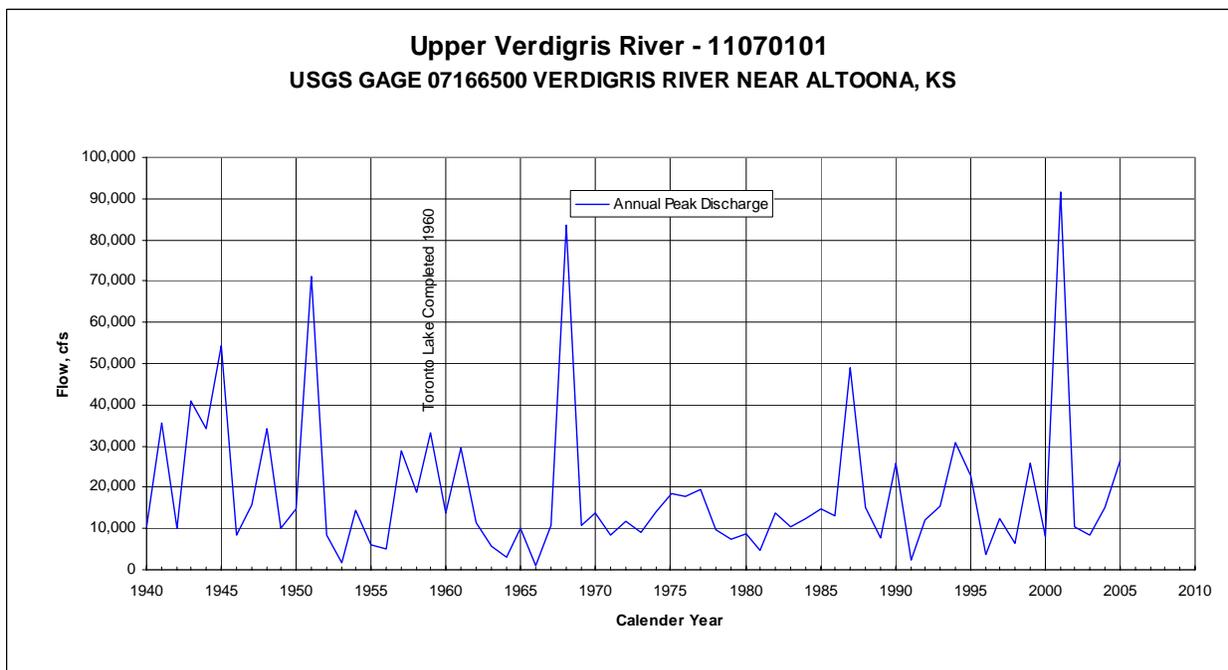
### 3.4 Stream Flow Data<sup>5</sup>

Stream flow data has been collected since 1940. There is one U.S. Geological Survey (USGS) stream gage station located within the sub-basin. For this assessment, data was collected from the stream gage station on the Verdigris River near Altoona, Kansas.

#### Average Annual Discharge



#### Annual Peak Flow



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### 3.5 Other Physical Descriptions

		MILES	PERCENT
<b>Stream Data</b> <sup>/5</sup> <i>Total Miles of Streams in HUC</i>	Total Miles – Major (100K Hydro Geographic Information System [GIS] Layer)	618	--
			ACRES
<b>Land Cover/Use</b> <sup>/3</sup>  Based on a 100-foot stretch on both sides of all streams in the 100K Hydro GIS Layer	Bare Rock/Sand/Clay	2	0
	Commercial/Industrial/Transportation	52	0
	Deciduous Forest	10,894	1
	Emergent Herbaceous Wetlands	797	0
	Evergreen Forest	107	0
	Grasslands/Herbaceous	37,192	5
	High Intensity Residential	8	0
	Low Intensity Residential	27	0
	Mixed Forest	342	0
	Open Water	8,687	1
	Pasture/Hay	25,140	3
	Quarries/Strip Mines/Gravel Pits	13	0
	Row Crops	11,542	2
	Shrubland	1,867	0
	Small Grains	91	0
	Transitional	27	0
	Urban/Recreational	11	0
Woody Wetlands	1,065	0	
<b>Total Acres of 100-foot Stream Buffers</b>		<b>97,863</b>	<b>13</b>
<b>Land Capability Class</b> <sup>/4</sup>	1 – slight limitations	430,000	56
	2 – moderate limitations		
	3 – severe limitations		
	4 – very severe limitations		
	5 – no erosion hazard, but other limitations	294,000	38
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest		
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat		
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply		
<b>Total</b>		<b>724,000</b>	<b>94</b>

## 4.0 Resource Concerns

Resource concerns are issues related to the natural environment. Natural resources include soil, water, air, plants, animals, and humans. Local conservationists identified major resource issues by land use that affect the Upper Verdigris sub-basin.

### 4.1 Summary of Resource Concerns

Resource Concerns/Issues by Land Use								
Soil, Water, Air, Plant, Animal, plus Human (SWAPA +H) Concerns	Specific Resource Concern/Issue	Pasture/Hay	Grain Crops	Row Crops	Grazed Range	Forest	Wildlife	Urban
		<b>Soil Erosion</b>	Sheet and Rill		X	X		
Ephemeral Gully			X	X				
Classic Gully	X				X			
Streambank	X				X			
<b>Soil Condition</b>	Compaction		X	X				
<b>Water Quality, Surface</b>	Excessive Nutrients and Organics		X	X				
	Excessive Suspended Sediment and Turbidity		X	X				
<b>Plant Condition</b>	Productivity, Health and Vigor	X			X	X		
	Noxious and Invasive Plants	X			X	X		
	Forage Quality and Palatability	X			X			
<b>Animal: Domestic</b>	Inadequate Stock Water				X			
<b>Human Economics</b>	High Capital/Financial Costs	X	X	X	X			

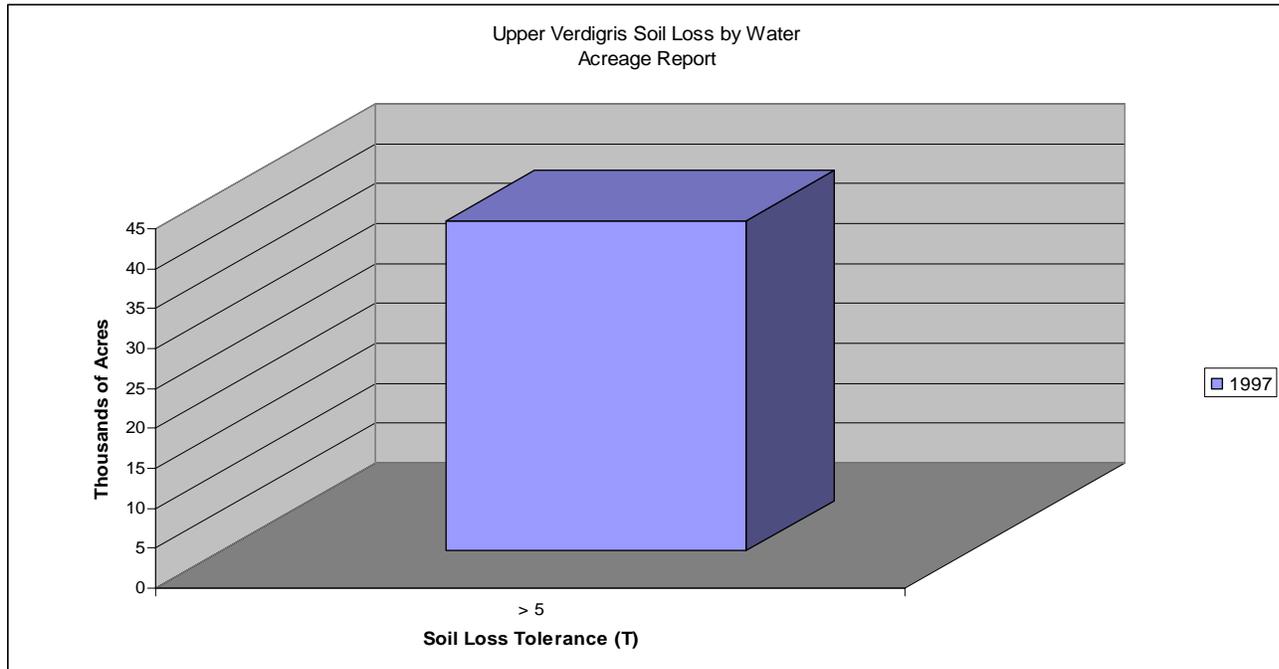
#### Pasture/Hay

- Pastureland is commonly over-utilized, lacks needed fertility, affected by timing of grazing, and affected by invasive weeds.
- Hay land lacks needed fertility, affected by timing of haying, and affected by invasive weeds.
- Invasive/noxious species are present (e.g. *Serecia lespedeza*, Johnson grass) and difficult to control.
- **Grain and Row Crops**
- Residue, nutrient, and pest management; vegetative practices; and structural practices are necessary to control erosion, protect water quality, and improve soil conditions.
- For cropland, sheet and rill erosion is greater on steeper slopes.
- Conventional tillage on cropland has caused compaction concerns on cropland.
- Over application of nutrients and organics has created surface water quality concerns.
- **Grazed Range**
- Rangeland is commonly over-utilized year after year that decreases productivity, health and vigor, deteriorates rangeland plant health, and affects forage quality and palatability.
- Prescribed burning is not widely utilized to aid in management of invasive plants, grazing distribution, or wildlife needs.
- Invasive plant species affect range health, forage production, and increase economic inputs for control of pest plants.
- Classic gully and streambank erosion are concerns in part due to over utilization of the plant resource and unabated livestock access to stream corridors and banks.
- Invasive/noxious species are present (e.g., *Serecia lespedeza*) and difficult to control.
- **General**
- Inputs needed to manage large agricultural operations, costs of production, and low commodity values require large capital outlay and place financial burdens of landowners and producers.

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## 4.2 Estimated Soil Loss<sup>4</sup>

Soil loss through wind and water erosion is critical to consider for dealing with air and water quality issues. As airborne particulate, soil particles are a major contributor to air quality concerns. Soil loss through water erosion causes water quality impairments as pollutants attach to soil colloids and are transported into the stream systems.



- The 1997 National Resources Inventory (NRI) estimate indicates that approximately 41,000 acres of the agricultural lands are eroding above the sustainable level of 5 tons per acre per year by water erosion. This is approximately 30 percent of cropland still needing erosion treatment.
- Controlling erosion not only sustains the long-term productivity of the land, but it also affects the amount of soil, pesticides, fertilizer, and other substances that move into the nation's waters.
- Through NRCS programs, many farmers and ranchers have applied conservation practices to reduce the effects of erosion by water. More may need to be done.

### 4.3 Water Quality Conditions<sup>/13</sup>

The Kansas Department of Health and Environment (KDHE) is responsible for monitoring water quality conditions in the state of Kansas. This section is provided by KDHE.

For up-to-date water quality condition information, visit the KDHE Web site:  
[http://www.kdheks.gov/befs/download/KS2006\\_305b\\_Reoprts.pdf](http://www.kdheks.gov/befs/download/KS2006_305b_Reoprts.pdf)

#### 4.3.1 Confined Animal Feeding Operations

In Kansas, confined animal feeding operations (CAFOs) with an animal unit capacity of 300 or more must register with the Kansas Department of Health and Environment. Waste disposal practices and the wastewater effluent quality of these registered CAFOs are closely monitored by the KDHE to determine the need for runoff control practices or structure in order to protect the waters of the state of Kansas. Because of this monitoring, registered CAFOs are not considered a significant threat to water resources within the watershed. A portion of the state's livestock population exists on small, unregistered farms. These small, unregistered livestock operations may contribute a significant source of fecal coliform bacteria and nutrients, depending on the presence and condition of waste management systems and proximity to water resources.

Confined Animal Feeding Operations						
Animal/Operation Type	Dairy	Feedlot	Poultry	Swine	Truck-wash	Other
No. of Permitted Farms	5	9	0	2	0	1
No. of Permitted Animal Units	989	7,525	0	665	0	0

#### 4.3.2 Public Water Supply Systems

In the State of Kansas, a public water supply system is defined by Kansas Statutes Annotated (K.S.A.) 65-162a and Kansas Administrative Regulations (K.A.R.) 28-15a-2 as a "system for delivery to the public of piped water for human consumption that has at least 10 service connections or regularly serves at least 25 individuals daily at least 60 days out of the year." These systems are regulated by the state to assure the citizenry safe and pathogen-free drinking water. The KDHE oversees more than 1,086 statewide public water supply systems including municipalities, rural water districts, and privately owned systems. These systems may serve a small community of several families to a city of more than 300,000 persons.

There are 10 Active Public Water Supply Systems located within this watershed. About half of needed water is drawn from surface water within the watershed and the other half is provided by the alluvial aquifers of the Verdigris River and its tributaries. Water quality in alluvial aquifers is generally good; however nitrates, minerals, pesticides, and bacteria can be pollutant concerns.

Source Water Assessment: The 1996 amendments to the Safe Drinking Water Act required each state to develop a Source Water Assessment Program (SWAP). Additionally, each state was required to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water. In Kansas, there are approximately 763 public water supplies that required SWAs. A SWA includes the following: delineation of the source water assessment area; inventory of potential contaminant sources; and susceptibility analysis. The SWA must also be made available to the public. KDHE's Watershed Management Section has implemented the Kansas SWAP plan, and all SWAs are completed.

The Safe Drinking Water Act did not require protection planning to be part of the SWAP process. On a voluntary basis, KDHE encourages public water supplies and their surrounding communities to use the SWAs as the foundation for future protection planning efforts. Source water protection information will be posted on this site as it is compiled. To obtain a copy of SWAs in this watershed visit <http://www.kdheks.gov/nps/swap/SWreports.html>.

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### 4.3.3 Designated Uses

According to the Kansas Surface Water Register, the most *common* designated uses for streams and rivers in this watershed include expected aquatic life use, domestic water supply, and food procurement.

Designated Uses								
Stream Name	AL	CR	DS	FP	GR	IW	IR	LW
Bachelor Cr	E		X	X				
Bernard Cr	E		X	X				
Big Cedar Cr	E							
Brazil Cr	E							
Buffalo Cr	E			X				
Buffalo Cr, West	E			X				
Cedar Cr	E			X				
Chetopa Cr	E			X				
Crooked Cr	E							
Dry Cr	E							
Elder Branch	E							
Fancy Cr	E		X					
Greenhall Cr	E							
Holderman Cr	E		X					
Homer Cr	E		X	X				
Kelly Branch	E							
Kuntz Branch	E							
Little Chetopa Cr	E							
Little Sandy Cr	E							
Long Cr	E							
Miller Cr	E							
Moon Branch	E							
Onion Cr	E							
Rock Cr	E			X				
Ross Branch	E							
Sandy Cr	E			X				
Shaw Cr	E							
Slate Cr	E			X				
Snake Cr	E			X				
Tate Branch Cr	E							
Van Horn Cr	E							
Verdigris R	S	C	X	X	X	X	X	X
Verdigris R, Bernard Br	E		X	X	X	X	X	X
Verdigris R, N Br	E		X	X	X	X	X	X
Walnut Cr	E			X				
West Cr	E			X				
Willow Cr	E			X				
Wolf Cr	E							

AL = Aquatic Life Support  
CR = Contact Recreation  
DS = Domestic Water Supply  
FP = Food Procurement

GR = Groundwater Recharge  
IW = Industrial Water Supply  
IR = Irrigation Water Supply  
LW = Livestock Water Supply

E = Expected Aquatic Life Use Water  
S = Special Aquatic Life Use Water  
C = Primary contact recreation stream segment is not open to and accessible by the public under Kansas law  
a = Secondary contact recreation stream segment is by law or written permission of the landowner open and accessible by the public  
b = Secondary contact recreation stream segment is not open to and accessible by the public under Kansas law  
X = Referenced stream segment is assigned the indicated designated use

### 4.3.4 Total Maximum Daily Loads

Total Maximum Daily Loads (TMDLs) are limits on the amount of pollutant entering a stream or lake, while still attaining water quality standards. The water quality standards identify the designated uses of streams, lakes, and wetlands and the level of water quality necessary to fully support these uses. The process of developing TMDLs in Kansas determines:

1. The pollutants causing water quality impairments.
2. The magnitude of the impairment relative to applicable water quality standards.
3. The level of pollution reduction needed to attain achievement of water quality standards.
4. The allocation of pollutant loads to be distributed among point and non-point sources in the watershed affecting the water quality limited water body.
5. Suggested corrective actions and management practices to be implemented in order to achieve the load allocations, TMDLs, and water quality standards.
6. The monitoring and evaluation strategies needed to assess the impact of corrective actions in achieving TMDLs and water quality standards.
7. Provisions for future revision of TMDLs based on those evaluations.

The following table shows the percentage of stream miles within HUC 8 11070101 that are listed on the 303d list. Section 303(d) of the Clean Water Act requires states to identify and list all water bodies where state water quality standards are not being met. Thereafter, TMDLs comprising quantitative objectives and strategies have been developed for these impaired waters within the watershed in order to achieve their water quality standards. For additional TMDL information or to download the TMDL report, visit: <http://www.kdheks.gov/tmdl/index.htm>.

<b>Stream Data</b>	Total Miles – Major (100K Hydro GIS Layer)	618
	303d/TMDL Listed Streams (KDHE)	60

2006 Impaired Waters with TMDLs			
Stream Segment	Stream/Lake with TMDL	Priority for TMDL Implementation	Impairments
17	West Creek	High	Dissolved Oxygen
19	Walnut Creek	Medium	Dissolved Oxygen
22	Chetopa Creek	High	Dissolved Oxygen
22	Chetopa Creek	Medium	Bacteria
	Wilson County State Fishing Lake	Medium	Eutrophication, Dissolved Oxygen
	Woodson County Wildlife Area	Medium	Eutrophication, Dissolved Oxygen

2006 Impaired Waters for HUC 8 11070101 needing TMDLs	
Impaired Stream/Lake	Impairment
Toronto Lake	Eutrophication, Dissolved Oxygen, Siltation
Eureka Lake	Eutrophication
Eureka Lake	Siltation
Woodson County Wildlife Area	Siltation, Dissolved Oxygen

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**Impairment definitions:**

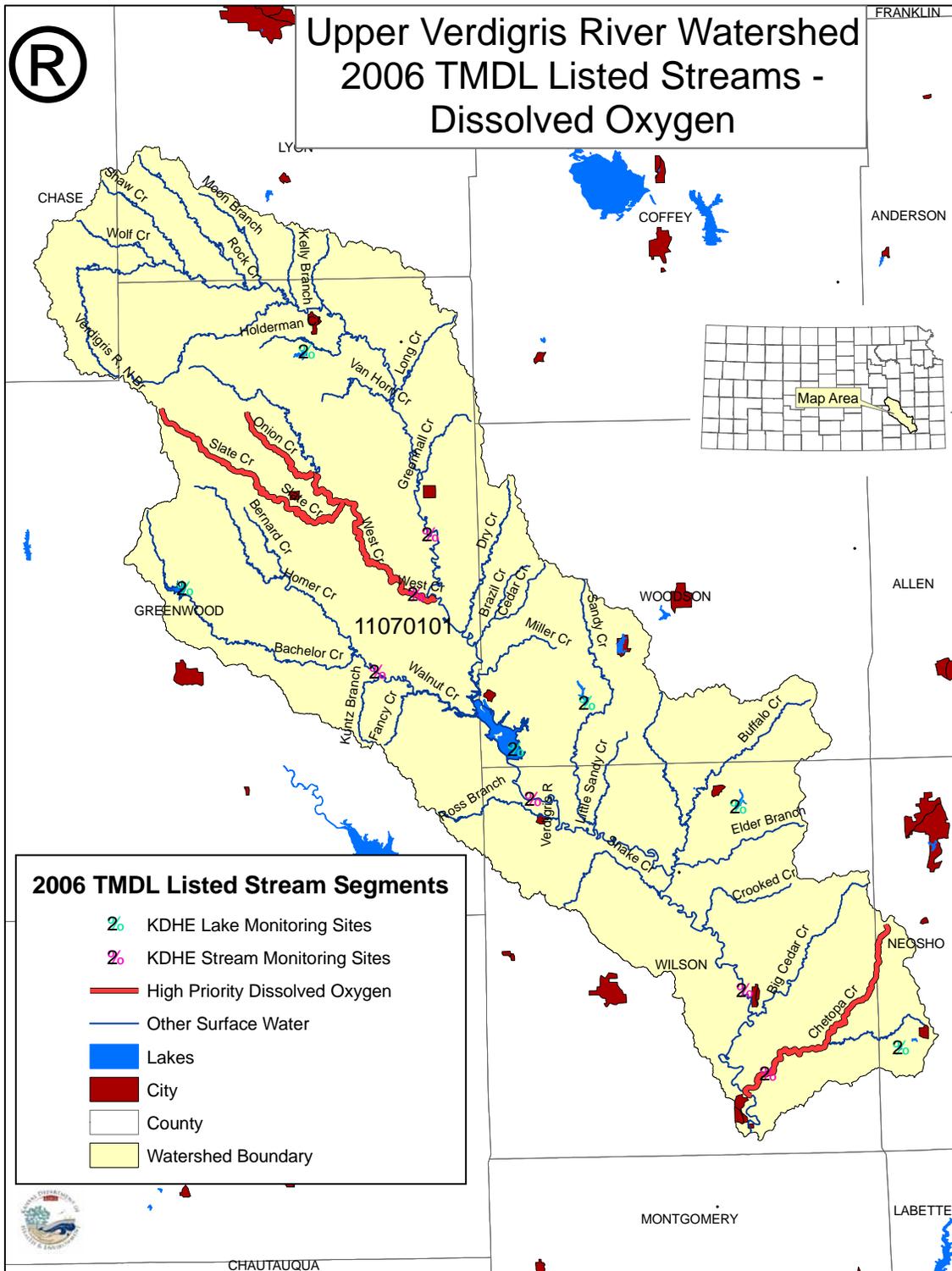
**Dissolved Oxygen:** Oxygen available to aquatic life with the water column. State water quality standards require a stream or lake to have at 5mg/L of dissolved oxygen.

**Bacteria:** Bacteria indicators (either fecal coliform or *E. coli*) are found in the digestive systems of warm-blooded animals. In surface waters, bacteria are an indicator of potential disease causing organisms. Potential sources of bacteria contamination in surface waters include municipal wastewater, livestock, septic systems, pets, and wildlife.

**Eutrophication:** Excessive nutrients entering lake causing an increase in algae to nuisance conditions, impairing aquatic life, recreation, and water supply uses.

**Siltation:** Excessive sediment entering lake causing loss of volume, increased turbidity, and decreased clarity. Siltation causes impairment of aquatic life, recreation, and water supply uses.

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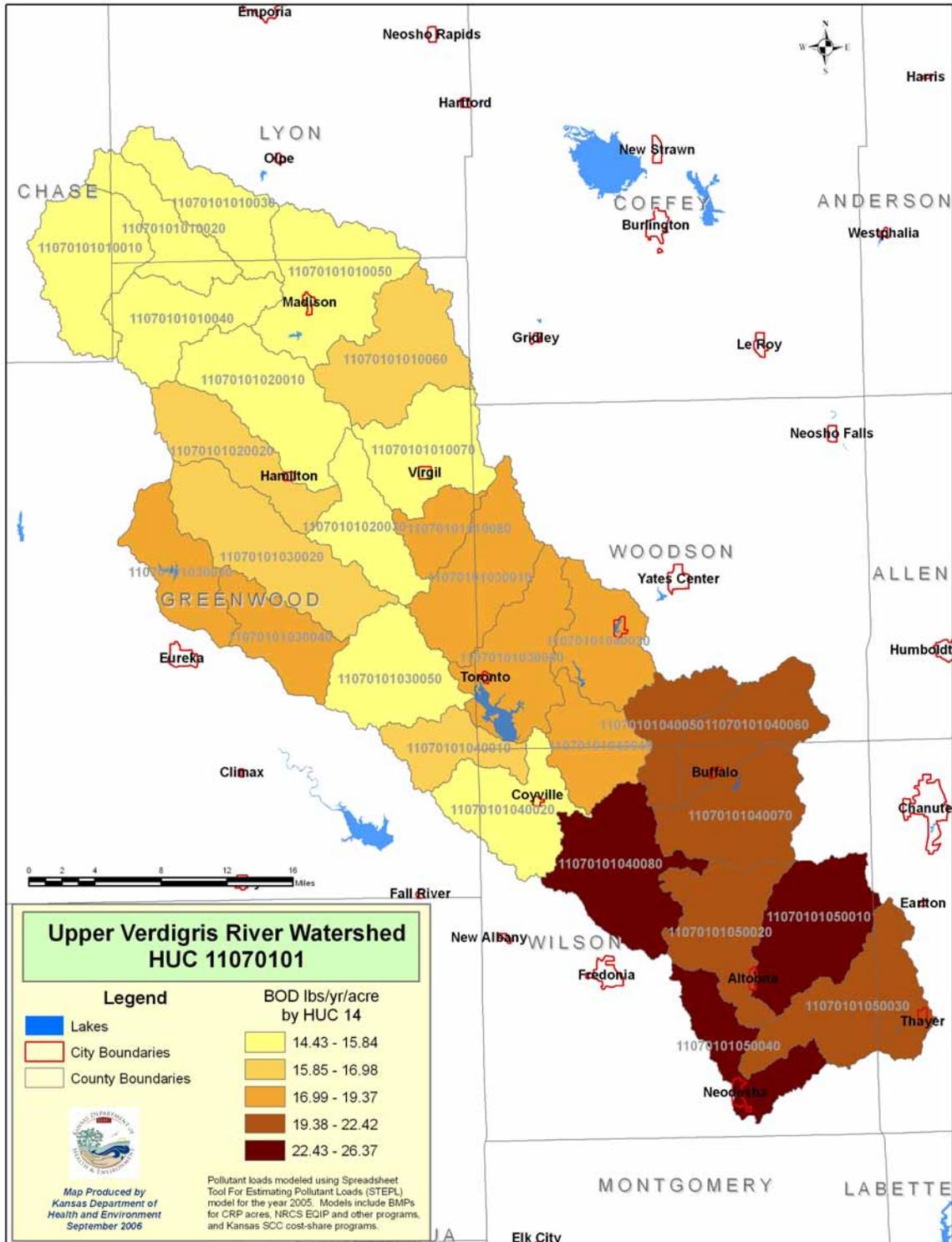
## 4.3.6 Modeled Pollutant Loads

The following figures indicate pollutant loads (sediment, biological oxygen demand, nitrogen, and phosphorus) modeled using the Spreadsheet Tool for Estimating Pollutant Loads (STEPL) model for the year 2005. Models include best management practices for Conservation Reserve Program (CRP) acres, NRCS Environmental Quality Incentives Program (EQIP) and other programs, and Kansas State Conservation Commission (SCC) cost-share programs.

### Sediment



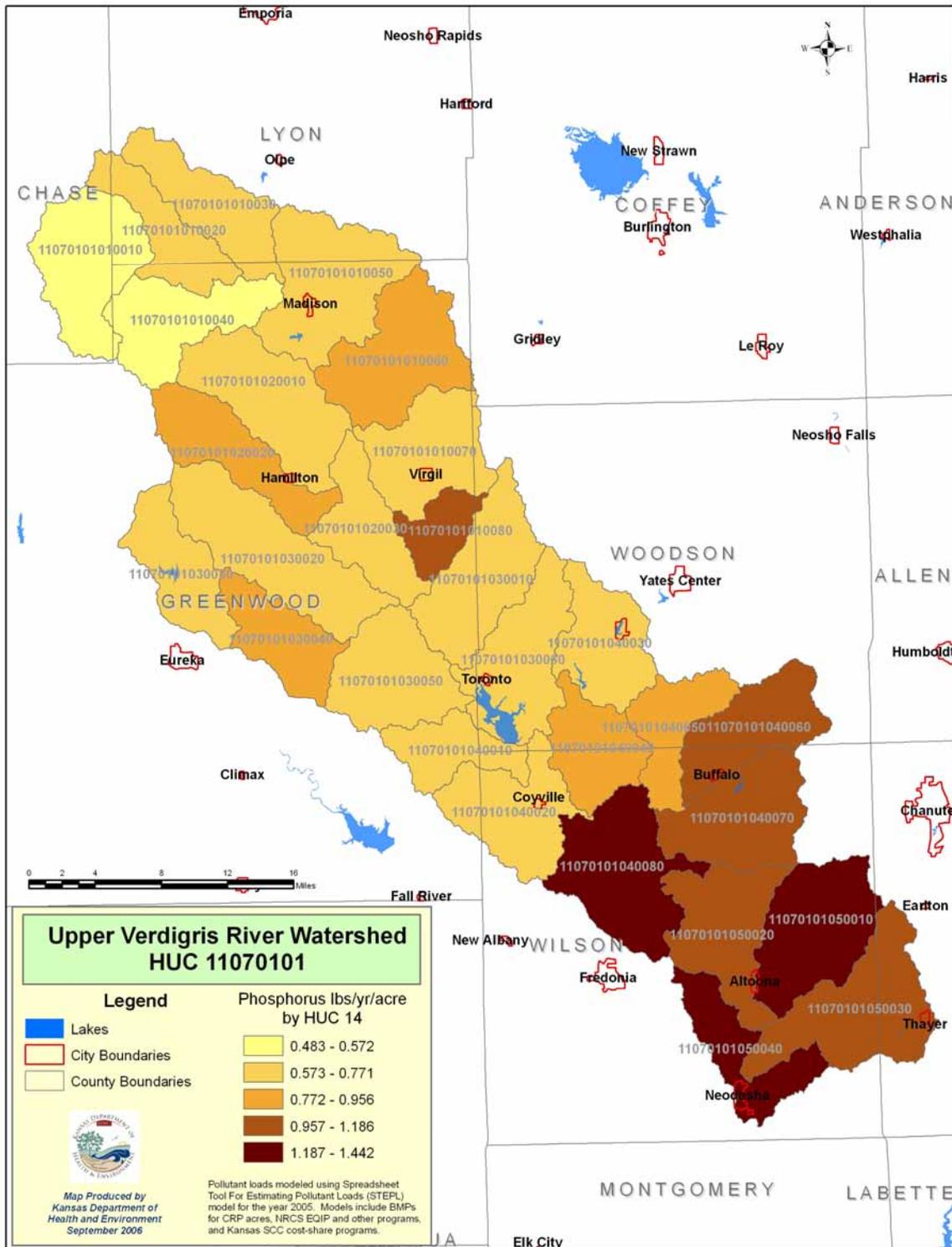
## Biological Oxygen Demand (BOD)





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## Phosphorus



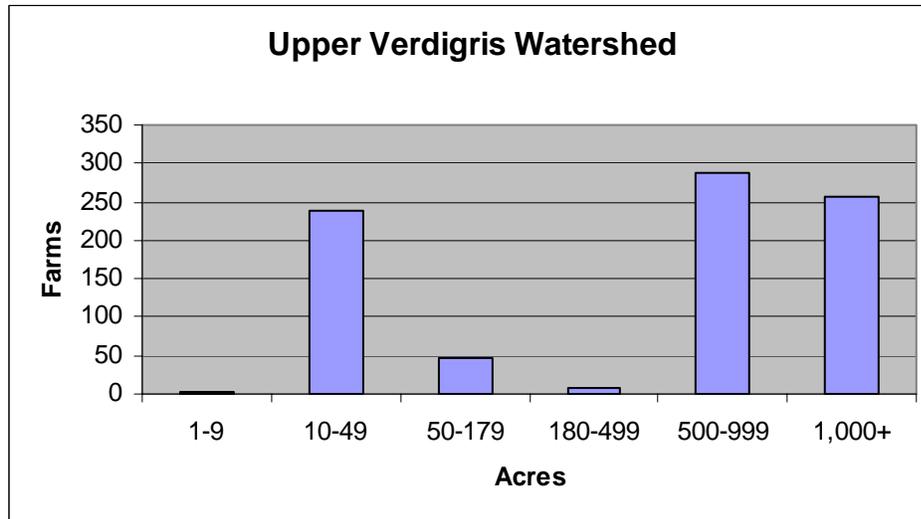
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## 4.4 Threatened and Endangered Species Status<sup>1</sup>

The Endangered Species Act provides protection to animals that are experiencing a decline in population, or nearing extinction. The table below lists species of concern and their federal and state designation(s).

<b>LISTED THREATENED AND ENDANGERED SPECIES</b>			
<b>Species Common Name (Scientific name)</b>	<b>Threatened (T), Endangered (E), Proposed (P), Candidate (C)</b>	<b>Designated Critical Habitat (Y)es/(N)o</b>	<b>Listing: Federal (F), State (S)</b>
<b>Animals, Vertebrates - Fishes</b>			
Honeyhead Chub ( <i>Nocomis biguttatus</i> )	T	Y	S
Neosho Madtom ( <i>Noturus placidus</i> )	T/T	Y	F/S
Redspot Chub ( <i>Nocomis asper</i> )	T	N	S
Topeka Shiner ( <i>Notropis topeka</i> )	E/T	Y	F/S
<b>Animals, Vertebrate - Birds</b>			
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	T/T	Y	F/S
Eskimo Curlew ( <i>Numenius borealis</i> )	E/E	N	F/S
Interior Least Tern ( <i>Sterna antillarum athalassos</i> )	E/E	Y	F/S
Peregrine Falcon ( <i>Falco peregrinus</i> )	E	N	S
Piping Plover ( <i>Charadrius melodus</i> )	T/T	N	F/S
Snowy Plover ( <i>Charadrius alexandrinus</i> )	T	N	S
Whooping Crane ( <i>Grus Americana</i> )	E/E	N	F/S
<b>Animals, Vertebrate – Mammals</b>			
Eastern Spotted Skunk ( <i>Spilogale putorius interrupta</i> )	T	Y	S
<b>Animals, Vertebrate - Reptiles</b>			
Common Map Turtle ( <i>Graptemys geographica</i> )	T	N	S
<b>Animals, Invertebrate - Insects</b>			
American Burying Beetle ( <i>Nicrophorus americanus</i> )	E/E	N	F/S
<b>Animals, Invertebrate – Unionid Mussels</b>			
Butterfly Mussel ( <i>Ellipsaria lineolata</i> )	T	N	S
Flat Floater Mussel ( <i>Anodonta suborbiculata</i> )	E	N	S
Flutedshell Mussel ( <i>Lasmigona costata</i> )	T	N	S
Neosho Mucket Mussel ( <i>Lampsilis rafinesqueana</i> )	E	Y	S
Ouachita Kidneyshell Mussel ( <i>Ptychobranchus occidentalis</i> )	T	Y	S
Rabbitfoot Mussel ( <i>Quadrula cylindrica</i> )	E	N	S
Western Fanshell Mussel ( <i>Cyprogenia aberti</i> )	E	Y	S

## 5.0 Census and Social Data<sup>/8</sup>



**Number of Farms: 811**

- Average Farm Size: 809 Acres

**Number of Operators: 1168**

- Principle Full-Time Operators: 526
- Principle Part-Time Operators: 285

## 5.1 Estimated Level of Willingness and Ability to Participate in Conservation<sup>/9</sup>

Many of the producers in the Upper Verdigris sub-basin are expanding their farm operations due to the number of retiring producers. Average producers are somewhat willing to consider innovative approaches to conservation, have a good knowledge of resource concerns, are willing to assume some risk when adapting to climatic change or environmental fluxes, and likely to participate in adoption of conservation systems rapidly. Participation in current farm programs varies from program to program, but is considered favorable. To increase the implementation of conservation throughout the sub-basin, resources need to be dedicated to marketing conservation and increasing conservation technical assistance for new and innovative approaches to conservation.

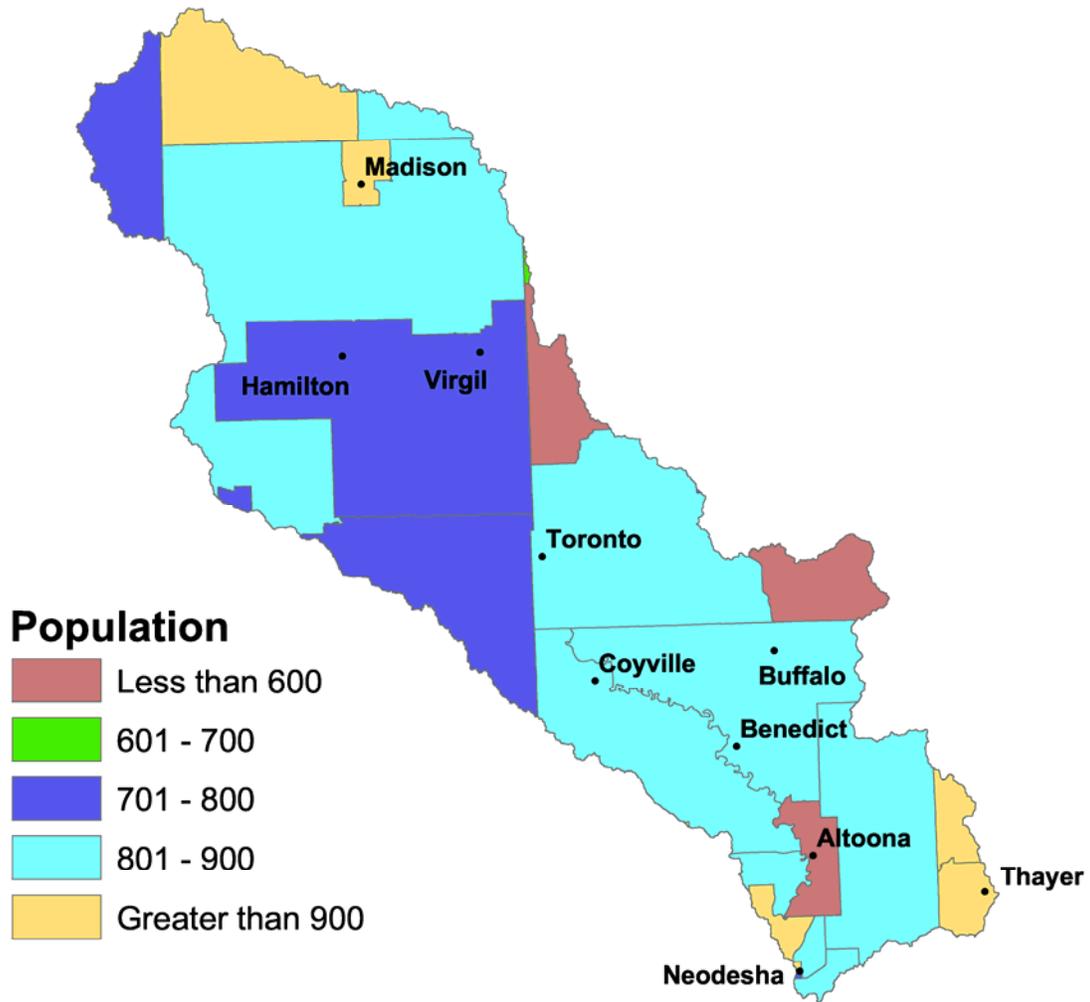
## 5.2 Evaluation of Social Capital<sup>/10</sup>

Social capital is defined as bonds of trust that arise between people interacting in everyday life. Local conservationists developed a summary of social capital for this sub-basin and concluded the following:

Collectively, communities in the Upper Verdigris sub-basin are reported to be somewhat effective at solving problems. Some communities are very close and are willing to assist their neighbors by pooling their resources. Dry conditions over the past decade have left the community with less economic capital, which has led to a decreased state of social well-being and thus less likely to address resource concerns. Opportunities for current farm operations are available to operate additional acres of land within the sub-basin due to the lack of returning producers available to take over family farms.

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## 5.3 Population Distribution Map (2000)



### 6.0 Conservation Progress

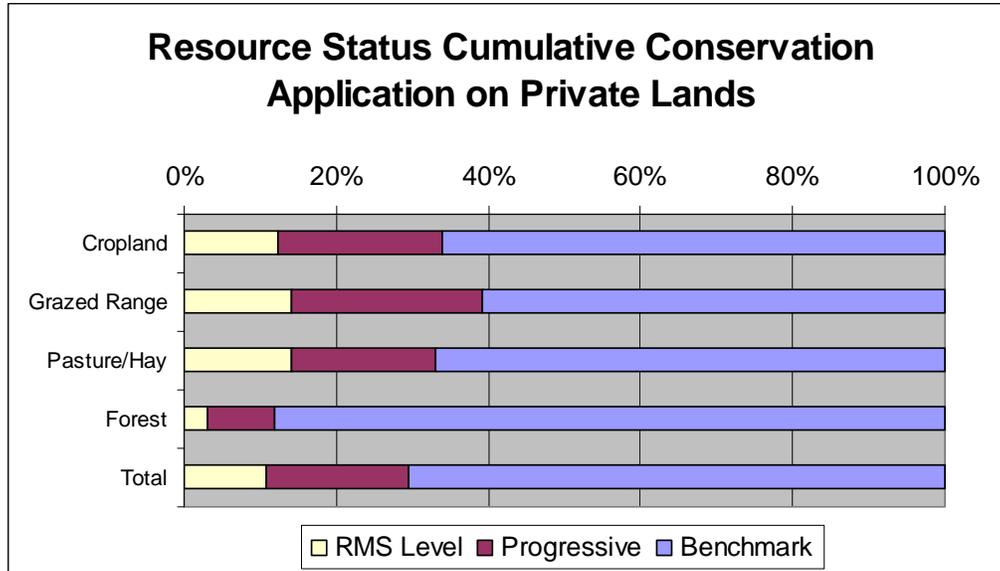
Conservation on the land is defined by the progress made by local landowners and operators addressing resource issues. Progress is typically accomplished through private, local, state, and federal funds. This data is current through the date the RWA was published. For up-to-date NRCS Performance Results System (PRS) information visit <http://ias.sc.egov.usda.gov/prsreport2006/>.

### 6.1 Reported Conservation Progress (2002 – 2006)

PRS Data	FY02	FY03	FY04	FY05	FY06	Avg/Year	Total
Total Conservation Systems Planned (ac)	11,841	16,636	N/A	27,623	32,971	22,268	89,071
Total Conservation Systems Applied (ac)	10,164	8,294	N/A	12,604	19,247	12,577	50,309
<b>Conservation Treatment (Units/Acres)</b>							
Brush Management (ac)			337	919	119	275	1,375
Conservation Crop Rotation (ac)			218	192	698	222	1,108
Contour Buffer Strips (ac)	20		2			4	22
Contour Farming (ac)			73			15	73
Cover Crop (ac)			271		146	83	417
Critical Area Planting (ac)			17	2	9	6	28
Dike (ft)			870			174	870
Diversion (362) (ft)					718	144	718
Fence (ft)			17,395	2,500	19,579	7,895	39,474
Field Border (ft)				13,800	73,933	17,547	87,733
Filter Strip (ac)	7	18	8	8	24	13	65
Forage Harvest Management (ac)			41	87	271	80	399
Forest Stand Improvement (ac)	19					4	19
Grassed Waterway (ac)	11	13		3	7	7	34
Pasture and Hay Planting (ac)			141	112	64	63	317
Pest Management (ac)	1,637	943	3,563	4,017	3,476	2,727	13,636
Pipeline (ft)			3,995	814	760	1,114	5,569
Pond (no)					6	1	6
Prescribed Burning (ac)			2,041	3,108	452	1,120	5,601
Prescribed Grazing (ac)	5,528	4,695	9,740	4,054	13,251	7,454	37,268
Range Planting (ac)			471	56	241	154	768
Residue Management, Mulch Till (ac)	612	408			557	315	1,577
Residue Management, No-Till/Strip Till (ac)	433	62	296		183	195	974
Residue Management, Ridge Till (ac)		707				141	707
Residue Management, Seasonal (ac)			84	98	36	44	218
Riparian Forest Buffer (ac)	26	9				7	35
Terrace (ft)			40,500	9,144	21,251	14,179	70,895
Tree/Shrub Establishment (ac)		5		1	8	3	14
Upland Wildlife Habitat Management (ac)	569	951	5,104	2,608	2,993	2,445	12,225
Use Exclusion (ac)			1,015	1,170	1,353	708	3,538
Watering Facility (no)			2	2	4	2	8

## 6.2 Cumulative Conservation Status

Conservation plans developed and applied from 1995 to 2005 are projected in the following chart.



- Progress over the last 5 years has been focused on:
  - ~ Nutrient and pest management on cropland
  - ~ Confined Animal Feeding Operations
  - ~ Erosion control on cropland
- Range producers typically have not worked with NRCS, creating an opportunity for assistance.
- Much of grazed range, pasture, and hay land are at the benchmark conservation level.

*Note: Estimates are based on information received from local conservationists in the watershed. Benchmark refers to untreated lands within the watershed.*

## 6.3 Other Watershed Projects

Watershed Projects, Plans, Studies, and Assessments		
NRCS Watershed Projects <sup>/11</sup>		Watershed Plans, Studies, and Assessments <sup>/12</sup>
Name	Status	Name
Upper Verdigris Watershed Joint District No. 24	Complete	Cedar Creek Watershed Joint District No. 56
Walnut West Watershed Joint District No. 72	Active	Tri-Creek Watershed Joint District No. 100
		Cedar Creek Watershed Joint District No. 97
319 Projects <sup>/13</sup>		
Name		
Watershed Restoration and Protection Strategy (WRAPS) – Oolagah Lake/Lower Verdigris Channel and Riparian Area Assessment		
Upper Verdigris/Toronto Lake WRAPS Development		

## 6.4 Lands Removed from Production through Farm Bill Programs<sup>/14</sup>

Conservation Reserve Program (CRP) <sup>a</sup> :	<b>7,917 acres</b>
Wetlands Reserve Program (WRP):	<b>13 acres</b>
Grassland Reserve Program (GRP):	<b>2,600 acres</b>
Farm and Ranch Lands Protection Program (FRPP):	<b>NONE</b>

<sup>a</sup> Data from 2006 Farm Service Agency, Conservation Reserve Program information

## 7.0 Footnotes/Bibliography

All data is provided "as is." There are no warranties, express or implied, including the warranty of fitness for a particular purpose, accompanying this document. Use for general planning purposes only.

1. Common Resource Area Map – Information available online at: <http://efotg.nrcs.usda.gov/treemenuFS.aspx>. Select Section I, E. Maps, 2. Common Resource Area Maps (CRA).
2. Precipitation Map - United States Department of Agriculture, National Weather and Climate Service. Online reference information available at: [ftp://gateway1.ftw.nrcs.usda.gov/GatewayCatalogDetails/MetaData/PRCIPANN%5Cprecip\\_a\\_ks.txt](ftp://gateway1.ftw.nrcs.usda.gov/GatewayCatalogDetails/MetaData/PRCIPANN%5Cprecip_a_ks.txt).
3. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS) Information available online at: <http://edcwww.cr.usgs.gov/programs/lccp/nationallandcover.html>.
4. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: <http://www.nrcs.usda.gov/technical/NRI/>.
5. Kansas stream flow data available from the Department of the Interior, U.S. Geological Survey online at: <http://waterdata.usgs.gov/ks/nwis/rt>.
6. Kansas Department of Health and Environment, Total Maximum Daily Loads (TMDL) Strategies, <http://www.kdheks.gov/tmdl/>.
7. U.S. Fish and Wildlife Service, Mountain-Prairie Endangered Species List, Kansas (January 2005) <http://www.mountain-prairie.fws.gov/endspp/CountyLists/KANSAS.htm>. The Kansas Department of Wildlife and Parks, Threatened and Endangered Species, [http://www.kdwp.state.ks.us/news/other\\_services/threatened\\_and\\_endangered\\_species](http://www.kdwp.state.ks.us/news/other_services/threatened_and_endangered_species).
8. Data were taken from the 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available.
9. Conservation participation was estimated using NRCS Social Sciences Technical Note 1801, Guide for Estimating Participation in Conservation, 2004. Four categories of indicators were evaluated: personal characteristics, farm structural characteristics, perceptions of conservation, and community context. Estimates are based on information received from local conservationists in the watershed.
10. Social capital is an indicator of the community's ability and willingness to work together to solve problems. A high amount of social capital helps a community to be physically healthy, socially progressive, and economically vigorous. A low amount of social capital typically results in community conflict, lack of trust and respect, and unsuccessful attempts to solve problems. The evaluation is based on NRCS Technical Report Release 4.1, March, 2002: Adding up Social Capital: an Investment in Communities. Local conservationists provided information to measure social capital.

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## Footnotes/Bibliography Continued

All data is provided "as is." There are no warranties, express or implied, including the warranty of fitness for a particular purpose, accompanying this document. Use for general planning purposes only.

11. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, <http://www.nrcs.usda.gov/programs/watershed/Purpose>. Natural Resources Conservation Service, Kansas online information at: <http://www.ks.nrcs.usda.gov/programs/pl566/>.
12. Natural Resources Conservation Service, Watershed Plans, Studies, and Assessments completed, [http://www.nrcs.usda.gov/programs/watershed/Surveys\\_Ping.html#Watershed%20Surveys%20and%20Plan](http://www.nrcs.usda.gov/programs/watershed/Surveys_Ping.html#Watershed%20Surveys%20and%20Plan).
13. Kansas Department of Health and Environment (KDHE), Bureau of Water, Watershed Management Section, KDHE Watershed Conditions Report, <http://www.kdheks.gov/nps/wraps/index.htm>. The KDHE, Watershed Management Section implements Section 319 of the Clean Water Act, coordinating programs designed to eliminate or minimize pollution that does not come from the end of a pipe. The section develops and reviews; strategies, management plans, local environmental protection plans, and county environmental codes intended to control non-point source pollution.
14. Natural Resources Conservation Service, Kansas, Program Information is located at: <http://www.ks.nrcs.usda.gov/programs/>.

### 7.1 Additional On-line Resources

1. US Environmental Protection Agency (EPA), EnviroMapper for Water, [http://map8.epa.gov/scripts/esrimap.dll?name=NHDMapper&Cmd=ZoomInByCat&qc=3&th=6&lc=00010200000110\\_0000&fipsCode=11070101](http://map8.epa.gov/scripts/esrimap.dll?name=NHDMapper&Cmd=ZoomInByCat&qc=3&th=6&lc=00010200000110_0000&fipsCode=11070101).
2. US EPA Surf Your Watershed at: [http://cfpub.epa.gov/surf/huc.cfm?huc\\_code=11070101](http://cfpub.epa.gov/surf/huc.cfm?huc_code=11070101).

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## Assessment

### Introduction

This assessment matrix has been developed to provide an estimate of conservation systems, which may be needed to address resource concerns identified in the RWA Resource Profile. This can also be described as likely future conditions within the watershed.

Conservation systems have been described in this assessment as systems of conservation practices developed to address resource concerns on various landuses. Systems include benchmark and resource management systems. Benchmark (BM) systems are best described as land units that have had no treatment or one or more resource concerns treated with conservation practices. Resource management systems (RMS) are described as land units which have all known resource concerns treated with conservation practices. The level of treatment of an individual resource concern is credited when the practice(s) used meet or exceed a predetermined level of treatment, known as quality criteria.

Only priority resource concerns have been described in this RWA. These concerns were identified by local resource professionals. Other resource concerns likely exist within the watershed but only make up a small percentage of what needs to be treated. Further investigation and analysis will need to be completed in order to better define all resource concerns.

Resource professionals provided an estimate by percent of conservation systems that will likely be applied to BM systems and untreated land units to address resource concerns identified in the resource profile. These systems are not meant to be comprehensive or address all resource concerns for each land unit in the watershed. Rather only the typical system of conservation practices that could be applied. Numerous alternatives and combinations of practices exist that should be made available to landowners and producers in order to meet their desired level of treatment.

Federal programs identified to implement conservation systems include, but are not limited to EQIP, Wildlife Habitat Incentives Program (WHIP), and WRP. Other funding available for implementation includes various private, local, and state program funds.

This assessment provides estimates only which have been developed using local conservationists and work groups to identify resource concerns, participation rates, and conservation systems likely to be applied. This information was merged with state average cost lists and estimated operation and maintenance costs to generate a cost estimate by individual practice for each conservation system projected to be applied.

Further investigation and analysis within the watershed is required to identify all resource concerns and locations of conservation practices and systems needed to address resource concerns.



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## 1.0 Cropland

### 1.1 Dryland

1.1.1 Current Conditions	Cultivated / Non-Cultivated*	Dryland	Irrigated	Total	
Total Cropland	150,000	145,900	4,100	150,000	Acres
Cropland Needing Treatment	90,000	87,540	2,460	90,000	Acres
Cropland Currently at RMS Level**	24,000	23,344	656	24,000	Acres
Cropland Currently at Progressive Level***	40,500	39,393	1,107	40,500	Acres
Cropland Currently at Untreated Level	85,500	83,163	2,337	85,500	Acres
Typical Cropland-Dryland Management Unit	80				

Note:  
Irrigated cropland will not be considered for treatment as it makes up less than 3 percent of total cropland in HUC.

\* Non-cultivated cropland is cropland that has been planted to a perennial crop such as alfalfa.

\*\* RMS level is a level of treatment that meets or exceeds NRCS quality criteria as defined in the electronic Field Office Technical Guide

\*\*\* Progressive level defines a management unit that does not have all resource concerns treated to the RMS level.

Note: For this analysis, all untreated units and progressive systems will be treated to RMS level

### Current Conditions for Cropland - Dryland

Management Systems		Quantity		Costs		Effects				Note: Effects are numerical values placed on benchmark conditions and degree of change in condition by conservation system(s) application. Scale range from -5 (most damaging to resources) to +5 (least damaging, best protection offered by treatment).
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Soil Erosion	Soil Condition	Water Quality	Human Economics	
BM1		Ac.	83,163			-3	-1	-3	-2	
	Conservation Cropping Rotation	Ac.	83,163							
	Residue Management	Ac.	83,163							
BM2			39,393			0	-1	-2	-1	
	Conservation Cropping Rotation	Ac.	39,393							
	Residue Management	Ac.	39,393							
	Terrace	Ac.	11,818							
RMS		Ac.	23,344			+1	0	0	+1	
	Conservation Cropping Rotation	Ac.	23,344							
	Terrace	Ac.	7,003							
	Conservation Tillage	Ac.	23,344							
	Nutrient Management	Ac.	23,344							
	Pest Management	Ac.	23,344							

### Desired/Estimated Participation Rates

Proposed Practice Change	Rate	Acres
Cropland-Dryland Conservation System	66%	57,776
Cropland-Irrigation Conservation System	66%	1,624
Total		59,400

**Estimates:** 16,600 Acres needing terraces  
90,000 Acres needing treatment  
  
32,224 Acres are not expected to be treated



1.1.2 Future Conditions		Total	BM1	BM2	RMS1	RMS2	RMS3						
Crop - Dryland		145,900	25,912	38,868	58,010	11,555	11,555						
<b>Future Conditions for Cropland - Dryland</b>													
Management Systems		Quantity		Costs		Effects				Implementation			
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Soil Erosion	Soil Condition	Water Quality	Human Economics	EQIP	WHIP	WRP	Other
BM1		Ac.	25,912			-3	-1	-3	-2				
	Conservation Cropping Rotation	Ac.	25,912		\$15,547								
	Residue Management	Ac.	25,912		\$570								
BM2		Ac.	38,868			0	-1	-2	-1				
	Conservation Cropping Rotation	Ac.	38,868		\$23,321								
	Residue Management	Ac.	38,868		\$855								
	Terrace	Ac.	11,660		\$1,385,247								
RMS1		Ac.	34,666			+1	+1	+1	+1				
	Conservation Cropping Rotation	Ac.	34,666	\$207,995	\$20,800					X			
	Grassed Waterway	Ac.	230	\$230,076	\$6,902					X			X
	Terrace	LF	920,304	\$828,274	\$20,707					X			X
	Conservation Tillage	Ac.	34,666	\$311,993	\$31,199					X			
	Terrace Restoration	LF	27,573	\$24,816	\$620					X			
	Filter Strip	Ac.	1,733	\$103,998	\$520					X			X
	Nutrient Management	Ac.	34,666	\$277,327	\$27,733					X			
	Pest Management	Ac.	34,666	\$207,995	\$20,800					X			
RMS2		Ac.	11,555			+3	+3	+2	+3				
	Conservation Cover	Ac.	11,555	\$173,329,200	\$1,733,292					X	X		X
	Native Grass Seeding	Ac.	11,555	\$577,764	\$2,889					X	X		X
RMS3		Ac.	34,899			+3	+2	+2	+2				
	Conservation Cropping Rotation	Ac.	34,899	\$209,396	\$20,940					X			
	Residue Management	Ac.	34,899	\$38,389	\$768					X			
	Nutrient Management	Ac.	34,899	\$279,194	\$27,919					X			
	Pest Management	Ac.	34,899	\$209,396	\$20,940					X			
	Terrace Restoration	Ft.	306,768	\$276,091	\$6,902					X			
	Filter Strip	Ac.	1,745	\$104,698	\$523					X			X
	Terrace	Ft.	306,768	\$276,091	\$6,902					X			X
	Grassed Waterway	Ac.	77	\$76,692	\$2,301					X			X
<b>Total RMS Costs</b>				<b>\$177,492,691</b>	<b>\$3,375,896</b>								

1.1.3 Potential RMS Effects Summary for Cropland - Dryland		
Cost Items and Programs	Costs	O&M Costs
Potential Farm Bill Programs		
Annual Management Incentives (3 yrs - Incentive Payments)		\$419,694
Operator Investment (25% Cost Share)	\$44,373,173	
Federal Costs (75% Cost Share)	\$133,119,518	
<b>Total RMS Costs</b>	<b>\$177,492,691</b>	<b>\$3,375,896</b>
Estimated Level of Participation	66%	
Total acres projected to be in RMS System	81,120	
Total Annual Crop Production Benefit	\$1,808,686	
<b>Beneficial Effects of Proposed RMS System</b>		
Decreases Soil Erosion		
Improves soil condition		
Reduces Transport of Pollutants and Sediment		

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## 2.0 Grazed Range

### 2.1 Native Grassland

2.1.1 Current Conditions	Grazed	Ungrazed	Total	
Total Grazed Range	390,000	0	390,000	Acres
Grazed Range Needing Treatment	265,200	0	265,200	
Total Range with Brush Invasion	155,500	0	155,500	Acres
Typical Range Management Unit	160			

\* Non-cultivated cropland is cropland that has been planted to a perennial crop such as alfalfa.

\*\* RMS level is a level of treatment that meets or exceeds NRCS quality criteria as defined in the electronic Field Office Technical Guide

\*\*\* Progressive level defines a management unit that does not have all resource concerns treated to the RMS level.

Note: For this analysis, all untreated units and progressive systems will be treated to RMS level

Current Conditions for Grazed Range										
Grazed Range		Quantity		Costs		Effects				Note: Effects are numerical values placed on benchmark conditions and degree of change in condition by conservation system(s) application. Scale range from -5 (most damaging to resources) to +5 (least damaging, best protection offered by treatment).
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Soil Erosion	Plant Condition	Animal: Domestic	Human Economics	
BM1		Ac.	265,200			-3	-3	-1	-2	
	Pond	No.	414							
	Watering Facility	No.	1,658							
	Fence	Mi.	3,315							
BM2		Ac.	124,800			0	+1	+1	+1	
	Prescribed Grazing	Ac.	124,800							
	Pond	No.	195							
	Watering Facility	No.	780							
	Pipeline	Ft.	156,000							
	Fence	Mi.	1,560							
Desired/Estimated Participation Rates										
	Proposed Practice Change	Rate	Acres							
	Grazing System	66%	175,032							
	Brush Management	66%	102,630							
	Prescribed Burning	66%	175,032							

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2.1.2 Future Conditions		Total	BM1	BM2	RMS								
Grazed Range		390,000	90,168	124,800	175,032								
Future Conditions for Grazed Range													
Grazed Range and Forestlands		Quantity		Costs		Effects				Implementation			
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Soil Erosion	Plant Condition	Animal: Domestic	Human Economics	EOIP	WHIP	WRP	Other
BM1		Ac.	90,168			-3	-3	-1	-2				
	Pond	No.	141		\$16,907								
	Watering Facility	No.	564		\$25,923								
	Fence	Mi.	1,127		\$238,044								
BM2		Ac.	124,800			0	+1	+1	+1				
	Prescribed Grazing	Ac.	124,800		\$123,552								
	Pond	No.	195		\$23,400								
	Watering Facility	No.	780		\$35,880								
	Pipeline	Ft.	2,028,000		\$36,504								
	Fence	Mi.	1,560		\$329,472								
RMS		Ac.	175,032			+3	+3	+3	+2				
	Prescribed Grazing	Ac.	175,032	\$525,096	\$173,282					X			
	Fence	LF	975,744	\$1,951,488	\$39,030					X			X
	Brush Management	Ac.	102,630	\$5,131,500	\$153,945					X	X		
	Prescribed Burning	Ac.	175,032	\$350,064	\$350					X	X		
	Pond	No.	426	\$5,108,400	\$51,084					X	X		X
	Watering Facility	No.	231	\$531,300	\$10,626					X			X
	Pipeline	Ft.	46,200	\$83,160	\$832					X			X
	Spring Development	No.	53	\$132,000	\$2,640					X			X
	Pest Management	Ac.	70,013	\$420,077	\$42,008					X	X		X
	Streambank & Shoreline Protection	Ft.	122,760	\$7,365,600	\$147,312					X			X
<b>Total RMS Costs</b>					<b>\$21,598,685</b>		<b>\$1,450,789</b>						

2.1.3 Potential RMS Effects Summary for Grazed Range		
Cost Items and Programs	Costs	O&M Costs
Potential Farm Bill Programs		
Annual Management Incentives (3 yrs - Incentive Payments)		\$215,639
Operator Investment (25% Cost Share)	\$5,399,671	
Federal Costs (75% Cost Share)	\$16,199,014	
<b>Total RMS Costs</b>	<b>\$21,598,685</b>	<b>\$1,450,789</b>
Estimated Level of Participation	66%	
Total acres projected to be in RMS System	175,032	
Total Annual Grazing Production Benefits	\$230,495	
Beneficial Effects of Proposed RMS System		
Reduces Soil Erosion		
Improves plant condition, health and vigor		
Increases Available Stockwater Supply		

## 3.0 Pasture/Hay Land

### 3.1 Non-irrigated Pasture/Hay Land

3.1.1 Current Conditions	Grazed	Ungrazed	Total	
Total Pasture/Hay Land	65,000	0	65,000	Acres
Pasture/Hay Land Needing Treatment	13,000	0	13,000	Acres
Typical Pasture/Hay Land Management Unit	80			

\* Non-cultivated cropland is cropland that has been planted to a perennial crop such as alfalfa.

\*\* RMS level is a level of treatment that meets or exceeds NRCS quality criteria as defined in the electronic Field Office Technical Guide.

\*\*\* Progressive level defines a management unit that does not have all resource concerns treated to the RMS level.

Note: For this analysis, all untreated units and progressive systems will be treated to RMS level.

#### Current Conditions for Pasture/Hay Land

Pasture	Quantity		Costs		Effects			Note:
	Unit	Quantity	Investment Cost	Annual O&M Cost	Soil Erosion	Plant Condition	Human Economics	
BM1	Ac.	13,000			-3	-1	-3	Effects are numerical values placed on benchmark conditions and degree of change in condition by conservation system(s) application. Scale range from -5 (most damaging to resources) to +5 (least damaging, best protection offered by treatment).
Pond	No.	81						
Watering Facility	No.	81						
Pipeline	Ft.	16,250						
Fence	Mi.	244						
BM2	Ac.	52,000			0	+1	+1	
Prescribed Grazing	Ac.	52,000						
Pond	No.	81						
Watering Facility	No.	569						
Pipeline	Ft.	113,750						
Fence	Mi.	975						

#### Desired/Estimated Participation Rates

Proposed Practice Change	Rate	Acres
Pasture/Hay Land System	66%	8,580

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3.1.2 Future Conditions		Total	BM1	BM2	RMS							
Pasture/Hay Land		65,000	4,420	52,000	8,580							
Future Conditions for Pasture/Hay Land												
Pasture/Hay land		Quantity		Costs		Effects			Implementation			
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Soil Erosion	Plant Condition	Human Economics	EOIP	WHIP	WRP	Other
BM1		Ac.	4,420			-3	-1	-3				
	Pond	No.	7		\$829							
	Water Facility	No.	21		\$2,486							
	Fence	Mi.	55		\$11,669							
BM2		Ac.	52,000			0	+1	+1				
	Prescribed Grazing	Ac.	52,000		\$51,480							
	Pond	No.	81		\$9,750							
	Water Facility	No.	244		\$29,250							
	Pipeline	Ft.	633,750		\$11,408							
	Fence	Mi.	650		\$137,280							
RMS		Ac.	8,580			+2	+3	+1				
	Prescribed Grazing	Ac.	8,580	\$25,740	\$8,494				X			
	Fence	Mi.	27	\$283,140	\$5,663				X			X
	Nutrient Management	Ac.	8,580	\$68,640	\$6,864				X			
	Pest Management	Ac.	8,580	\$51,480	\$5,148				X			
	Water Facility	No.	107	\$643,500	\$12,870				X			X
	Pipeline	Ft.	21,450	\$38,610	\$386				X			X
<b>Total RMS Costs</b>				<b>\$1,111,110</b>	<b>\$293,576</b>							

3.1.3 Potential RMS Effects Summary for Pasture/Hay Land		
Cost Items and Programs	Costs	O&M Costs
Potential Farm Bill Programs		
Annual Management Incentives (3 yrs - Incentive Payments)		\$20,506
Operator Investment (25% Cost Share)	\$277,778	
Federal Costs (75% Cost Share)	\$833,333	
<b>Total RMS Costs</b>	<b>\$1,111,110</b>	<b>\$293,576</b>
Estimated Level of Participation	66%	
Total acres projected to be in RMS System	8,580	
Total Annual Forage Production Benefits	\$14,047	
Beneficial Effects of Proposed RMS System		
Reduces Soil Erosion		
Improves plant condition, health and vigor		

4.0 Forest

4.1 Forest - Private

4.1.1 Current Conditions	Forest	Private	Public	Total	
Total Forest	53,000	43,990	9,010	53,000	Acres
Forest Needing Treatment	27,030	22,435	4,595	27,030	Acres
Forest Currently at RMS Level**	2,120	1,760	360	2,120	Acres
Forest Currently at Progressive Level***	5,830	4,839	991	5,830	Acres
Forest Currently at Untreated Level	45,050	37,392	7,659	45,050	Acres

\*\* RMS level is a level of treatment that meets or exceeds NRCS quality criteria as defined in the electronic Field Office Technical Guide.  
 \*\*\* Progressive level defines a management unit that does not have all resource concerns treated to the RMS level.  
 Note: For this analysis, identified treatment units will be treated to RMS level at the expected adoption rate.

**Current Conditions for Forest - Private**

Management Systems		Quantity		Costs		Effects	Note: Effects are numerical values placed on benchmark conditions and degree of change in condition by conservation system(s) application. Scale range from -5 (most damaging to resources) to +5 (least damaging, best protection offered by treatment)
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Plant Condition	
BM1	No Treatment	Ac.	37,392			-4	
BM2	Forest Stand Improvement	Ac.	4,839			0	
	Pest Management	Ac.	4,839				
RMS1	Forest Stand Improvement	Ac.	1,760			+2	
	Tree/Shrub Pruning	Ac.	1,760				
	Pest Management	Ac.	1,760				
	Upland Wildlife Habitat Management	Ac.	1,760				

**Desired/Estimated Participation Rates**

Proposed Practice Change	Rate	Acres
Conservation System Forest - Private	66%	14,807
Conservation System Forest - Public	0%	0
<b>Total</b>		<b>14,807</b>

4.1.2 Future Conditions	Total	BM1	BM2	RMS1	RMS2
Conservation Systems Forest - Private (Ac.)	43,990	22,584	4,839	13,605	2,961

**Future Conditions for Forest - Private**

Management Systems		Quantity		Costs		Effects	Implementation				
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Plant Condition	EOIP	WHIP	WRP	Other	
BM1	No Treatment	Ac.	22,584		\$5,646	-4					
BM2	Forest Stand Improvement	Ac.	4,839		\$5,565	0					
	Pest Management	Ac.	4,839		\$2,903						
RMS1	Forest Stand Improvement	Ac.	13,605			+2					
	Forest Stand Improvement	Ac.	3,401	\$782,301	\$3,912		X	X		X	
	Tree/Shrub Pruning	Ac.	3,401	\$204,078	\$4,082		X			X	
	Pest Management	Ac.	13,605	\$81,631	\$8,163		X	X			
	Upland Wildlife Habitat Management	Ac.	13,605	\$1,224,470	\$15,306		X	X			
RMS2	Forest Stand Improvement	Ac.	2,961			+3					
	Forest Stand Improvement	Ac.	740	\$170,281	\$851		X	X		X	
	Tree/Shrub Pruning	Ac.	740	\$44,421	\$888		X			X	
	Pest Management	Ac.	2,961	\$17,768	\$1,777		X	X			
	Upland Wildlife Habitat Management	Ac.	2,961	\$266,527	\$3,332		X	X			
	Use Exclusion	Ac.	2,961	\$23,691	\$24		X	X			
<b>Total RMS Costs</b>				<b>\$2,815,169</b>	<b>\$52,448</b>						

**4.1.3 Potential RMS Effects Summary for Forest - Private**

Cost Items and Programs	Costs	O&M Costs
Potential Farm Bill Programs		
Annual Management Incentives (3 yrs - Incentive Payments)		\$9,940
Operator Investment (25% Cost Share)	\$703,792	
Federal Costs (75% Cost Share)	\$2,111,377	
<b>Total RMS Costs</b>	<b>\$2,815,169</b>	<b>\$52,448</b>
Estimated Level of Participation	66%	
Total acres projected to be in RMS System	16,567	
Total Annual Forest Production Benefit	\$28,676	
<b>Beneficial Effects of Proposed RMS System</b>		
Improves Forest Stand Health and Plant Condition		