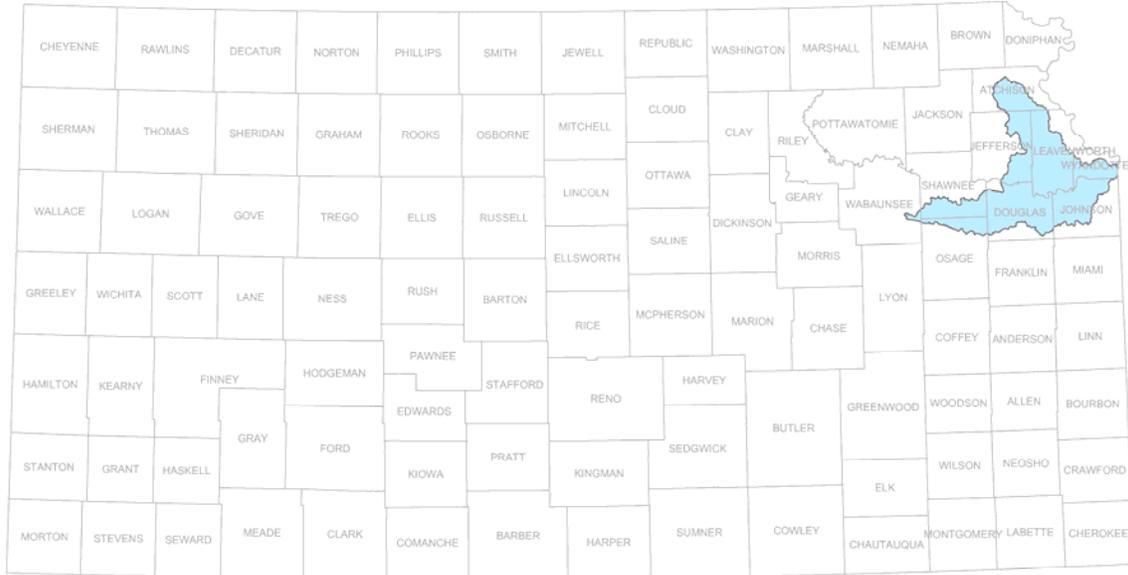


KANSAS

Rapid Watershed Assessment

Lower Kansas Watershed Hydrologic Unit Code – 10270104



September 2008

Produced by:

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Resource Profile

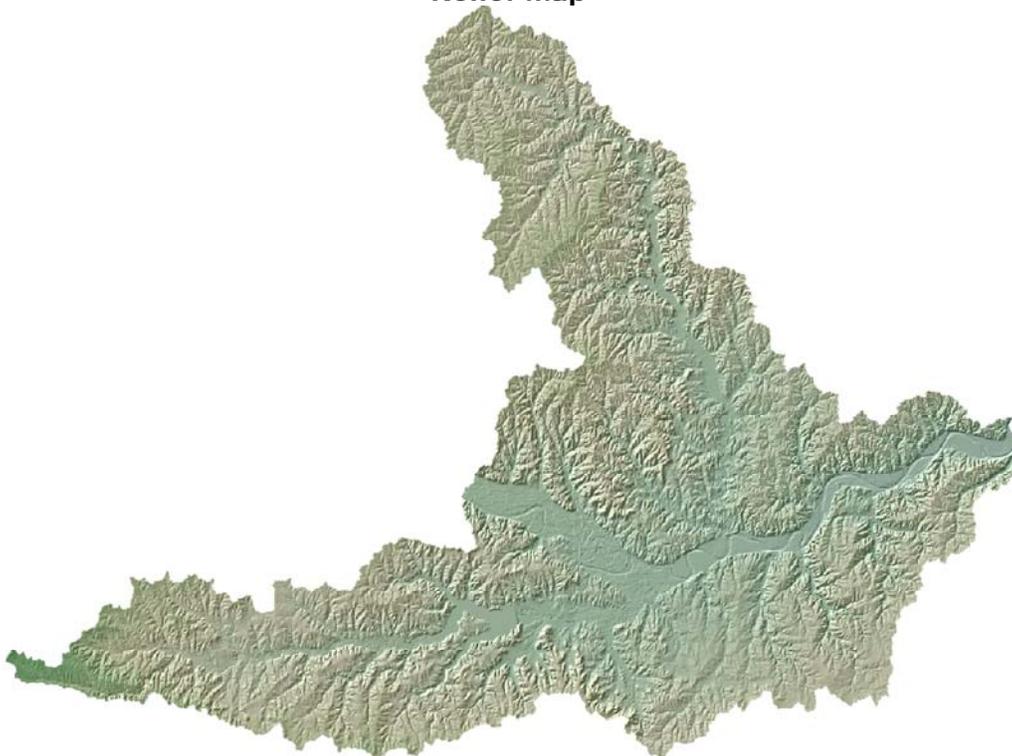
1.0 Purpose

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 Lower Kansas sub-basin's natural resources, resource concerns, conservation needs, and ability to resolve natural resource issues and concerns.

2.0 Introduction

The Lower Kansas 8-Digit Hydrologic Unit Code (HUC) sub-basin is comprised of approximately 1,056,000 acres in northeast Kansas and includes the counties of Atchison, Douglas, Jefferson, Johnson, Shawnee, Leavenworth, Osage, Wabaunsee, and Wyandotte. Discrepancies exist in the size of the watershed due to how the data was developed. Those discrepancies are not adjusted in this assessment. National Land Cover Data (NLCD) indicates approximately 26 percent of the sub-basin is in grain and row crop; 47 percent is in grassland, pasture, and hay; 16 percent is in various forest types; and just less than 8 percent is urban and residential. This sub-basin is located in the Kansas River Basin and flows from west to east through northeast Kansas. This area has substantial residential and urban land uses. Conservation treatments on these land uses are not addressed in this RWA.

Relief Map



Resource concerns are numerous in the sub-basin. They include, but are not limited to, soil erosion, soil condition, and plant condition health and vigor on rangeland. Economic issues such as the high capital costs of crop production/farm operation, increased management, and risks and uncertainty related to crop production may delay the acceptance and implementation of conservation on agricultural lands in the sub-basin.

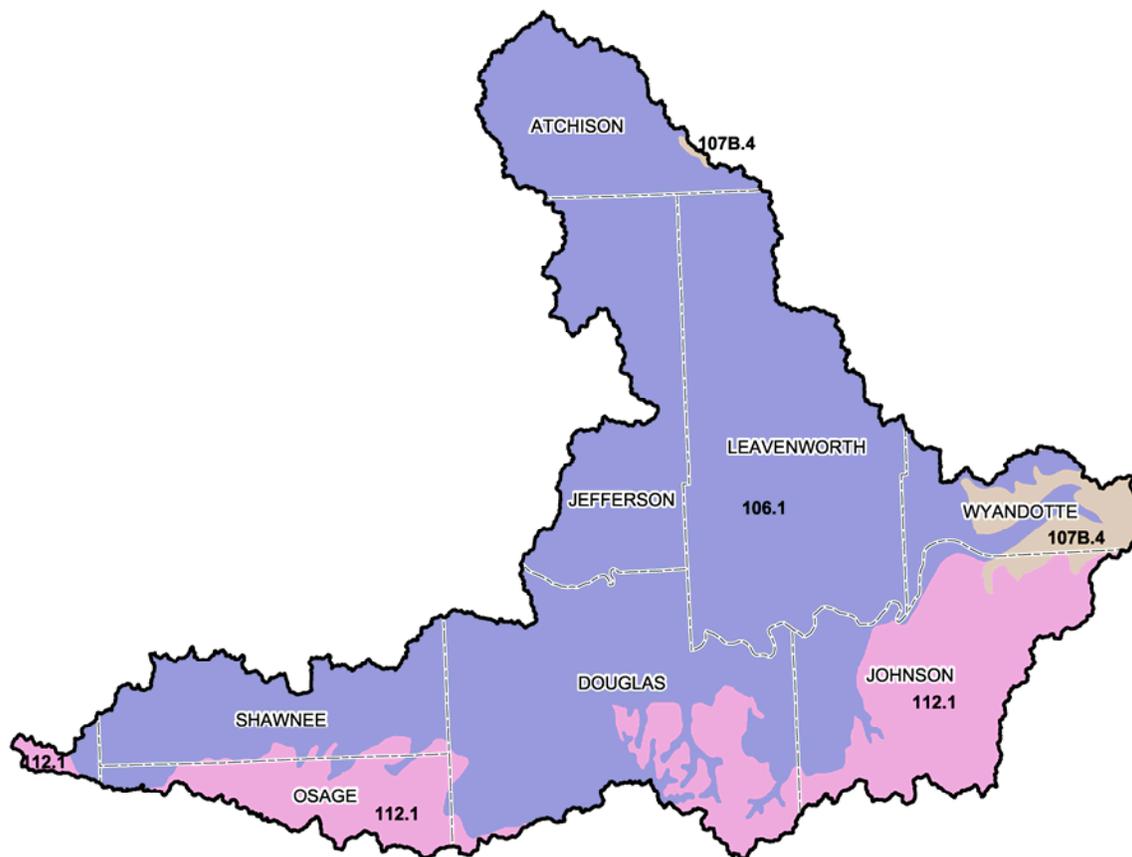
It is estimated that there are 2,851 farms with an average size of 244 acres in the Lower Kansas sub-basin.

Five Natural Resources Conservation Service (NRCS) field offices, 8 county conservation districts, 9 K-State Research and Extension offices, and 2 Resource Conservation and Development (RC&D) areas (Glacial Hills and Lake Region) provide conservation assistance in the sub-basin.

3.0 Physical Description

The physical descriptions of the Lower Kansas sub-basin provide detailed information so that the user can better understand the natural resources associated with this geographical land unit.

3.1 Common Resource Area (CRA) Map⁴¹



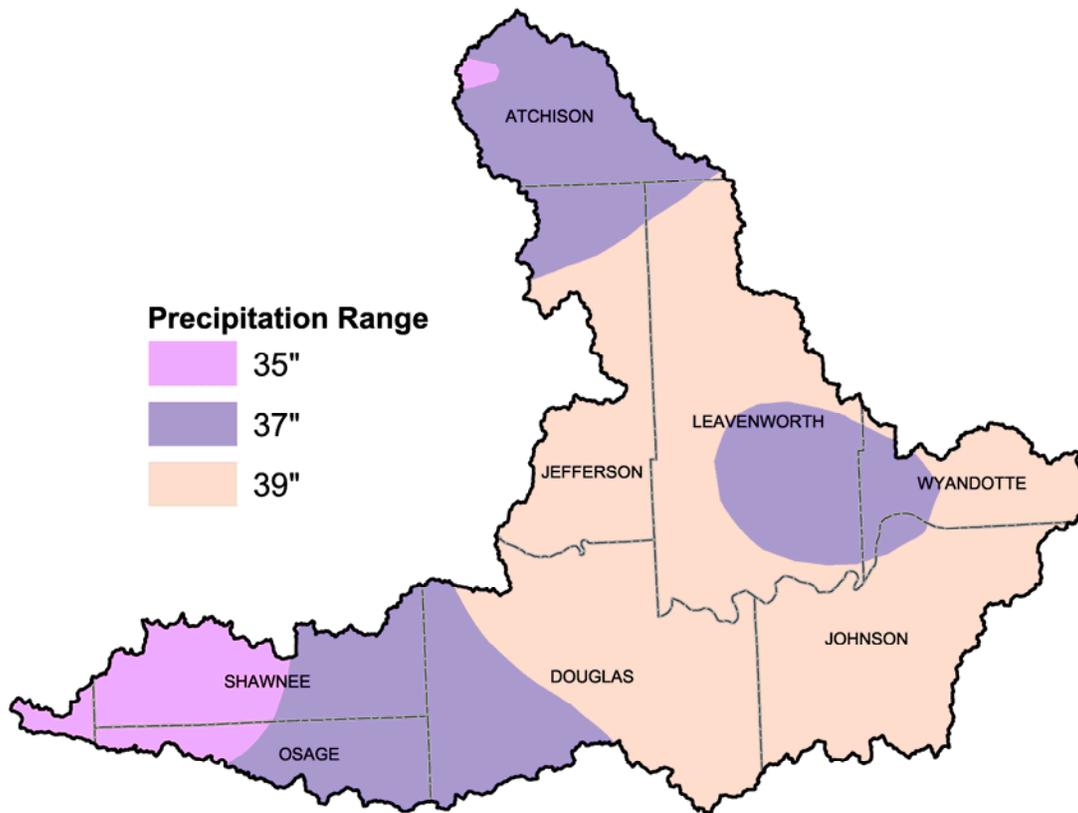
106.1 – Nebraska and Kansas Loess Drift Hills: The Nebraska and Kansas Loess Drift Hills CRA is a dissected glacial drift plain mantled by thick loess. The nearly level to strongly sloping ridgetops are broad and smooth. The stream valleys are narrow with steep sideslopes. Local relief reaches to 200 feet. Soils are deep with high clay content. Presettlement vegetation was native tall grasses on the hills and trees along the streams and intermittent drainage ways.

107B.4 – Missouri Loess Hills: The Loess Hills CRA is distinguished by a thick loess mantle (10 to 25 feet) and loess soils. It is a hilly region characterized by broad, rounded ridges, moderate slopes, broad stream valleys, and a local relief of 100 to 150 feet. Bedrock and glacial till are exposed in the deeper valleys. Most of the CRA is in farms, but substantial tracts in the breaks along the Missouri River are thickly wooded.

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 broad for the size of the streams. Geologic parent materials are mainly thin-bedded Pennsylvanian limestones and shales. Presettlement 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. The Kansas City metropolitan area exerts urbanization pressure on land use in the northwest.

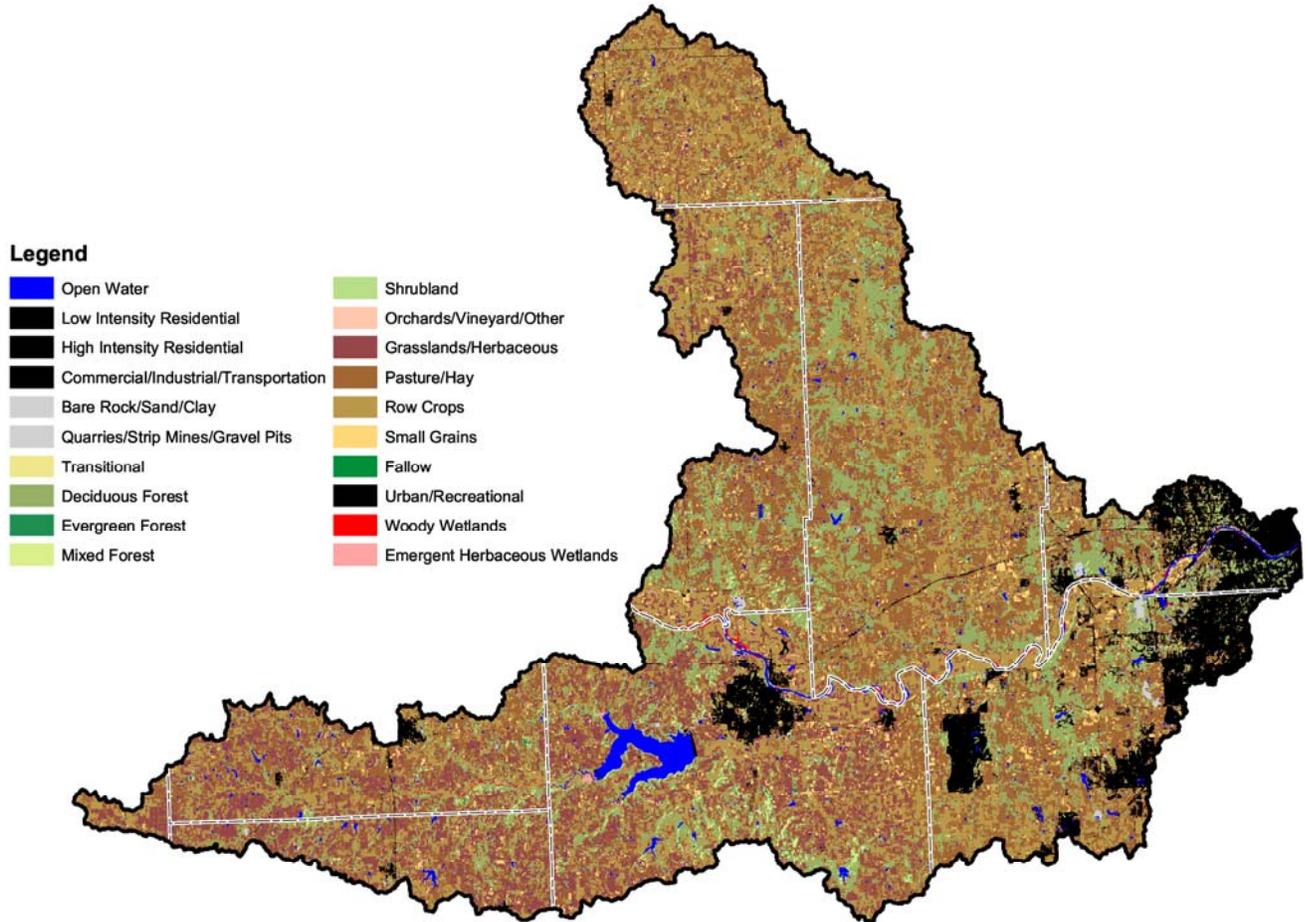
3.2 Precipitation Map²

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



3.3 Land Use and Land Cover Distribution Map³

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



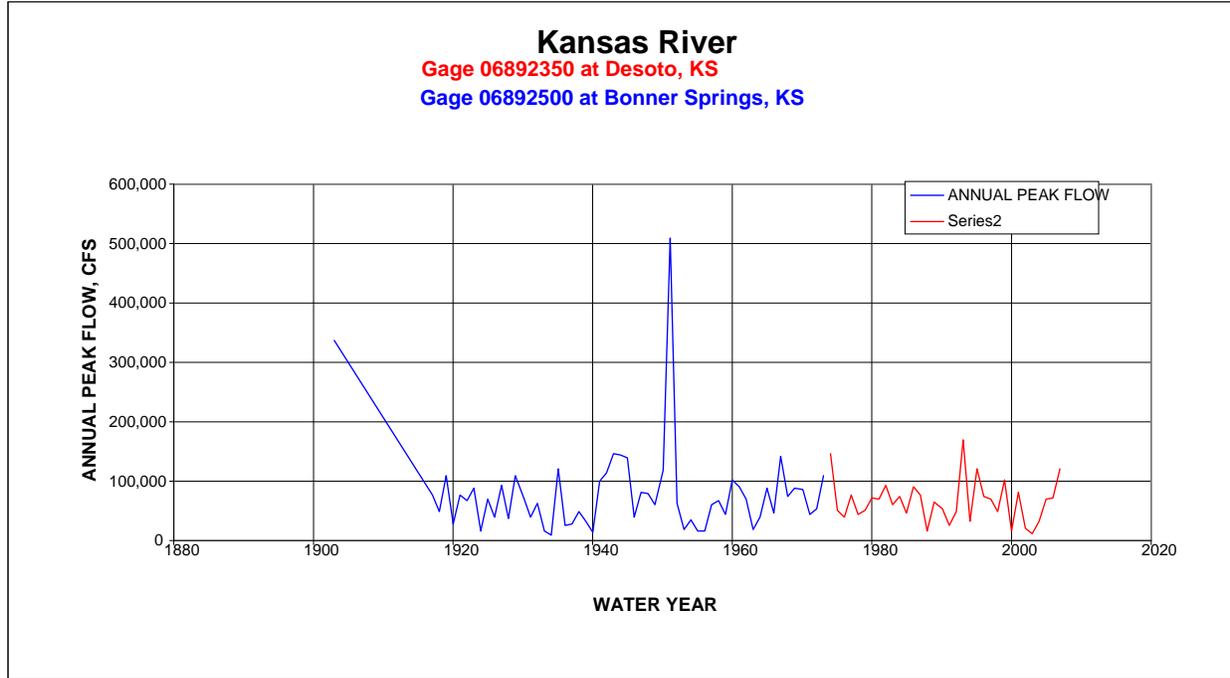
3.3.1 Land Use and Land Cover Summary Table³

Land Cover/Land Use	Ownership					
	Public		Private		Totals	%
	Acres	%	Acres	%		
Open Water	7,000	*	15,872	2	22,872	2
Low Intensity Residential			18,499	2	18,499	2
High Intensity Residential			24,570	2	24,570	2
Commercial/Industrial/Transportation			22,718	2	22,718	2
Bare Rock/Sand/Clay			1,671	*	1,671	*
Quarries/Strip Mines/Gravel Pits			2,109	*	2,109	*
Transitional			80	*	80	*
Deciduous Forest	2,000	*	155,091	15	157,091	15
Evergreen Forest			495	*	495	*
Mixed Forest			12,833	1	12,833	1
Shrubland			1,119	*	1,119	*
Grasslands/Herbaceous	8,879	1	124,748	12	133,627	13
Pasture/Hay			357,997	34	357,997	34
Row Crops			253,791	24	253,791	24
Small Grains			25,726	2	25,726	2
Urban/Recreational			15,056	1	15,056	1
Woody Wetlands			2,648	*	2,648	*
Emergent Herbaceous Wetlands	500	*	2,428	*	2,928	*
HUC Totals^a	18,379	2	1,037,450	98	1,055,829	100
*Less than 1 percent of total acres						
^a Totals are approximate due to rounding and small unknown acreages						
<i>Special Considerations for This 8-Digit HUC:</i>						
<ul style="list-style-type: none"> ▪ Small grains and row crops are the predominant commodities grown on 26 percent of the watershed ▪ Grasslands/Herbaceous and Pasture/Hay make up 47 percent of the watershed ▪ Forest makes up 16 percent of the watershed ▪ Urban/residential land comprises less than eight percent of the watershed 						
Irrigated Lands⁴	Percent of Cropland			Percent of HUC		
Pressure/Gravity	3			<1		

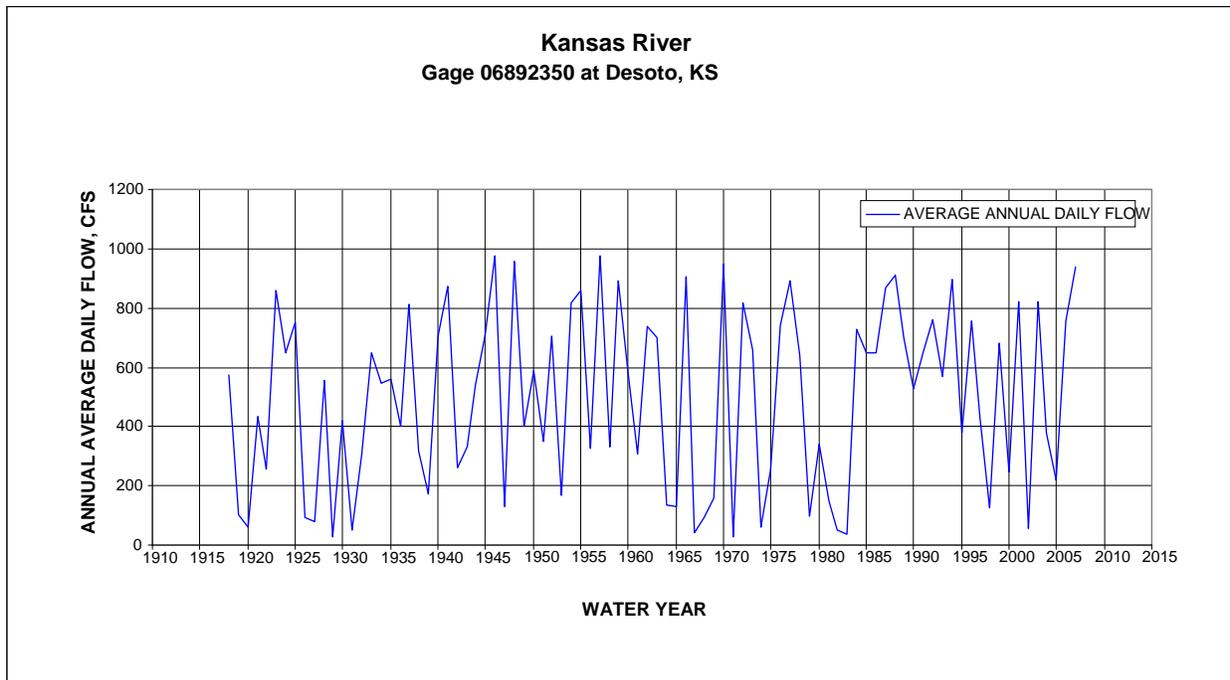
3.4 Stream Flow Data⁴⁵

Stream flow data has been collected since the 1920s. For this assessment, data was collected from two stream gage stations on the Lower Kansas River near Desoto and Bonner Springs, Kansas.

Annual Peak Flow



Average Annual Discharge



3.5 Other Physical Descriptions

Stream Data ^{/6}	Total Miles of Streams in HUC Major (24K Hydro Geographic Information System [GIS] Layer) including intermittent and perennial streams.	3,779 miles	
Land Cover/Use ^{/3} Based on a 100-foot stretch on both sides of all streams in the 24K Hydro GIS Layer		ACRES	PERCENT
	Open Water	20,940	16
	Low Intensity Residential	1,350	1
	High Intensity Residential	937	1
	Commercial/Industrial/Transportation	1,177	1
	Bare Rock/Sand/Clay	1,335	1
	Quarries/Strip Mines/Gravel Pits	171	*
	Transitional	6	*
	Deciduous Forest	31,926	24
	Evergreen Forest	35	*
	Mixed Forest	2,627	2
	Shrubland	70	*
	Grasslands/Herbaceous	7,729	6
	Pasture/Hay	38,183	29
	Row Crops	20,912	16
	Small Grains	758	1
Urban/Recreational	898	1	
Woody Wetlands	1,134	1	
Emergent Herbaceous Wetlands	568	*	
Total Acres	130,754	100	

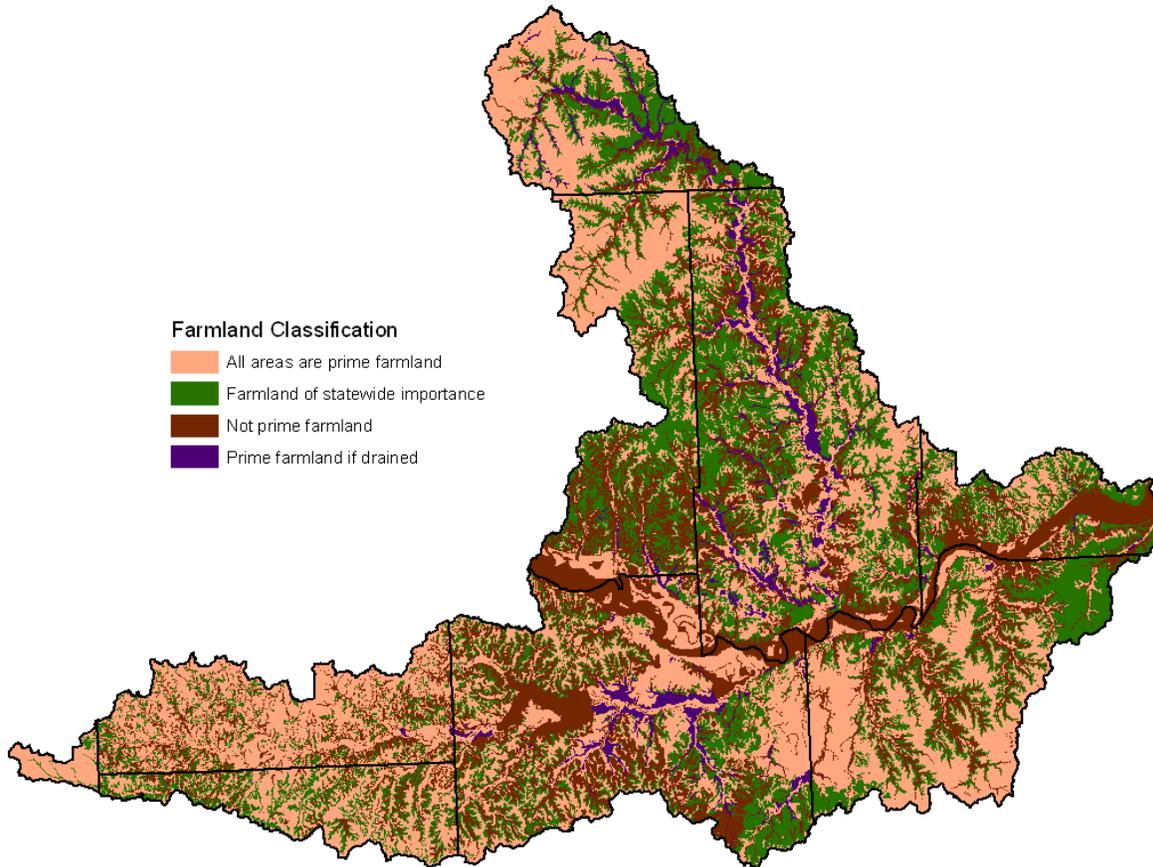
**Less than 1 percent of total acres*

3.6 Farmland Classification^{/12}

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management.

Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce economically sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods.

Farmland of statewide importance, or of local importance, is land other than prime farmland or unique farmland but is also highly productive. Criteria for defining and delineating these lands are determined by the appropriate state or local agencies in cooperation with the USDA.

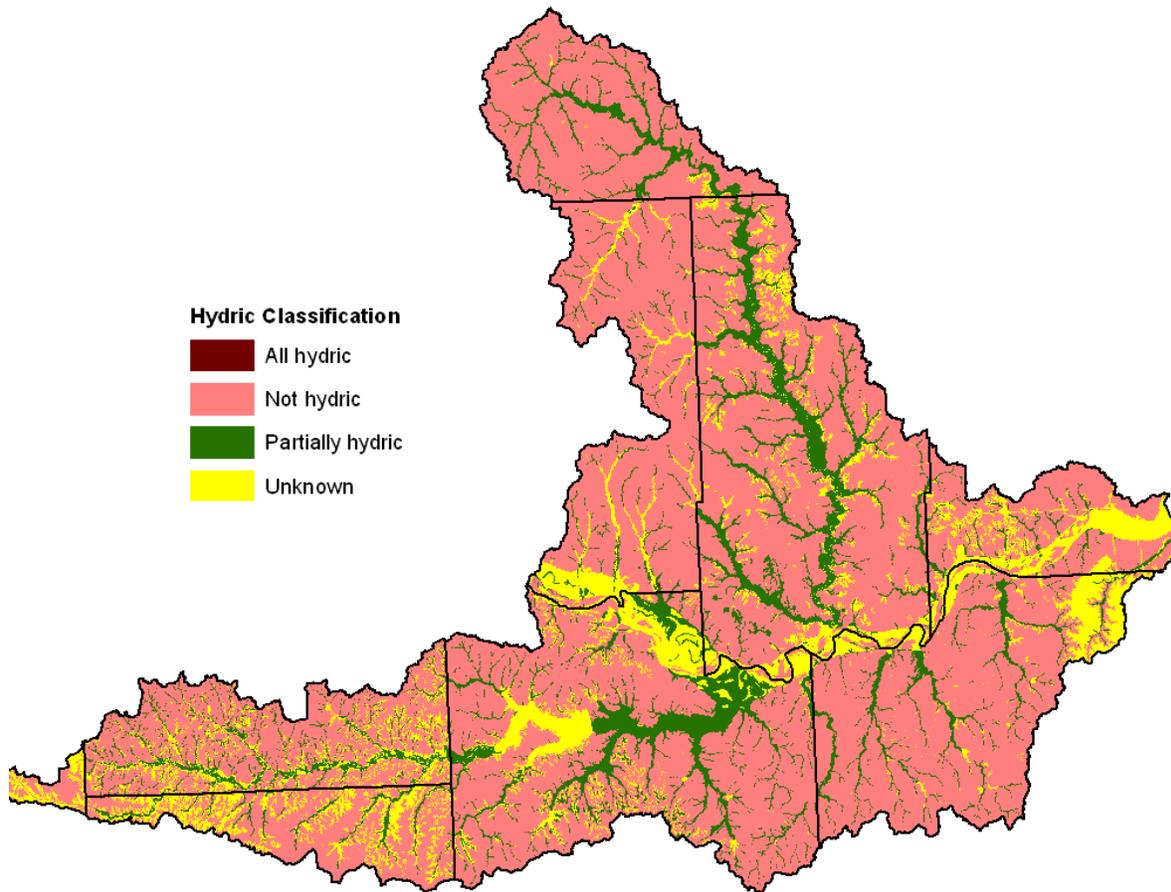


3.6.1 Farmland Classification Summary

Farmland Classification	Acres	Percent
All areas are prime farmland	450,663	43
Farmland of statewide importance	291,266	27
Not prime farmland	276,436	26
Prime farmland if drained	38,446	4
Total	1,056,811	100

3.7 Hydric Soils¹²

Hydric soils are soils that are sufficiently wet in the upper part of the soil profile to develop anaerobic conditions during the growing season. These soils can include wetland areas that may provide benefits for aquifer recharge, floodwater holding capacity, habitat for numerous species of terrestrial and aquatic organisms, and a diversity of plants. These areas may be protected at the federal level.



3.7.1 Hydric Soils Summary

Hydric Classification	Acres	Percent
All hydric	37	0
Not hydric	796,840	76
Partially hydric	122,845	12
Unknown	135,251	13
Total	1,054,973	100

4.0 Resource Concerns

Resource concerns are issues related to the natural environment. Natural resources include soil, water, air, plants, animals, and humans (SWAPA+H). Local conservationists identified major resource issues by land use that affect the Lower Kansas sub-basin.

4.1 Summary of Resource Concerns

Resource Concerns/Issues by Land Use								
SWAPA+H Concerns	Specific Resource Concern/Issue	Pasture/Hay	Grain Crops	Row Crops	Grazed Range	Forest	Wildlife	Urban
Soil Erosion	Sheet and Rill		X	X				
	Ephemeral Gully		X	X				
	Classic Gully	X			X			
	Streambank				X	X		
	Road, Roadsides, and Construction Sites							X
Soil Condition	Organic Matter Depletion		X	X				
	Rangeland Site Stability				X			
	Damage from Sediment Deposition*		X	X				X
Water Quantity	Inefficient Water Use on Non-Irrigated Land*		X					
	Reduced Storage of Water Bodies by Sediment Accumulation				X			
Water Quality, Surface	Excessive Nutrients and Organics		X	X				
	Excessive Suspended Sediment and Turbidity	X			X			
Plant Condition	Productivity, Health and Vigor	X			X			
	Noxious and Invasive Plants	X			X	X	X	
	Forage Quality and Palatability				X			
	Wildfire Hazard*				X			
Animal: Fish and Wildlife	Inadequate Cover/Shelter						X	
Animal: Domestic	Inadequate Quantities and Quality of Feed and Forage				X			
	Inadequate Stock Water				X			
Human, Economics	Land Use Constraints/Restrictions							X
	High Risk & Uncertainty		X	X				
	High Management Level Required			X	X			
	Low or Unreliable Profitability	X		X	X			

*NRCS has not identified quality criteria for resource concern

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.
- Soil erosion and soil condition concerns exist due to lack of residue, conventional tillage, and erosion control measures on cropland.

Grazing Land

- Overutilization of the grass resource affects productivity, health, and vigor.
- Deciduous and evergreen trees have invaded range sites affecting range health and productivity.
- Lack of available water for livestock affects grazing distribution and herd health.

Urban

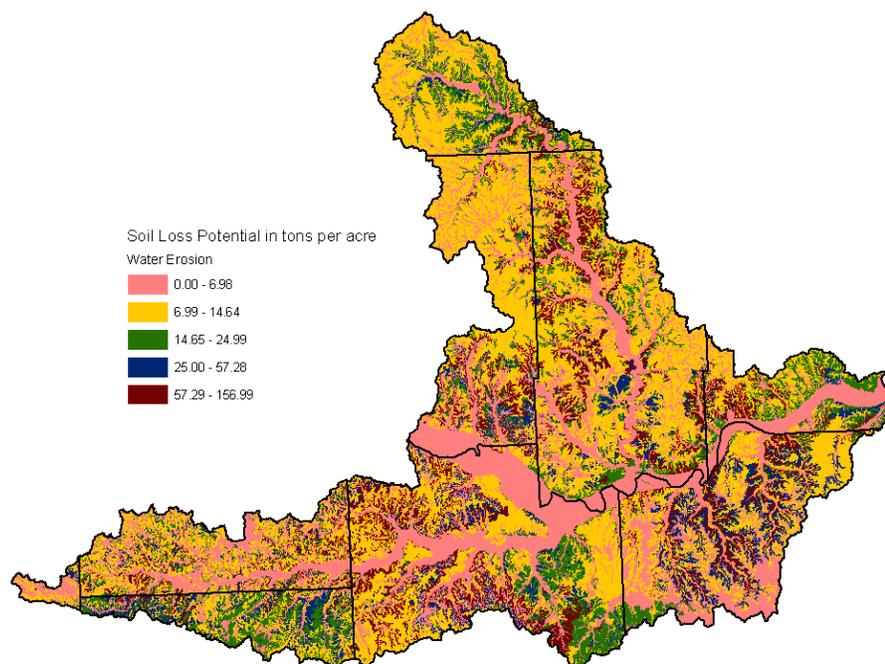
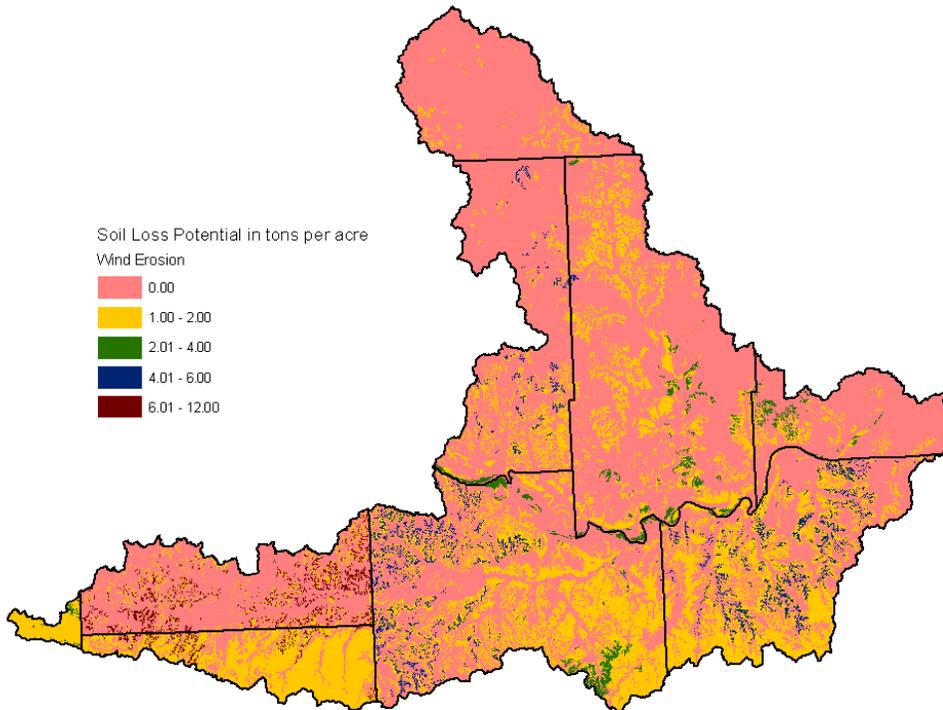
- Erosion and deposition are contributing to off-site resource concerns and water quality.

General

- Inputs needed to manage large agricultural operations, costs of production, high degrees of risk and uncertainty, and fluctuating commodity values require high management levels, and place large capital and financial burdens on operators.

4.2 Potential Soil Loss¹²

Soil loss through wind and water erosion is critical to consider for dealing with air and water quality issues. As airborne particulate, soil particles can be a major contributor to air quality concerns. Soil loss through water erosion causes water quality impairments as pollutants are attached to soil colloids and are transported into the stream systems. Wind and water erosion have been identified as concerns in the watershed. The following maps developed with the Soil Survey Geographic (SSURGO) Database display soil loss potential within the Lower Kansas sub-basin.



4.3 Water Quality Conditions

The Kansas Department of Health and Environment (KDHE) is responsible for monitoring water quality conditions in the state of Kansas. This section has been provided by KDHE. For up-to-date water quality condition information, visit the KDHE at www.kdheks.gov/nps/watershed_condition.htm.

4.3.1 Confined Animal Feeding Operations (CAFO)

In Kansas, confined animal feeding operations (CAFOs) with an animal unit capacity of 300 or more must register with the KDHE. 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.

Animal Type	Dairy	Feedlot	Poultry	Swine	Truck-wash	Other
No. of Permitted Farms	6	6	0	12	0	0
No. of Permitted Animal Units	2,433	3,199	0	2,186	0	0

Note: All animal units based upon federal animal units as of 10/01/07.

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 112 active Public Water Supply (PWS) sites within the Lower Kansas Watershed (HUC 10270104). While some of the PWSs intake water from surface water sources, groundwater is the predominant PWS source of water within the watershed. Portions of the Glacial Drift and Douglas Aquifers exist in the northwest and southwestern portions of the Lower Kansas (respectively). Water from these aquifers is often used for rural domestic water supply. Historically, the water is very hard with nitrates being one of the primary pollutant concerns. Alluvial aquifers of the Kansas River and its tributaries exist throughout the watershed and provide the primary water source for many PWSs. Water quality in alluvial aquifers is generally good, although nitrates, minerals, pesticides, and bacteria can be pollutant concerns.

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 PWSs that required SWAs. A SWA includes the following: delineation of the SWA 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, please visit www.kdheks.gov/nps/swap/SWreports.html.

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, primary and secondary contact recreation, domestic water supply, food procurement, industrial water supply, groundwater recharge, irrigation water supply, and livestock water supply.

Designated Uses								
Lake Name	AL	CR	DS	FP	GR	IW	IR	LW
Antioch Park Lake	E	A	O	X		O	O	O
Baker Wetlands	E			X				
Carbondale West Lake	E	B		X				
Cedar Lake	E	B	X	X		X		
Clinton Lake	S	A	X	X		X		
Douglas Co. State Fishing Lake	E	B		X				
Frisco Lake	E	B		X				
Gardner City Lake	E	A	X	X		X		
Lake Debanawa	E	A		X				
Lake Quivira	E	A		X				
Lakeview Estates Lake	E	B		X				
Leavenworth Co. State Fishing Lake	E	B		X				
Lenexa Lake	E	B	O	X		O	O	O
Lone Star Lake	E	A		X				
Mahaffie Farmstead Lake	E	B	O	X		O	O	O
Mary's Lake	E	B	O	X		O	O	O
New Olathe Lake	E	A	X	X		X		
North Park Lake	E	B	O	X		O	O	O
Olathe Waterworks Lakes	E	B	X	X		X		
Overbrook Lake	E	B		X				
Pierson Park Lake	E	B		X				
Potter's Lake	E	B	O	X		O	O	O
Shawnee Mission Lake	E	A		X				
Strowbridge Reservoir	E	B	X	X		X		
Sunflower Park Lake	E	B	O	X		O	O	O
Stream Name								
Baldwin Creek	E	b						
Barber Creek	E	b	X	X	X	X	X	X
Brenner Heights Creek	E	b	X	X	X	X	X	X
Brush Creek	E	b						
Brush Creek, West	E	b						
Buck Creek	S	b	X	X	X	X	X	X
Burys Creek	E	C		X				
Buttermilk Creek	E	b						
Camp Creek	E	C	X	X	X	X	X	X
Camp Creek	E	b	X	X	X	X	X	X
Camp Creek	E	b	X	X	X	X	X	X
Captain Creek	E	C	X	X	X	X	X	X
Cedar Creek	E	C	X	X	X	X	X	X
Chicken Creek	E	b						
Clear Creek	E	B	X	X	X	X	X	X
Coal Creek	E	C		X				
Cow Creek	E	b						
Crooked Creek	E	C		X				
Crooked Creek	E	C		X				
Dawson Creek	E	b						
Deer Creek	E	C						
Elk Creek	S	C	X	X				

Designated Uses								
Stream Name	AL	CR	DS	FP	GR	IW	IR	LW
Fall Creek	E	b	X					
Hanson Creek	S	b	X	X	X	X	X	X
Hays Creek	S	b						
AL = Aquatic Life Support			FP = Food Procurement			IW = Industrial Water Supply		
CR = Contact Recreation			GR = Groundwater Recharge			LW = Livestock Water Supply		
DS = Domestic Water Supply			IR = Irrigation Water Supply					
<p>E = Expected Aquatic Life Use Water</p> <p>S = Special Aquatic Life Use Water</p> <p>A = Primary contact recreation stream segment is a designated public swimming area</p> <p>B = Primary contact recreation stream segment is by law or written permission of the landowner open to and accessible by the public</p> <p>C = Primary contact recreation stream segment is not open to and accessible by the public under Kansas law</p> <p>a = Secondary contact recreation stream segment is by law or written permission of the landowner open and accessible by the public</p> <p>b = Secondary contact recreation stream segment is not open to and accessible by the public under Kansas law</p> <p>X = Referenced stream segment is assigned the indicated designated use</p> <p>O = Referenced stream segment does not support the indicated designated use</p>								

4.3.4 Total Maximum Daily Loads

Total Maximum Daily Loads (TMDLs) set limits on the amount of pollutants that can enter a stream or lake and still allow the water body to meet 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 overall level of pollution reduction needed to meet water quality standards
4. The allocation of pollutant loads to be distributed among point and nonpoint sources within the watershed and impacted water bodies
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

[Section 303\(d\) of the Clean Water Act](#) requires that states 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. The following table shows the percentage of stream miles within HUC 8 10270104 that are listed on the 303d list.

Stream Data *Percent of Total Miles of Streams in HUC	303d/TMDL Listed Streams (DEQ)	729	84%*
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2008 Impaired Waters with TMDLs		
Stream/Watershed/Lake with TMDL	Priority for TMDL Implementation	Impairments
- Lower Kansas River (from Lawrence to Kansas City), including Turkey Cr (77), Mattoon Cr (1178), Muncie Cr (55), Barber Cr (373), Little Turkey Cr (62), Tooley Cr (379), East Mission Cr (61), Wolf Cr (53), Little Kaw Cr (59), Kent Cr (73), Mud Cr (20), Baldwin Cr (69), Buck Cr (22), Stone House Cr (57), Oakley Cr (56) - Stranger Creek, including Cow Creek (58), Nine Mile Creek, Tonganoxie Creek (14), Hog Creek (54), Jarbelo Creek (51), Fall Creek (52), Brush Creek (49), Scatter Creek (13), Indian Creek (48), Prairie Creek (47), West Brush Creek (46), Dawson Creek (45), Buttermilk Creek (44), Crooked Creek (10 and 12), Camp Creek (41) - Cedar Creek, including Little Cedar Creek and Camp Creek - Mill Creek, including Little Mill Creek - Kill Creek - Upper Wakarusa River, including Burys Creek (32), Middle Branch of Wakarusa River (64), S. Branch of Wakarusa River (63), Six Mile Creek	High	Bacteria
Lower Wakarusa River, including Coal Creek and Little Wakarusa Creek	Medium	Bacteria
Mill Creek, Upper Wakarusa River	High	Impaired Biology
Lower Kansas River (Johnson Co.), Kansas River (Lawrence), Crooked Creek	Medium	Impaired Biology
Lower Kansas River, Kansas River (Lawrence), Kill Creek	Low	Chlordane
Cedar Creek	High	Nitrate
Mill Creek	Low	Chloride
Washington Creek	High	Dissolved Oxygen
Nine Mile Creek	Low	Zinc
Baker Wetlands	High	Dissolved Oxygen
Antioch Park Lake	Low	Chlordane
New Olathe Lake, Cedar Lake, Clinton Lake	High	Eutrophication
Gardner City Lake	High High	Dissolved Oxygen Eutrophication
Mary's Lake	Medium Medium Medium	Dissolved Oxygen Eutrophication pH
Sunflower Park Lake	Medium Medium	Dissolved Oxygen Eutrophication
Lone Star Lake, Frisco Lake, Pierson Park Lake, Olathe Waterworks Lake	Low	Eutrophication
Lakeview Estates Lake	Low Low	Aquatic Plants Eutrophication
Potter's Lake	Low Low	Eutrophication pH

2008 Impaired Waters Needing TMDLs	
Impaired Stream/Lake	Impairment
Kansas River (at Lecompton, Eudora, Desoto, and Kansas City)	Total Suspended Solids (TSS)
Kansas River (at Lecompton, Desoto, and Kansas City)	Total Phosphorus (Phos.)
Kansas River (at Lecompton)	Impaired Biology and Lead
Kansas River (at Eudora)	PCB, Lead, and Copper
Kansas River (at Desoto and Kansas City)	Lead

2008 Impaired Waters Needing TMDLs (continued)	
Impaired Stream/Lake	Impairment
Upper Stranger Creek	TSS, Total Phos., Atrazine, Copper, and Lead
Lower Stranger Creek	Impaired Biology, Atrazine, Copper and Lead
Nine Mile Creek	Lead and Total Phosphorus
Crooked Creek	Total Phosphorus and Atrazine
Lower Wakarusa River	TSS
Coal Creek	Dissolved Oxygen
Kill Creek, Captain Creek	Atrazine
Mill Creek, Cedar Creek	Total Phosphorus
Baker Wetlands	Eutrophication and pH
Douglas County State Fishing Lake, Leavenworth State Fishing Lake, Rose's Lake, Strowbridge Reservoir	Eutrophication
Kansas River (at LeCompton, Eudora, Desoto and Kansas City)	TSS

For additional TMDL information or to download the TMDL report, please visit www.kdheks.gov/tmdl/index.htm.

Impairment definitions:

Aquatic Plants: Excessive macrophytes (aquatic plants) impairing recreational uses of lakes.

Atrazine: An herbicide that can be hazardous to human health and aquatic life at concentrations exceeding 5 parts per billion.

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.

Impaired Biology: Impairments caused by excessive nutrients/sediments, toxic ammonia or organic material present in the stream, decreasing the diversity of clean water biological organisms in the stream.

Chlordane: Banned pesticide used for termite treatment in urban development, suspected of causing cancer through food chain, accumulates in tissue of aquatic life, no longer legally used.

Chloride: A naturally occurring mineral which, in high concentrations, can cause deterioration of domestic plumbing, adverse water taste, and hypertension in humans. The primary source of chloride impacted groundwater is intrusion of salt water from deeper formations.

Copper: Heavy metal which has minimal health effects. Copper in drinking water can produce taste problems.

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

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

Lead: A metal that can be hazardous to human health and aquatic life at elevated levels.

Nitrate: A naturally occurring mineral that is an essential component of all living matter. However, high concentrations (greater than 10 parts per million) in drinking water can cause adverse health effects. Sources of nitrate include municipal wastewater treatment plant discharges, runoff from livestock operations, leaching of fertilizer from urban and agricultural areas, and failing septic systems.

PCB: Polychlorinated biphenyls are a family of man-made chemicals that contain 209 individual compounds with varying levels of toxicity. Some are recognized carcinogens. Eating contaminated

fish is a major source of PCB exposure for humans because PCBs bioaccumulate in some species of fish found in contaminated waters.

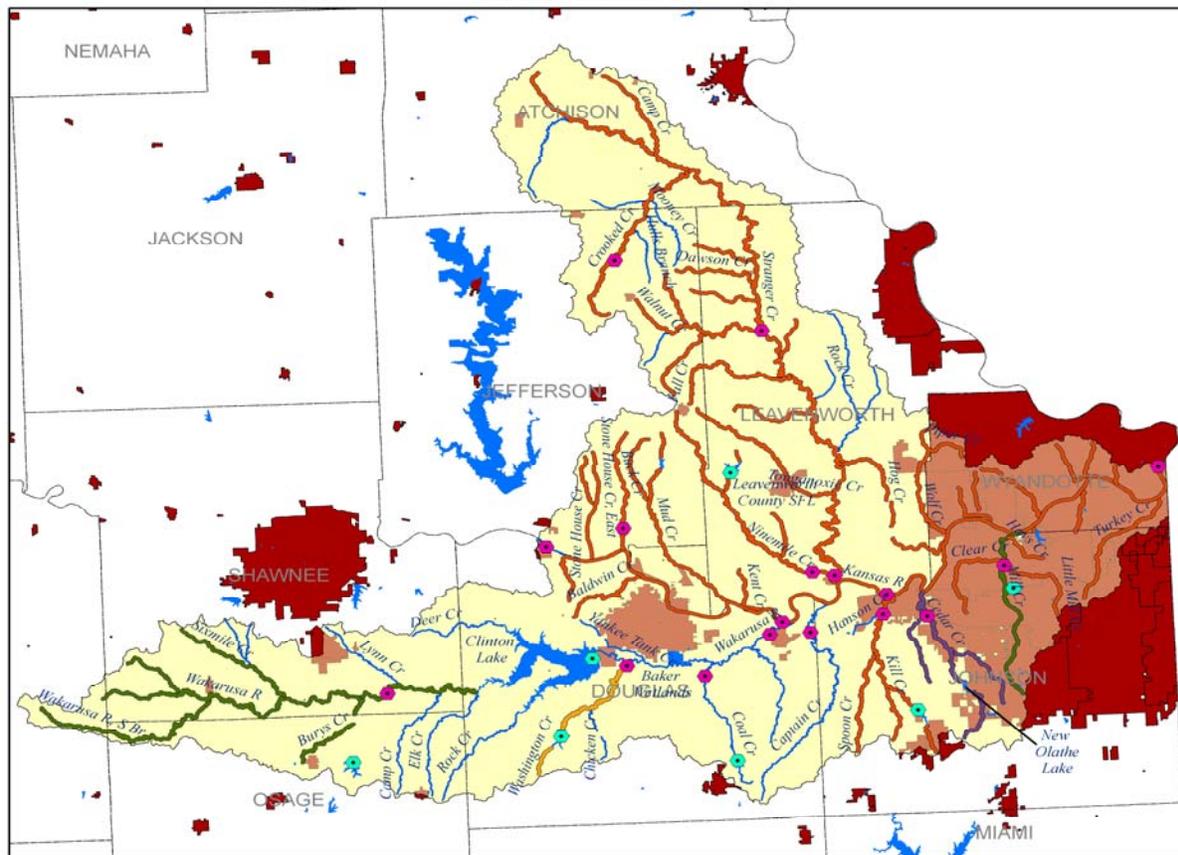
pH: Measure of the alkalinity or acidity of water. The scale ranges from 0 to 14 with 7.0 being neutral, 0 to 7 being acidic, and 7 to 14 being basic or alkaline.

Total Phosphorus: Nutrient for plant growth which in excessive amounts will cause overabundance of macrophytes, attached algae, and algal blooms.

Total Suspended Solids: Amount of sediment and organic material present in the water column of a stream; can inhibit the life cycle of aquatic life or recreational use of water in excessive amounts.

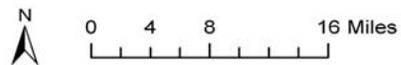
Zinc: A heavy metal often resulting from mining operations. It is usually associated with taste problems in drinking water.

**Lower Kansas Watershed
HUC 10270104
2008 TMDLs**

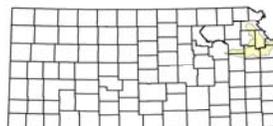


TMDL Classifications and Map Key

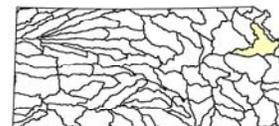
- KDHE Stream Monitoring Station
- KDHE Lake Monitoring Station
- Stream or River
- High Priority Bacteria
- High Priority Bacteria and Impaired Biology
- High Priority Bacteria and Nitrate
- High Priority Dissolved Oxygen
- Lake
- HUC 10270104 Boundary
- County Boundary
- City Boundary



Map area shown in yellow.



Kansas County Boundaries



8-Digit Hydrologic Unit Codes in Kansas

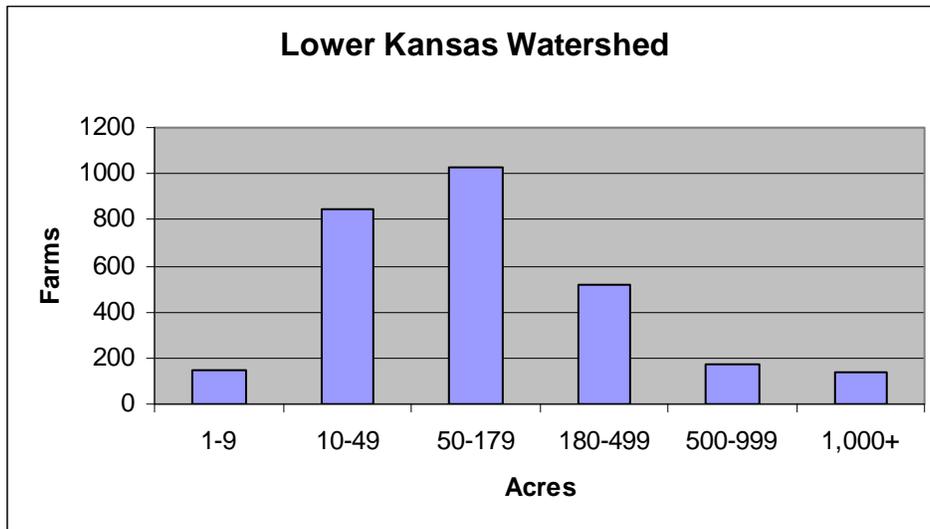
4.4 Threatened and Endangered Species Status¹⁷

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

LISTED THREATENED AND ENDANGERED SPECIES (COUNTY LISTS)			
Species Common Name (<i>Scientific name</i>)	Threatened (T), Endangered (E), Proposed (P), Candidate (C), Species in Need of Conservation (SINC)	Designated Critical Habitat (Y)es/(N)o	Listing: Federal (F), State (S)
Animals, Vertebrates – Fishes			
Arkansas Darter (<i>Etheostoma cragini</i>)	C/T	Y	F/S
Arkansas River Shiner (<i>Notropis girardi</i>)	T/E	Y	S
Arkansas River Speckled Chub (<i>Macrhybopsis tetranema</i>)	E	Y	S
Neosho Madtom (<i>Noturus placidus</i>)	T/T	Y	F/S
Plains Minnow (<i>Hybognathus placitus</i>)	SINC	N	S
Silver Chub (<i>Macrhybopsis storeriana</i>)	E	Y	S
Sturgeon Chub (<i>Macrhybopsis gelida</i>)	C/T	Y	F/S
Spotted Sucker (<i>Minytrema melanops</i>)	SINC	N	S
Topeka Shiner (<i>Notropis topeka</i>)	E/T	Y	F/S
Animals, Vertebrate – Birds			
Bald Eagle (<i>Haliaeetus leucocephalus</i>)*	T	Y	S
Eskimo Curlew (<i>Numenius borealis</i>)	E/E	N	F/S
Henslow's Sparrow (<i>Ammodramus henslowii</i>)	SINC	N	S
Least Tern (<i>Sterna antillarum</i>)	E/E	Y	F/S
Peregrine Falcon (<i>Falco peregrinus</i>)	E	N	S
Piping Plover (<i>Charadrius melodus</i>)	T/T	Y	F/S
Snowy Plover (<i>Charadrius alexandrinus</i>)	T	Y	S
Whooping Crane (<i>Grus americana</i>)	E/E	N	F/S
Black Tern (<i>Chlidonias niger</i>)	SINC	N	S
Bobolink (<i>Dolichonyx oryzivorus</i>)	SINC	N	S
Chihuahuan Raven (<i>Corvus cryptoleucus</i>)	SINC	N	S
Golden Eagle (<i>Aquila chrysaetos</i>)	SINC	N	S
Long-billed Curlew (<i>Numenius americanus</i>)	SINC	N	S
Short-eared Owl (<i>Asio flammeus</i>)	SINC	N	S
Yellow-throated Warbler (<i>Dendroica dominica</i>)	SINC	N	S
Whip-poor-will (<i>Camprimulgus vociferous</i>)	SINC	N	S
Animals, Vertebrate – Amphibians/Reptiles			
Western Hognose Snake (<i>Heterodon nasicus</i>)	SINC	N	S
Timber Rattlesnake (<i>Crotalus horridus</i>)	SINC	N	S
Eastern Hognose Snake (<i>Heterodon platirhinos</i>)	SINC	N	S
Glossy Snake (<i>Arizona elegans</i>)	SINC	N	S
Animals, Vertebrate – Mammals			
Eastern Spotted Skunk (<i>Spilogale putorius</i>)	T	Y	S
Franklin's Ground Squirrel (<i>Spermophilus franklinii</i>)	SINC	N	S
Southern Bog Lemming (<i>Synaptomys cooperi</i>)	SINC	N	S
Animals, Invertebrate – Insects			
American Burying Beetle (<i>Nicrophorus americanus</i>)	E/E	N	F/S
Animals, Invertebrate – Crustaceans			
Cylindrical Papershell Mussel (<i>Anadontoides ferussacianus</i>)	SINC	N	S

LISTED THREATENED AND ENDANGERED SPECIES (COUNTY LISTS)			
Species Common Name (<i>Scientific name</i>)	Threatened (T), Endangered (E), Proposed (P), Candidate (C), Species in Need of Conservation (SINC)	Designated Critical Habitat (Y)es/(N)o	Listing: Federal (F), State (S)
Animals, Invertebrate – Crustaceans (continued)			
Flutedshell Mussel (<i>Lasmigona costata</i>)	T	N	S
Ouachita Kidneyshell Mussel (<i>Ptychobranhus occidentalis</i>)	T	Y	S
Wabash Pigtoe Mussel (<i>Fusconaia flava</i>)	SINC	N	S
*The Bald Eagle has been de-listed nationally (2007) but remains a state listed species. The Bald Eagle remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.			

5.0 Census and Social Data (2000)⁴⁸



Estimated Number of Farms: 2,851

Average Farm Size: 244 acres

Estimated Number of Total Farm Operators: 2,851

Principal Operators – Full-Time: 1,475

Principal Operators – Part-Time: 1,376

5.1 Estimated Level of Willingness and Ability to Participate in Conservation⁴⁹

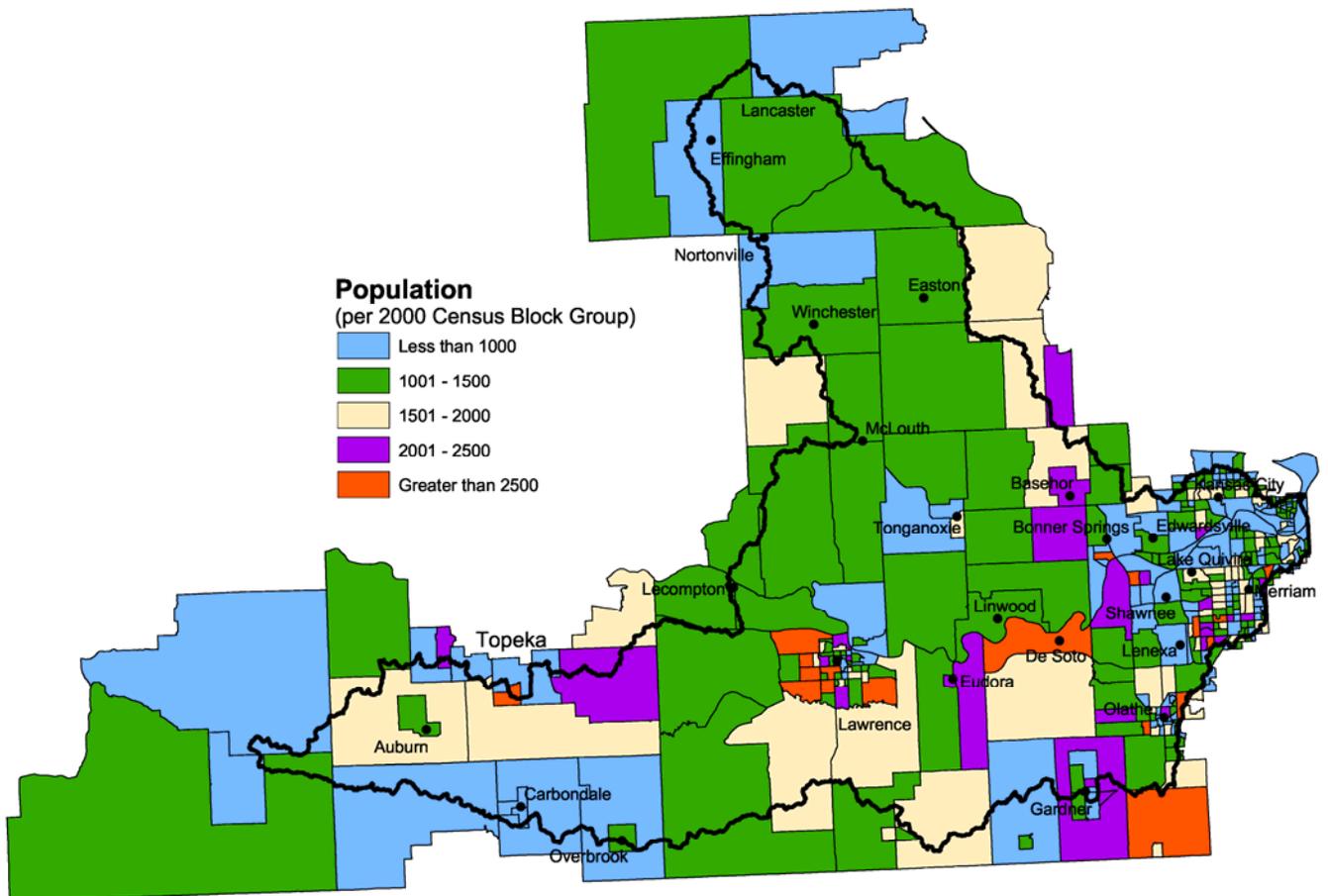
The Lower Kansas sub-basin exhibits a likelihood of full participation in the first five years of the project with moderate adjustments in technical and financial assistance, and conservation marketing. This sub-basin exhibits an increased need of educational and technical assistance to improve the participation rate. There is a need for minor modifications in the technical delivery system. The existing information and education delivery system needs minor modifications to improve effectiveness. Existing financial incentives need to be expanded or increased to improve the participation rate and accelerate participation.

5.2 Evaluation of Social Capital¹⁰

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 Lower Kansas sub-basin are reported to be somewhat effective at solving problems. In times of need, rural communities are willing to assist their neighbors by pooling their resources to overcome adversity. Large communities are strong economic centers and provide tremendous cultural activities but may be somewhat distant from the rural communities and agriculture. Although, large communities recognize the importance of agri-business and the environment which indicates a willingness to support conservation.

5.3 Population Distribution Map (2000)



6.0 Conservation Progress

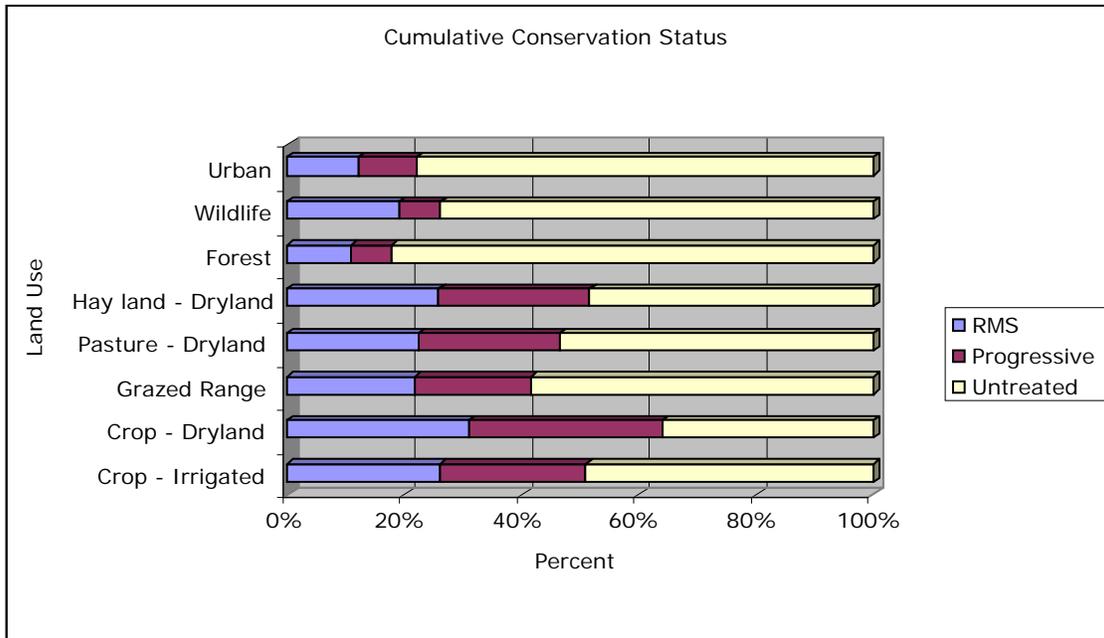
Conservation on the land is defined by the progress made by local landowners and operators addressing resource issues. Progress is typically accomplished through private, local, state, and federal funds. This data is current through the date the RWA was published. For up-to-date NRCS Performance Results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

6.1 Reported Conservation Progress (Fiscal Years [FYs] 2004–2008)

Total Conservation Systems Applied						1,158
Summary Conservation Practices Applied	FY2008*	FY2007	FY2006	FY2005	FY2004	Total
Access Road (ft)	0	0	0	0	900	900
Brush Management (ac)	475	1,553	2,028	1,458	2,081	7,595
Comprehensive Nutrient Management Plan (no)	0	1	0	39		40
Conservation Crop Rotation (ac)	4,231	7,377	7,398	6,707	8,961	34,674
Contour Buffer Strips (ac)	0	1	11	8	7	27
Contour Farming (ac)	1,632	4,982	5,160	4,281	5,565	21,620
Cover Crop (ac)	0	3	2	39	21	65
Critical Area Planting (ac)	0	12	22	16	35	85
Diversion (ft)	2,193	2,049	2,607	2,494	536	9,879
Fence (ft)	1,285	9,747	0	16,416	1,765	29,213
Field Border (ft)	0	6,370	8,265	12,370	0	27,005
Filter Strip (ac)	12	68	116	38	264	498
Forage Harvest Management (ac)	197	906	941	946	740	3,730
Forest Stand Improvement (ac)	0	230	241	2	66	539
Grade Stabilization Structure (no)	7	2	3	0	1	13
Grassed Waterway (ac)	12	10	113	19	9	163
Heavy Use Area Protection (ac)	0	14	12	6	7	39
Nutrient Management (ac)	3,204	6,839	9,962	10,423	5,181	35,609
Pasture and Hay Planting (ac)	211	40	101	341	255	948
Pest Management (ac)	3,514	5,409	5,684	7,641	7,643	29,891
Pipeline (ft)	0	954	60	4,188	0	5,202
Pond (no)	2	3	5	2	2	14
Prescribed Burning (ac)	588	529	1,157	572	1,150	3,996
Prescribed Grazing (ac)	467	1,623	2,667	1,859	1,220	7,836
Prescribed Grazing (ac)	0	170	0	428	1,572	2,170
Range Planting (ac)	0	68	162	574	297	1,101
Residue and Tillage Management, Mulch Till (ac)	1,017	1,164	0	0	0	2,181
Residue and Tillage Management, No-Till/Strip Till/Direct Seed (ac)	2,095	1,882	0	0	0	3,977
Residue Management, Mulch Till (ac)	358	2,877	5,345	3,219	2,733	14,532
Residue Management, No-Till/Strip Till (ac)	400	622	2,922	3,374	4,889	12,207
Residue Management, Seasonal (ac)	314	678	457	610	746	2,805
Restoration and Management of Rare and Declining Habitats (ac)	155	469	547	0	0	1,171
Riparian Forest Buffer (ac)	0	0	5	14	81	100
Spring Development (no)	0	0	0	4	0	4
Streambank and Shoreline Protection (ft)	0	505	0	0	0	505
Subsurface Drain (ft)	5,970	6,690	9,987	2,440	0	25,087
Terrace (ft)	117,541	237,277	276,031	100,485	68,231	799,565
Tree/Shrub Establishment (ac)	2	8	2	1	4	17
Tree/Shrub Pruning (ac)	0	0	27	0	0	27
Underground Outlet (ft)	41,778	51,419	68,622	24,859	6,729	193,407
Upland Wildlife Habitat Management (ac)	2,972	5,333	5,507	3,741	5,899	23,452
Use Exclusion (ac)	266	1,776	1,858	1,349	2,126	7,375
Waste Utilization (ac)	0	0	0	39	0	39
Water and Sediment Control Basin (no)	22	15	5	20	0	62
Watering Facility (no)	0	6	3	4	0	13
Wetland Creation (ac)	0	10	0	12	0	22
Wetland Restoration (ac)	0	0	1	0	3	4
Wetland Wildlife Habitat Management (ac)	0	10	12	12	18	52

6.2 Cumulative Conservation Status

Estimated conservation plans developed and applied from 1995 to 2008 are projected in the following chart.



- A resource management system (RMS) is conservation systems developed to address all identified resource concerns on a land unit or farm
 - Progress over the last 10+ years has been focused on:
 - Nutrient and pest management and erosion control on cropland
 - Grazing management on rangeland
- Note: Estimates are based on information received from local conservationists in the watershed.*

6.3 Other Watershed Projects

<i>Watershed Projects, Plans, Studies, and Assessments/11/13</i>
Kansas City Mid America Regional Council (MARC) Watershed Restoration and Protection Strategy (WRAPS) Development Project
Shawnee County WRAPS Development Project
Kansas Water Quality Initiative – Environmental Assessment and Critical Area Identification – Part 4
Metropolitan Kansas City Water Quality Initiative – Part 2
Leavenworth County Conservation District – NPS Pollution
Thompsonville Watershed Joint District No. 5
Wakarusa (Upper and Lower) Watershed Joint District No. 35

6.4 Lands Removed from Production through Farm Bill Programs¹⁴

Conservation Reserve Program (CRP)^a: **20,807 acres**
Wetlands Reserve Program (WRP): **538 acres**

^aData from 2006 Farm Service Agency, CRP 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 – U.S. Department of Agriculture, National Weather and Climate Service. Online reference information available at <http://datagateway.nrcs.usda.gov/>.
3. National Land Cover Data (NLCD) - Originator: U.S. Geological Survey (USGS); Information available online at <http://landcover.usgs.gov/natl/landcover.php>.
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 U.S. 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://ecos.fws.gov/tess_public/SpeciesReport.do?lead=6&listingType=L. The Kansas Department of Wildlife and Parks, 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.
11. Natural Resources Conservation Service, Kansas online information at <http://www.ks.nrcs.usda.gov/programs/pl566/>.

Footnotes/Bibliography (continued)

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12. Natural Resources Conservation Service, Web Soil Survey can be located on-line at <http://websoilsurvey.nrcs.usda.gov/app/>.
13. Kansas Department of Health and Environment, Bureau of Water, Watershed Management Section, <http://www.kdheks.gov/nps/wraps/index.htm>.
14. Natural Resources Conservation Service, Kansas, Program Information is located at <http://www.ks.nrcs.usda.gov/programs/>.

8.0 Additional On-line Resources

1. U.S. Environmental Protection Agency, EnviroMapper for Water, http://map8.epa.gov/scripts/esrimap.dll?name=NHDMapper&Cmd=ZoomInByCat&qc=3&th=6&lc=00010200000110_0000&fipsCode=10270104.
2. U.S. Environmental Protection Agency, Surf Your Watershed at http://cfpub.epa.gov/surf/huc.cfm?huc_code=10270104.

9.0 Assessment Matrix

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 land uses. Systems include baseline and resource management. Baseline systems are best described as land units that have had no recorded treatment or one or more resource concerns treated with conservation practices. A RMS is described as land units that have all known resource concerns treated with conservation practices. The level of treatment to 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. Local resource professionals identified these concerns. Other resource concerns likely exist within the watershed but only make up a small percentage of what may need 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 baseline systems and untreated land units to address resource concerns identified in the resource profile. These prescribed 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 Environmental Quality Incentives Program (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 that have been developed using local conservationists and work groups to identify resource concerns, participation rates, and conservation systems likely to be applied. Only RMS plans were prescribed in this assessment. 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.

9.1 CROPLAND - DRYLAND

WATERSHED NAME & CODE		LOWER KANSAS - 10270104				LANDUSE ACRES		271,132	
LAND USE TYPE		CROPLAND - DRYLAND				TYPICAL UNIT SIZE ACRES		80	
ASSESSMENT INFORMATION						ESTIMATED PARTICIPATION		58%	
CONSERVATION SYSTEMS BY TREATMENT LEVELS		CURRENT CONDITIONS	FUTURE CONDITIONS			RESOURCE CONCERNS			
		Total Units	Existing Unchanged Units	New Treatment Units	Total Units	Soil Erosion - Sheet and Rill	Soil Erosion - Ephemeral Gully	Soil Condition - Organic Matter Depletion	Water Quality - Excessive Nutrients and Organics in Surface Water
Baseline System		System Rating ->				4	4	3	3
Total Acreage at Baseline Level		97,608	40,995	0	40,995				
Conservation Crop Rotation (ac.) 328		24,402	10,249	0	10,249	3	3	4	2
Diversion (ft.) 362		366,028	153,732	0	153,732	4	4	0	3
Grassed Waterway (ac.) 412		1,952	820	0	820	0	5	0	2
Residue Management, Seasonal (ac.) 344		48,804	20,498	0	20,498	4	2	3	3
Terrace (ft.) 600		3,050,235	1,281,099	0	1,281,099	5	4	2	2
Progressive System		System Rating ->				5	5	4	5
Total Acreage at Progressive Level		89,474	37,579	0	37,579				
Conservation Crop Rotation (ac.) 328		44,737	18,789	0	18,789	3	3	4	2
Contour Farming (ac.) 330		44,737	18,789	0	18,789	3	3	1	3
Cover Crop (ac.) 340		44,737	18,789	0	18,789	4	3	4	2
Diversion (ft.) 362		559,210	234,868	0	234,868	4	4	0	3
Grassed Waterway (ac.) 412		1,789	752	0	752	0	5	0	2
Nutrient Management (ac.) 590		44,737	18,789	0	18,789	1	1	3	5
Pest Management (ac.) 595		44,737	18,789	0	18,789	1	0	0	0
Residue and Tillage Management, Mulch Till (ac.) 345		44,737	18,789	0	18,789	4	2	3	3
Residue Management, Seasonal (ac.) 344		89,474	37,579	0	37,579	4	2	3	3
Terrace (ft.) 600		2,796,049	1,174,340	0	1,174,340	5	4	2	2
Resource Management System (RMS)		System Rating ->				5	5	5	5
Total Acreage at RMS Level		84,051	84,051	108,507	192,558				
Conservation Crop Rotation (ac.) 328		84,051	124,151	68,407	192,558	3	3	4	2
Contour Farming (ac.) 330		84,051	109,998	82,560	192,558	3	3	1	3
Cover Crop (ac.) 340		84,051	109,998	82,560	192,558	4	3	4	2
Critical Area Planting (ac.) 342		4,203	4,203	5,425	9,628	5	5	5	3
Diversion (ft.) 362		525,318	1,061,956	141,531	1,203,487	4	4	0	3
Filter Strip (ac.) 393		8,405	8,405	10,851	19,256	2	0	0	4
Grassed Waterway (ac.) 412		2,522	4,692	1,085	5,777	0	5	0	2
Nutrient Management (ac.) 590		84,051	109,998	82,560	192,558	1	1	3	5
Pasture & Hayland Planting (ac.) 512		84,051	84,051	108,507	192,558	4	4	4	2
Pest Management (ac.) 595		84,051	109,998	82,560	192,558	1	0	0	0
Range Planting (ac.) 550		84,051	84,051	108,507	192,558	4	4	4	2
Residue and Tillage Management, Mulch Till (ac.) 345		84,051	109,998	82,560	192,558	4	2	3	3
Residue Management, No-Till/Strip Till/Direct Seed (ac.) 329		84,051	84,051	108,507	192,558	5	3	4	3
Riparian Forest Buffer (ac.) 391		21,013	21,013	27,127	48,139	3	0	2	2
Terrace (ft.) 600		5,253,183	8,644,027	3,390,845	12,034,872	5	4	2	2
CONSERVATION INVESTMENT INFORMATION									
CONSERVATION SYSTEMS BY TREATMENT LEVELS		FUTURE	USDA INVESTMENT			PRIVATE INVESTMENT			
		New Treatment Units	Installation Cost 75%	Management Cost - 3 yrs 100%	Technical Assistance 20%	Total Present Value Cost	Installation Cost 25%	Annual O & M + Mgt Costs 100%	Total Present Value Cost
Progressive System Acres Treated		0							
Conservation Crop Rotation (ac.) 328		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Contour Farming (ac.) 330		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cover Crop (ac.) 340		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Diversion (ft.) 362		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Grassed Waterway (ac.) 412		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Nutrient Management (ac.) 590		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pest Management (ac.) 595		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Residue and Tillage Management, Mulch Till (ac.) 345		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Residue Management, Seasonal (ac.) 344		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Terrace (ft.) 600		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal			\$0	\$0	\$0	\$0	\$0	\$0	\$0
Resource Management System (RMS) Acres Treated		108,507							
Conservation Crop Rotation (ac.) 328		68,407	\$0	\$3,078,297	\$615,659	\$3,358,434	\$0	\$1,026,099	\$1,579,527
Contour Farming (ac.) 330		82,560	\$0	\$1,238,395	\$247,679	\$1,351,094	\$0	\$412,798	\$635,442
Cover Crop (ac.) 340		82,560	\$0	\$18,575,931	\$3,715,186	\$20,266,415	\$0	\$6,191,977	\$9,531,631
Critical Area Planting (ac.) 342		5,425	\$813,803	\$0	\$162,761	\$976,563	\$271,268	\$54,254	\$499,803
Diversion (ft.) 362		141,531	\$636,889	\$0	\$127,378	\$764,267	\$212,296	\$16,984	\$283,838
Filter Strip (ac.) 393		10,851	\$1,546,225	\$0	\$309,245	\$1,855,470	\$515,408	\$41,233	\$689,095
Grassed Waterway (ac.) 412		1,085	\$195,313	\$0	\$39,063	\$234,375	\$65,104	\$5,208	\$87,044
Nutrient Management (ac.) 590		82,560	\$0	\$3,715,186	\$743,037	\$4,053,283	\$0	\$1,238,395	\$1,906,326
Pasture & Hayland Planting (ac.) 512		108,507	\$7,324,224	\$0	\$1,464,845	\$8,789,069	\$2,441,408	\$97,656	\$2,852,772
Pest Management (ac.) 595		82,560	\$0	\$4,953,582	\$990,716	\$5,404,377	\$0	\$1,651,194	\$2,541,768
Range Planting (ac.) 550		108,507	\$7,324,224	\$0	\$1,464,845	\$8,789,069	\$2,441,408	\$97,656	\$2,852,772
Residue and Tillage Management, Mulch Till (ac.) 345		82,560	\$0	\$4,953,582	\$990,716	\$5,404,377	\$0	\$1,651,194	\$2,541,768
Residue Management, No-Till/Strip Till/Direct Seed (ac.) 329		108,507	\$0	\$9,765,632	\$1,953,126	\$10,654,344	\$0	\$3,255,211	\$5,010,915
Riparian Forest Buffer (ac.) 391		27,127	\$25,634,785	\$0	\$5,126,957	\$30,761,742	\$8,544,928	\$1,025,391	\$12,864,250
Terrace (ft.) 600		3,390,845	\$3,814,700	\$0	\$762,940	\$4,577,640	\$1,271,567	\$152,588	\$1,914,323
Subtotal			\$47,290,163	\$46,280,606	\$18,714,154	\$107,240,521	\$15,763,388	\$16,917,839	\$45,791,275
TOTAL ACRES TREATED / ESTIMATED TREATMENT COSTS		108,507	\$47,290,163	\$46,280,606	\$18,714,154	\$107,240,521	\$15,763,388	\$16,917,839	\$45,791,275

Note: Estimates for matrices are for general planning purposes only and not based on actual funding.

9.2 GRAZED RANGE

WATERSHED NAME & CODE		LOWER KANSAS - 10270104				LANDUSE ACRES		133,627	
LANDUSE TYPE		GRAZED RANGE				TYPICAL UNIT SIZE ACRES		160	
ASSESSMENT INFORMATION						ESTIMATED PARTICIPATION		58%	
CONSERVATION SYSTEMS BY TREATMENT LEVELS	CURRENT CONDITIONS	FUTURE CONDITIONS			RESOURCE CONCERNS				
	Total Units	Existing Unchanged Units	New Treatment Units	Total Units	Soil Erosion – Streambank	Plant Condition – Productivity, Health and Vigor	Plant Condition – Noxious and Invasive Plants	Domestic Animals – Inadequate Stock Water	
Baseline System						System Rating ->			
Total Acreage at Baseline Level		77,504	32,552	0	32,552	1	0	0	3
Pond (no.) 378	484	203	0	203	3	0	0	5	
Progressive System						System Rating ->			
Total Acreage at Progressive Level		26,725	11,225	0	11,225	4	4	4	4
Brush Management (ac.) 314	6,681	2,806	0	2,806	2	5	5	0	
Pest Management (ac.) 595	13,363	5,612	0	5,612	0	3	5	0	
Pond (no.) 378	167	70	0	70	3	0	0	5	
Spring Development (no.) 574	167	70	0	70	0	0	0	5	
Streambank & Shoreline Protection (ft.) 580	83,517	35,077	0	35,077	5	0	0	0	
Resource Management System (RMS)						System Rating ->			
Total Acreage at RMS Level		29,398	29,398	60,453	89,851	4	5	5	4
Brush Management (ac.) 314	7,349	11,225	11,238	22,463	2	5	5	0	
Pest Management (ac.) 595	29,398	37,148	52,702	89,851	0	3	5	0	
Pond (no.) 378	184	562	0	562	3	0	0	5	
Prescribed Burning (ac.) 338	29,398	29,398	60,453	89,851	0	4	4	0	
Prescribed Grazing (ac.) 528	29,398	29,398	60,453	89,851	3	5	4	0	
Spring Development (no.) 574	184	281	281	562	0	0	0	5	
Streambank & Shoreline Protection (ft.) 580	91,869	140,308	140,475	280,784	5	0	0	0	
CONSERVATION INVESTMENT INFORMATION									
CONSERVATION SYSTEMS BY TREATMENT LEVELS	FUTURE	USDA INVESTMENT				PRIVATE INVESTMENT			
	New Treatment Units	Installation Cost 75%	Management Cost - 3 yrs 100%	Technical Assistance 20%	Total Present Value Cost	Installation Cost 25%	Annual O & M + Mgt Costs 100%	Total Present Value Cost	
Progressive System Acres Treated									
Brush Management (ac.) 314	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pest Management (ac.) 595	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pond (no.) 378	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Spring Development (no.) 574	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Streambank & Shoreline Protection (ft.) 580	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Resource Management System (RMS) Acres Treated									
Brush Management (ac.) 314	11,238	\$632,139	\$0	\$126,428	\$758,567	\$210,713	\$8,429	\$246,217	\$1,045,133
Pest Management (ac.) 595	52,702	\$0	\$3,162,149	\$632,430	\$3,449,918	\$0	\$1,054,050	\$1,622,553	\$5,146,500
Pond (no.) 378	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Prescribed Burning (ac.) 338	60,453	\$1,586,887	\$0	\$317,377	\$1,904,265	\$528,962	\$21,158	\$618,090	\$2,454,415
Prescribed Grazing (ac.) 528	60,453	\$317,377	\$0	\$63,475	\$380,853	\$105,792	\$0	\$105,792	\$486,645
Spring Development (no.) 574	281	\$526,783	\$0	\$105,357	\$632,139	\$175,594	\$7,024	\$205,181	\$814,938
Streambank & Shoreline Protection (ft.) 580	140,475	\$9,482,088	\$0	\$1,896,418	\$11,378,506	\$3,160,696	\$252,856	\$4,225,816	\$15,897,868
Subtotal		\$12,545,275	\$3,162,149	\$3,141,485	\$18,504,248	\$4,181,758	\$1,343,516	\$7,023,650	\$26,051,612
TOTAL ACRES TREATED / ESTIMATED TREATMENT COSTS		60,453	\$12,545,275	\$3,162,149	\$3,141,485	\$18,504,248	\$4,181,758	\$1,343,516	\$7,023,650

Note: Estimates for matrices are for general planning purposes only and not based on actual funding.

9.3 PASTURE/HAY - DRYLAND

WATERSHED NAME & CODE		LOWER KANSAS - 10270104				LANDUSE ACRES		357,997				
LANDUSE TYPE		PASTURE/HAY - DRYLAND				TYPICAL UNIT SIZE ACRES		80				
ASSESSMENT INFORMATION						ESTIMATED PARTICIPATION		58%				
CONSERVATION SYSTEMS BY TREATMENT LEVELS	CURRENT CONDITIONS	FUTURE CONDITIONS			RESOURCE CONCERNS							
	Total Units	Existing Unchanged Units	New Treatment Units	Total Units	Soil Erosion – Classic Gully	Water Quality – Excessive Suspended Sediment and Turbidity in Surface Water	Plant Condition – Productivity, Health and Vigor	Plant Condition – Noxious and Invasive Plants				
Baseline System					System Rating ->				0	2	4	4
Total Acreage at Baseline Level		178,999	75,179	0	75,179							
Forage Harvest Management (ac.) 511		44,750	18,795	0	18,795	0	3	5	5			
Prescribed Grazing (ac.) 528		44,750	18,795	0	18,795	1	3	5	4			
Progressive System					System Rating ->				0	2	4	4
Total Acreage at Progressive Level		89,499	37,590	0	37,590							
Forage Harvest Management (ac.) 511		44,750	18,795	0	18,795	0	3	5	5			
Pest Management (ac.) 595		44,750	18,795	0	18,795	0	0	3	5			
Prescribed Grazing (ac.) 528		44,750	18,795	0	18,795	1	3	5	4			
Resource Management System (RMS)					System Rating ->				0	2	5	5
Total Acreage at RMS Level		89,499	89,499	155,729	245,228							
Forage Harvest Management (ac.) 511		89,499	141,409	103,819	245,228	0	3	5	5			
Nutrient Management (ac.) 590		89,499	89,499	155,729	245,228	0	0	5	1			
Pest Management (ac.) 595		89,499	115,454	129,774	245,228	0	0	3	5			
Prescribed Grazing (ac.) 528		89,499	141,409	103,819	245,228	1	3	5	4			
CONSERVATION INVESTMENT INFORMATION												
CONSERVATION SYSTEMS BY TREATMENT LEVELS	FUTURE	USDA INVESTMENT				PRIVATE INVESTMENT						
	New Treatment Units	Installation Cost 75%	Management Cost - 3 yrs 100%	Technical Assistance 20%	Total Present Value Cost	Installation Cost 25%	Annual O & M + Mgt Costs 100%	Total Present Value Cost				
Progressive System Acres Treated												
0												
Forage Harvest Management (ac.) 511		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0			
Pest Management (ac.) 595		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0			
Prescribed Grazing (ac.) 528		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0			
Subtotal			\$0	\$0	\$0	\$0	\$0	\$0	\$0			
Resource Management System (RMS) Acres Treated												
155,729												
Forage Harvest Management (ac.) 511		103,819	\$0	\$2,491,659	\$498,332	\$2,718,410	\$0	\$830,553	\$1,278,513			
Nutrient Management (ac.) 590		155,729	\$0	\$7,007,791	\$1,401,558	\$7,645,528	\$0	\$2,335,930	\$3,595,819			
Pest Management (ac.) 595		129,774	\$0	\$7,786,435	\$1,557,287	\$8,495,031	\$0	\$2,595,478	\$3,995,354			
Prescribed Grazing (ac.) 528		103,819	\$545,050	\$0	\$109,010	\$654,061	\$181,683	\$0	\$181,683			
Subtotal			\$545,050	\$17,285,885	\$3,566,187	\$19,513,030	\$181,683	\$5,761,962	\$9,051,370			
TOTAL ACRES TREATED / ESTIMATED TREATMENT COSTS		155,729	\$545,050	\$17,285,885	\$3,566,187	\$19,513,030	\$181,683	\$5,761,962	\$9,051,370			

Note: Estimates for matrices are for general planning purposes only and not based on actual funding.

9.4 FOREST

WATERSHED NAME & CODE		LOWER KANSAS - 10270104				LANDUSE ACRES		169,924	
LANDUSE TYPE		FOREST				TYPICAL UNIT SIZE ACRES		40	
ASSESSMENT INFORMATION						ESTIMATED PARTICIPATION		58%	
CONSERVATION SYSTEMS BY TREATMENT LEVELS	CURRENT CONDITIONS	FUTURE CONDITIONS			RESOURCE CONCERNS				
	Total Units	Existing Unchanged Units	New Treatment Units	Total Units	Soil Erosion – Streambank	Plant Condition – Noxious and Invasive Plants			
Baseline System						System Rating ->			
Total Acreage at Baseline Level		139,338	58,522	0	58,522	0	0		
No Conservation Practices being applied at this level		0	0	0	0	0	0	0	0
Progressive System						System Rating ->			
Total Acreage at Progressive Level		11,895	4,996	0	4,996	3	0		
Streambank & Shoreline Protection (ft.) 580		148,684	62,447	0	62,447	5	0		
Resource Management System (RMS)						System Rating ->			
Total Acreage at RMS Level		18,692	18,692	87,715	106,406	3	1		
Forest Stand Improvement (ac.) 666		1,869	1,869	8,771	10,641	1	3		
Streambank & Shoreline Protection (ft.) 580		233,646	319,882	1,010,198	1,330,080	5	0		
CONSERVATION INVESTMENT INFORMATION									
CONSERVATION SYSTEMS BY TREATMENT LEVELS	FUTURE	USDA INVESTMENT				PRIVATE INVESTMENT			
	New Treatment Units	Installation Cost 75%	Management Cost - 3 yrs 100%	Technical Assistance 20%	Total Present Value Cost	Installation Cost 25%	Annual O & M + Mgt Costs 100%	Total Present Value Cost	
Progressive System Acres Treated									
Streambank & Shoreline Protection (ft.) 580		0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Resource Management System (RMS) Acres Treated									
Forest Stand Improvement (ac.) 666		8,771	\$1,973,582	\$0	\$394,716	\$2,368,299	\$657,861	\$78,943	\$990,399
Streambank & Shoreline Protection (ft.) 580		1,010,198	\$68,188,377	\$0	\$13,637,675	\$81,826,053	\$22,729,459	\$1,818,357	\$30,389,039
Subtotal		\$70,161,959	\$0	\$14,032,392	\$84,194,351	\$23,387,320	\$1,897,300	\$31,379,438	
TOTAL ACRES TREATED / ESTIMATED TREATMENT COSTS		87,715	\$70,161,959	\$0	\$14,032,392	\$84,194,351	\$23,387,320	\$1,897,300	\$31,379,438

Note: Estimates for matrices are for general planning purposes only and not based on actual funding.