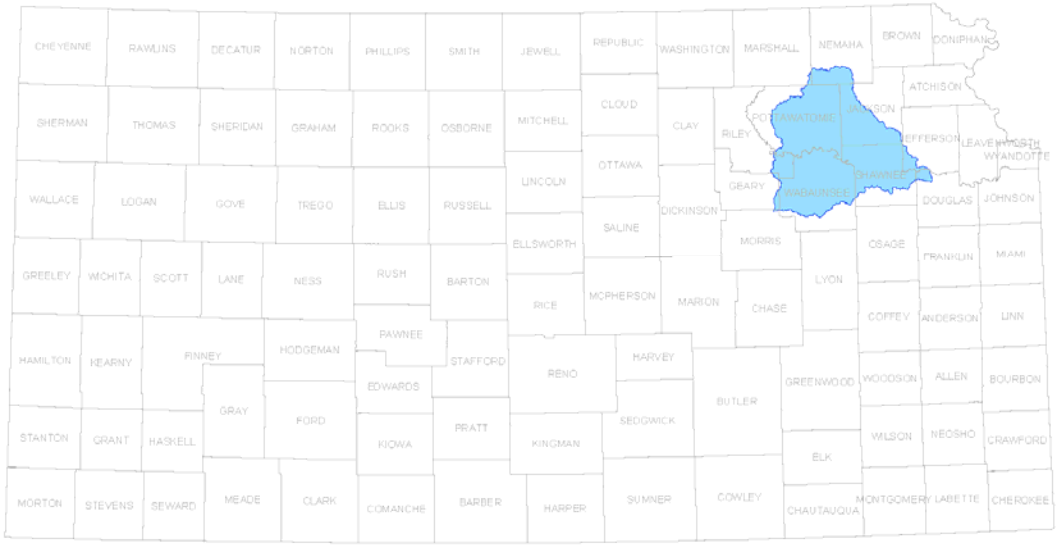
KANSAS
Rapid Watershed Assessment

Middle Kansas Watershed
Hydrologic Unit Code – 10270102



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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
Watershed Management Section
1000 S.W. Jackson
Topeka, Kansas 66612

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Middle Kansas – 10270102

DECEMBER 2006

Resource Profile Contents

Assessment Contents

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Resource Profile

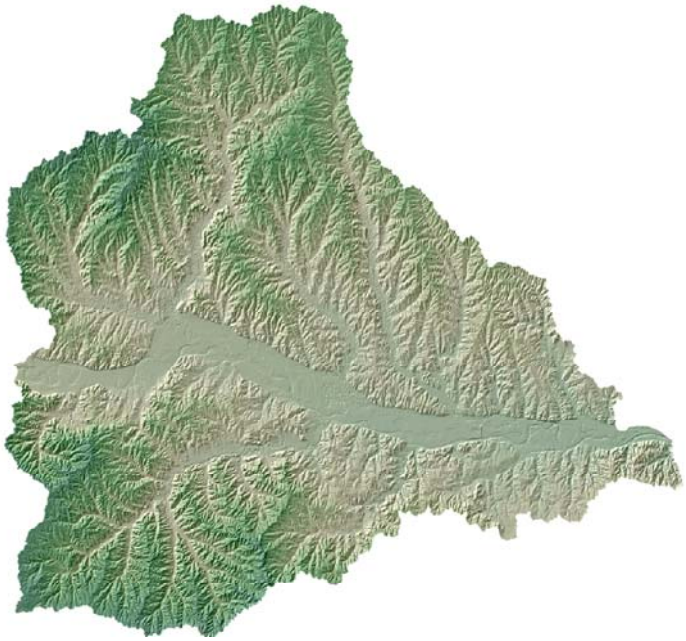
1.0 Purpose

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

2.0 Introduction

The Middle Kansas 8-Digit Hydrologic Unit Code (HUC) sub-basin is comprised of 1,395,582 acres in north central Kansas and includes the counties of Marshall, Nemaha, Pottawatomie, Jackson, Geary, Riley, Wabaunsee, Shawnee, Jefferson, and Douglas. According to the National Land Cover Data (NLCD), approximately 28 percent of the sub-basin is in grain and row crop; 61 percent is in grassland, pasture, and hay; and the rest is made up of other various land uses. This sub-basin is located in the Middle Kansas Watershed Basin and drains into the Kansas River as it flows from west to east through the city of Topeka.

Relief Map



Resource concerns are numerous in the sub-basin. They include, but are not limited to, soil erosion, soil condition, deteriorated surface water quality, deteriorating plant conditions, and erosion in developing urban areas. Economic issues such as the high capital costs of crop production and farm operation, and the high level of management required to operate the farm may delay the acceptance and implementation of conservation on agricultural lands in the sub-basin.

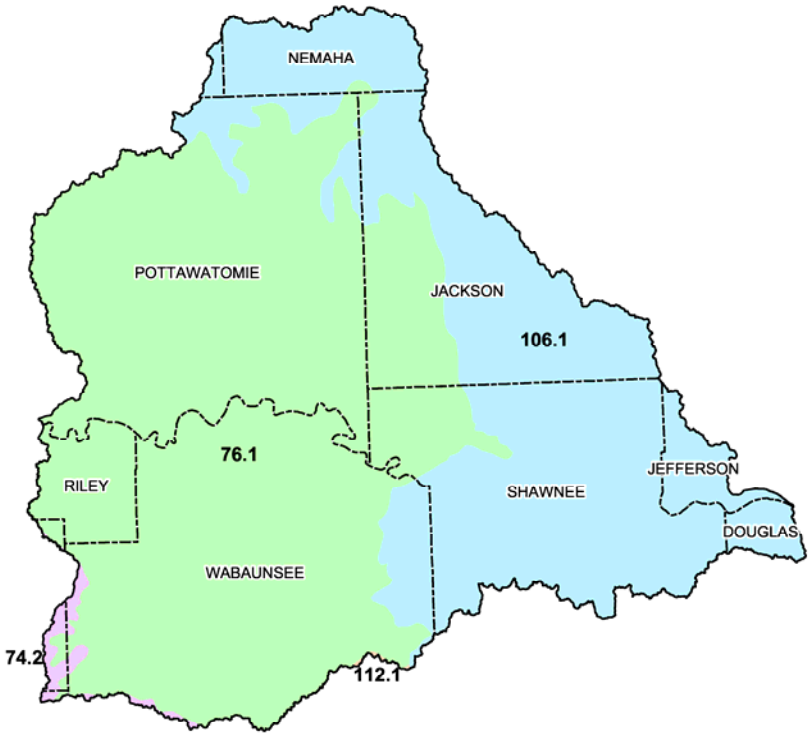
It is estimated that there are 823 farms and 822 operators in the Middle Kansas sub-basin. The estimated farm size in 2002 was 436 acres, down from 440 acres from the 1987 estimate.

Ten Natural Resources Conservation Service (NRCS) service centers, ten county conservation districts, the Cross Creek Watershed District, and the Glacial Hills and the Flint Hills Resource Conservation and Development (RC&D) areas provide conservation assistance in the sub-basin.

3.0 Physical Description

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

3.1 Common Resource Area Map[1]



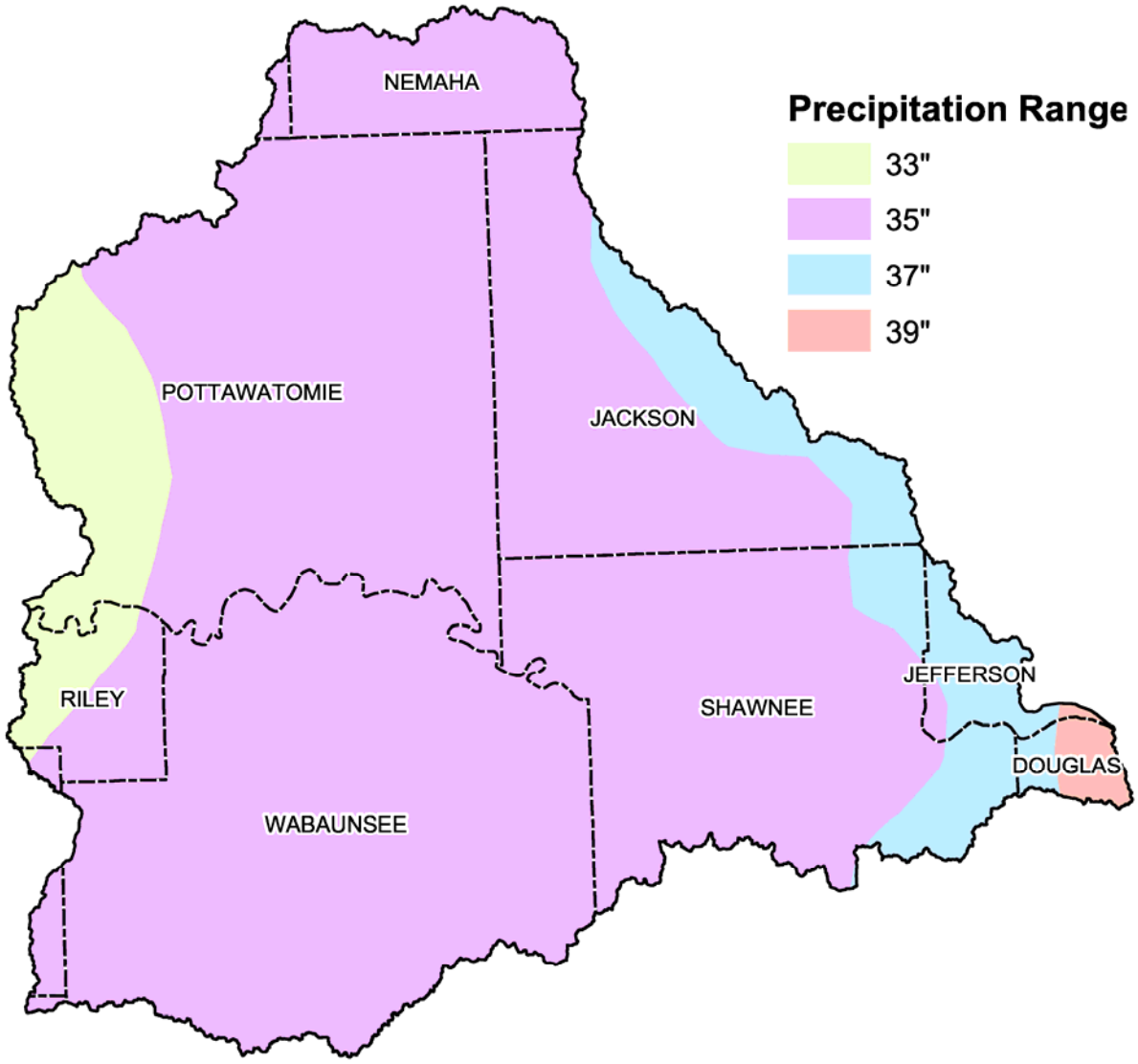
74.2 – Central Kansas Alluvial Plain: The Central Kansas Alluvial Plains CRA is a level to nearly level plain mantled by loess and underlain by unconsolidated alluvial sediments. This CRA inter-fingers in the Central Kansas Sandstone Hills as broad river valleys and terraces with a local relief in the tens of feet. Pre-settlement vegetation was tall to mid grass prairies. Most of this land is in farms, dominantly small grains and hay.

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.

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

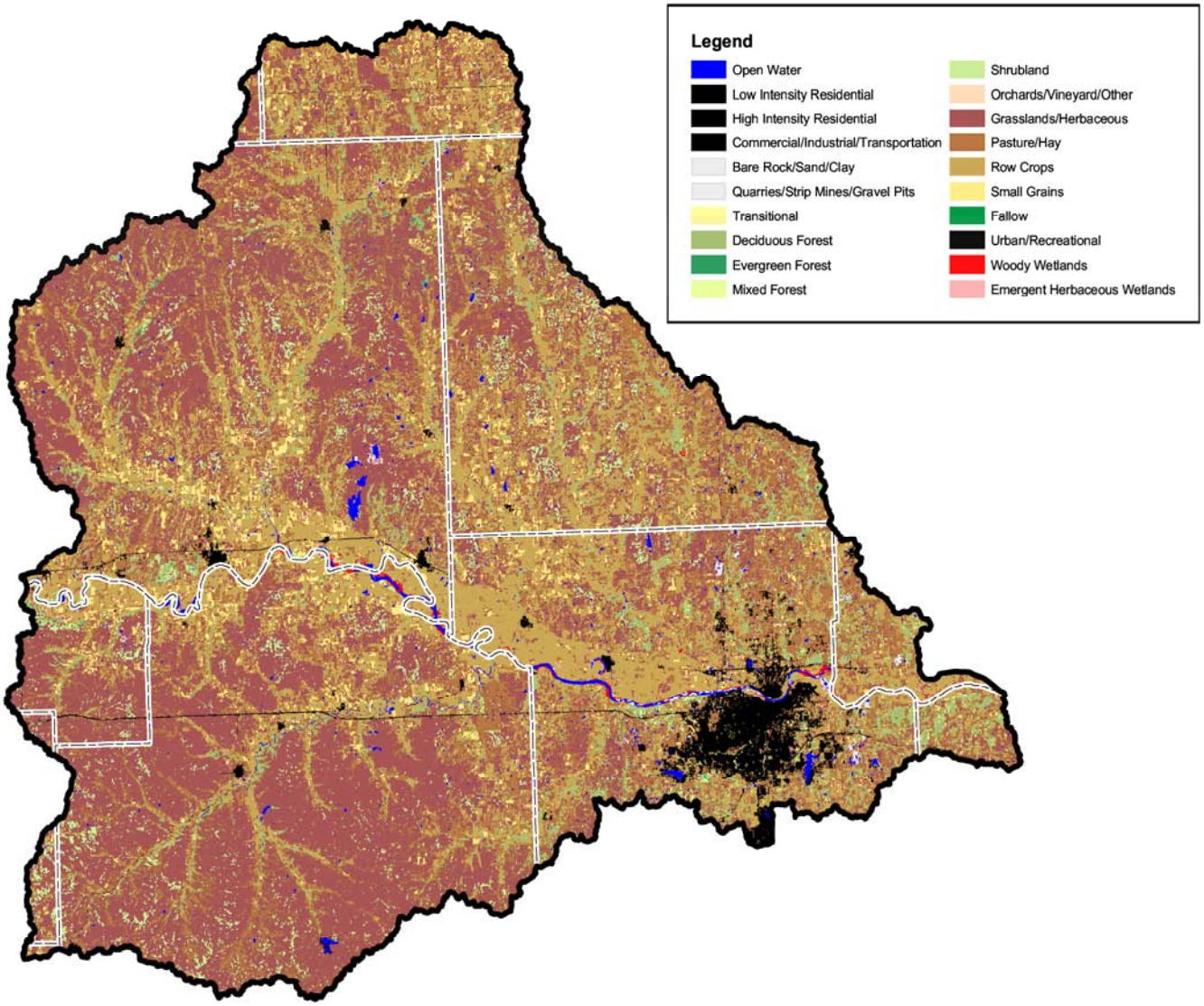
3.2 Precipitation Map[12]

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



3.3 Land Use and Land Cover Distribution Map[/3]

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 Table[3]

Land Cover/ Land Use	Ownership							
	Public		Private		Tribal		Totals	
	Acres	%	Acres	%	Acres	%	Acres	%
Open Water	130	*	18,162	1	178	*	18,470	1
Low Intensity Residential			7,326	1	1	*	7,327	1
High Intensity Residential			13,604	1			13,604	1
Commercial/Industrial/ Transportation			10,049	1	3	*	10,052	1
Bare Rock/Sand/Clay			756	0			756	0
Quarries/Strip Mines/ Gravel Pits			1,348	0			1,348	0
Deciduous Forest			68,203	5	655	*	68,858	5
Evergreen Forest			648	0	5	*	653	0
Mixed Forest			2,521	0	21	*	2,542	0
Shrubland			30,555	2	584	*	31,139	2
Grasslands/Herbaceous	7295	*	530,050	38	1653	*	538,998	39
Pasture/Hay			305,462	22	1544	*	307,006	22
Row Crops			332,534	24	1039	*	333,573	24
Small Grains			48,699	4	356	*	49,055	4
Urban/Recreational			5,097	0	1	*	5,098	0
Woody Wetlands			3,113	0	7	*	3,120	0
Emergent Herbaceous Wetlands			3,641	0	343	*	3,984	0
HUC Totals [a]	**7,425**	*	**1,381,768**	**100%**	**6,390**	*	**1,395,582**	**100%**

**: Less than 1 percent of total acres.*
[a]: Totals are approximate due to rounding and small unknown acreages.

Special Considerations for This 8-Digit HUC:

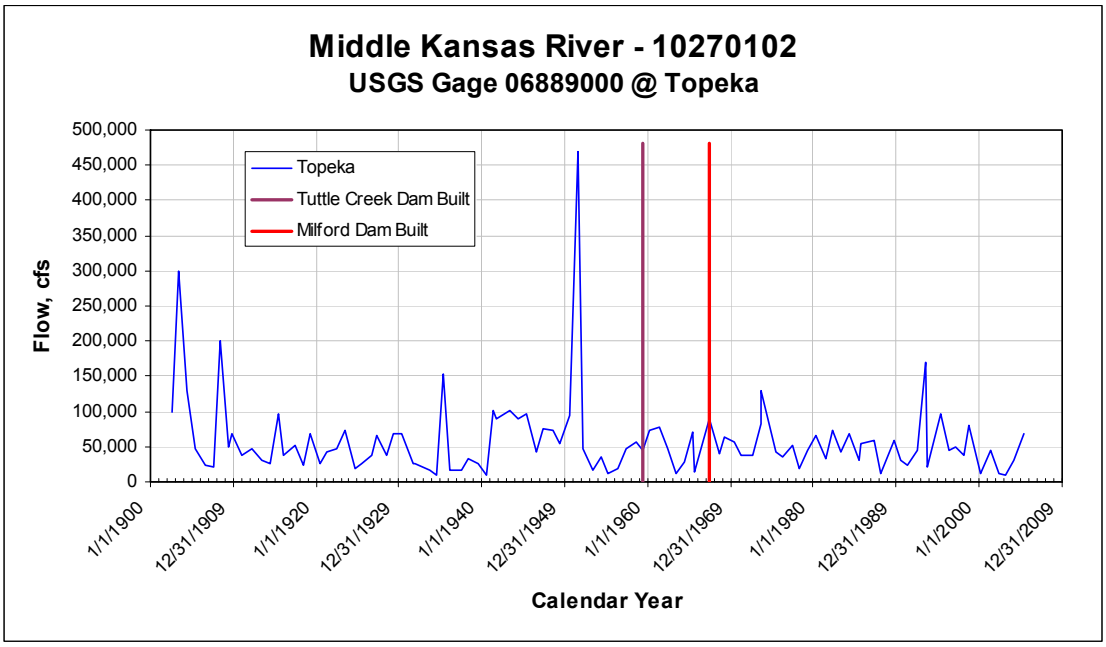
- Small grains and row crops are the predominant commodities grown in rotation on 28 percent of the watershed (approx. 382,628 acres).
- Grasslands/Herbaceous and Pasture/Hay make up approximately 61 percent of the watershed (approximately 846,004 acres).
- Forest makes up approximately 5 percent of the watershed (approximately 72,053 acres).
- Urban land comprises 3 percent of the watershed (approximately 36,081 acres).

Irrigated Lands[4]	Percent of Cropland	Percent of HUC
	< 5%	< 2%

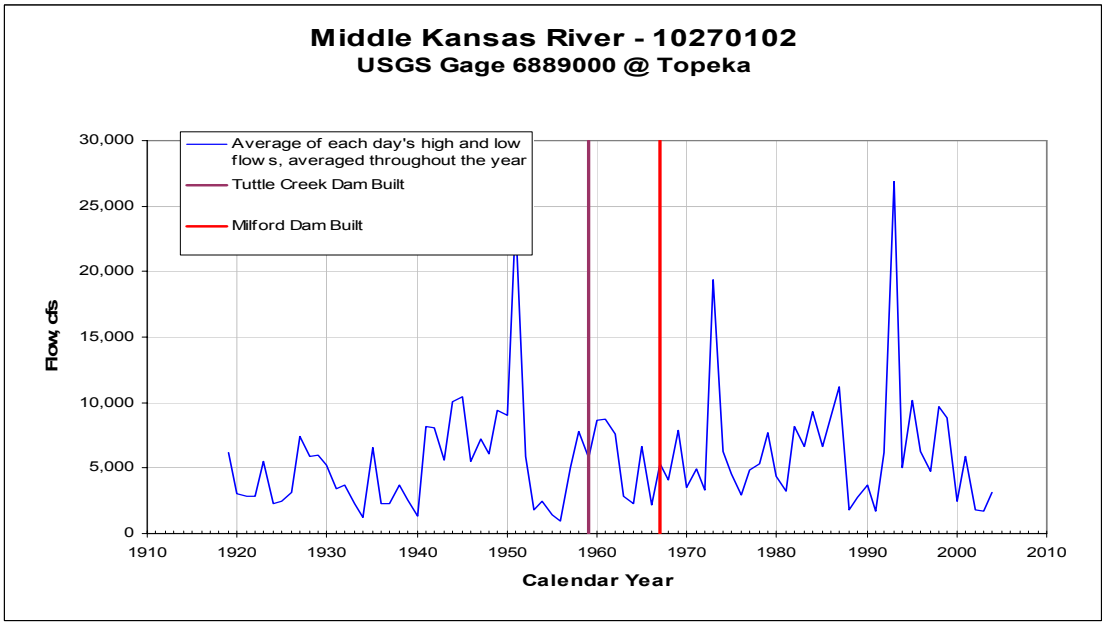
3.4 Stream Flow Data[5]

Stream flow data has been collected since the early 1900s. There are eight known U. S. Geological Survey (USGS) stream gage stations located within the sub-basin. For this assessment, data was collected from one stream gage station on the Kansas River near Topeka, Kansas.

Annual Peak Flow



Average Annual Discharge



3.5 Other Physical Descriptions

Stream Data[6]	Total Miles of Streams in HUC Major (100K Hydro Geographic Information System [GIS] Layer)	495	
		ACRES	**PERCENT**
Land Cover/ Use[3] Based on a 100-foot stretch on both sides of all streams in the 100K Hydro GIS Layer	Bare Rock/Sand/Clay	62	0
	Commercial/Industrial/Transportation	97	0
	Deciduous Forest	559	1
	Emergent Herbaceous Wetlands	953	2
	Evergreen Forest	30	0
	Fallow	36	0
	Grasslands/Herbaceous	32,121	52
	High Intensity Residential	42	0
	Low Intensity Residential	47	0
	Mixed Forest	0	0
	Open Water	339	1
	Pasture/Hay	4,665	9
	Quarries/Strip Mines/Gravel Pits	9	0
	Row Crops	5,798	9
	Shrubland	383	1
	Small Grains	16,072	26
	Transitional	0	0
	Urban/Recreational	33	0
	Woody Wetlands	315	1
	Total Acres of 100-foot Stream Buffers	**61,561**	**100%**
Land Capability Class[4]	**1** – slight limitations		
	2 – moderate limitations		
	3 – severe limitations	764,400	55
	4 – very severe limitations		
	5 – no erosion hazard, but other limitations		
	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	562,700	40
	Total	**1,327,100**	**95%**

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 Middle 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			
	Road, Roadsides and Construction Sites							X
Soil Condition	Organic Matter Depletion		X	X				
	Rangeland Site Stability				X			
	Compaction		X	X				
	Contaminants: Commercial Fertilizer - N		X	X				
	Contaminants: Commercial Fertilizer - P		X	X				
Water Quality, Surface	Harmful Levels of Pesticides		X	X				
	Excessive Nutrients and Organics		X	X				
Plant Condition	Productivity, Health and Vigor				X			
	Noxious and Invasive Plants	X			X			
	Forage Quality and Palatability				X			
Animal, Domestic	Inadequate Stock Water				X			
Economic	High Capital/Financial Costs			X				
	High Management Level Required			X				

Pasture/ Hay

- Pastureland is commonly over-utilized, lacks needed fertility, affected by timing of grazing and invasive weeds.
- Classic gullies have been identified as a concern.
- Invasive/noxious species are present (e.g. *Serecia lespedeza*, Johnsongrass).

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.
- Over application of nutrients and organics has created surface water quality concerns.
- Sheet and rill and ephemeral gully erosion are concerns in part due to lack of residue and/or needed erosion control methods on cropland.

Grazed Range

- Pastureland is commonly over-utilized, affected by timing of grazing and invasive weeds; affecting productivity, health and vigor.
- Over-utilization of the resource has created classic gullies and rangeland site stability concerns.
- Inadequate water supply for livestock affects grazing distribution and health and condition of the animal.

Urban

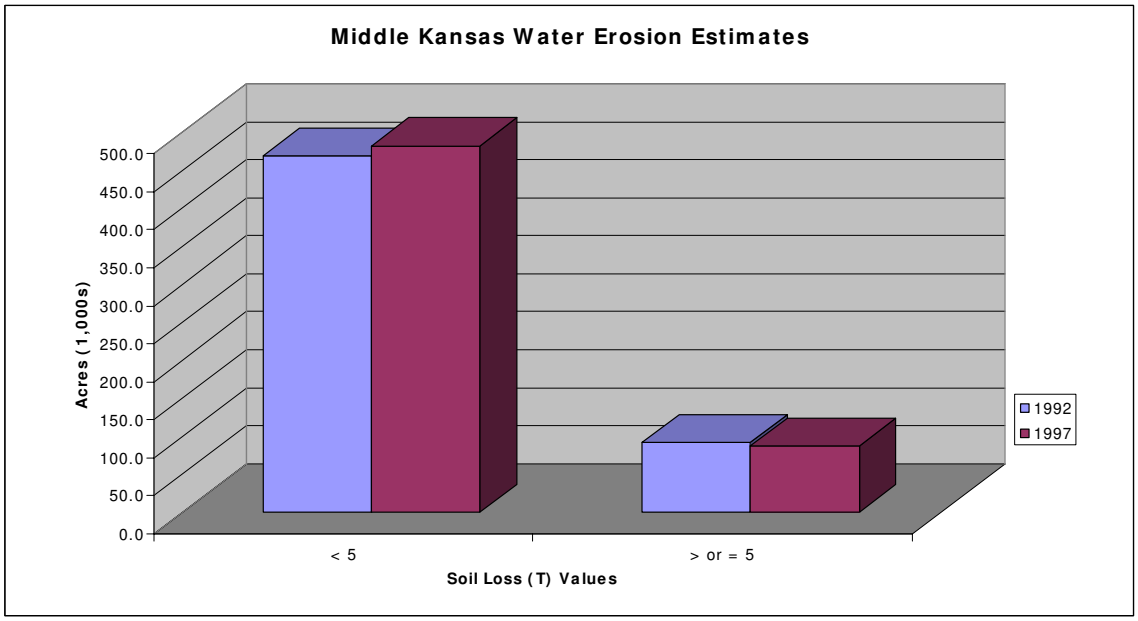
- Urban areas lack needed erosion protection during and after construction activities occur.

General

- Inputs needed to manage large agricultural operations, costs of production, and low commodity values, require capital and place financial burdens on landowners and producers.

4.2 Estimated Soil Loss[/4]

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 are attached to soil colloids and are transported into the stream systems. Erosion by water has been identified as a concern in the watershed.



- Acres with soils eroding (by water) over 5 tons per acre per year have been reduced on approximately 4,000 acres of cropland and pasture from 1982 to 1997.
- Natural Resources Inventory (NRI) 1997 estimates indicate that 88,000 acres of the agricultural lands still had water erosion rates above a sustainable level.
- 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.

4.3 Water Quality Conditions[/6 & /13]

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 web-site:
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 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.

Confined Animal Feeding Operations Registry Table						
Animal/ Operation Type	Dairy	Feedlot	Poultry	Swine	Truck Wash	Other
Number of Permitted Farms	15	34	4	27	0	3
Number of Permitted Animal Units	1,552	25,460	0	13,041	0	525

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 109 Active Public Water Supply Sites located within this watershed. Though water is drawn from surface water within the watershed, much of the public water supply for the area is provided by two groundwater aquifers. Portions of the Glacial Drift aquifer exist in the northern portion of this watershed and are often used for rural domestic water supply. Alluvial aquifers of the Kansas River and its tributaries exist throughout the watershed and provide the primary water source for many public water supplies. 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 please visit: http://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 - Streams								
Stream Name	AL	CR	DS	FP	GR	IW	IR	LW
Adams Creek	E	b		X				
Antelope Creek	E	C						
Bartlett Creek	E	b						
Big Elm Creek	E	b						
Blackjack Creek	E	b						
Blacksmith Creek	E	b						
Bourbonais Creek	E	C		X				
Brush Creek	E	C						
Coal Creek	E	b						
Coryell Creek	E	b						
Cow Creek	E	b						
Cross Creek	E	C		X				
Darnells Creek	E	b						
Deep Creek	E, S	C	X	X	X	X	X	X
Deep Creek, E Br	E	b	X	X	X	X	X	X
Deer Creek	E	C	X	X	X	X	X	X
Dog Creek	E	b						
Doyle Creek	E	C						
Dry Creek	E	C						
Dutch Creek	E	b						
Elm Creek	E	C, b						
Elm Slough	E	b						
Emmons Creek	E	b						
French Creek	E	C						
Gilson Creek	E	b						
Halfday Creek	E	C	X	X	X	X	X	X
Hendricks Creek	E	C						
Hise Creek	E	b						
Illinois Creek	E, S	C, b	X	X	X	X	X	X
Indian Creek	E	b	X	X	X	X	X	X
James Creek	E	b						
Jim Creek	E	b						
Johnson Creek	E	b						
Kansas R	S	B	X	X	X	X	X	X
Kuenzli Creek	E	b						
Little Cross Creek	E	b						
Little Muddy Creek	E	C						
Little Soldier Creek	E	C, b	X	X	X	X	X	X
Loire Creek	E	C						
Lost Creek	E	b						
Messhoss Creek	E	C						
Mill Creek	S	C	X	X	X	X	X	X
Mill Creek, E Br	S	C	X	X	X	X	X	X
Mill Creek, S Br	S	b	X	X	X	X	X	X
Mill Creek, W Br	E	C, b	X	X	X	X	X	X

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Natural Resources Conservation Service

Middle Kansas – 10270102

DECEMBER 2006

Stream Name	AL	CR	DS	FP	GR	IW	IR	LW
Mission Creek	E	C, B	X	X	X	X	X	X
Mission Creek, N Br	E	C						
Mission Creek, S Br	E	b	X					
Mud Creek	E	b						
Muddy Creek	E	C		X				
Muddy Creek, W Fk	E	b		X				
Mulberry Creek	E	b						
Nehring Creek	E	C		X				
Paw Paw Creek	E	b						
Pleasant Hill Run	E	C		X				
Pomeroy Creek	E	b						
Post Creek	E	b						
Pretty Creek	E	b						
Riley Creek	E	C						
Rock Creek	E	C		X				
Rock Creek, E Fk	E	b		X				
Ross Creek	E	b						
Salt Creek	E	b						
Sand Creek	E	b						
Shunganunga Creek	E	C, B	X	X	X	X	X	X
Shunganunga Creek, S Br	E	B	X	X	X	X	X	X
Snake Creek	E	b						
Snokomo Creek	E	b						
Soldier Creek	E	C	X	X	X	X	X	X
Spring Creek	E	C, b						
Stinson Creek	E	b	X	X	X	X	X	X
Sullivan Creek	E	C						
Tecumseh Creek	E	b	X	X	X	X	X	X
Turkey Creek	E	C						
Vassar Creek	E	b						
Vermillion Creek	E	C, b	X	X	X	X	X	X
Walnut Creek	E	b		X				
Wells Creek	E	b						
Whetstone Creek	E	b						
Wilson Creek	E	C						

AL = Aquatic Life Support
IW = Industrial Water Supply
FP = Food Procurement
GR = Groundwater Recharge
DS = Domestic Water Supply
LW = Livestock Water Supply
CR = Contact Recreation
IR = Irrigation Water Supply

E = Expected Aquatic Life Use Water
S = Special Aquatic Life Use Water
B = Primary contact recreation stream segment is by law or written permission of the landowner open to and accessible by the public
C = Primary contact recreation stream segment is not open to and accessible by the public under Kansas law
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

According to the Kansas Surface Water Register, the most *common* designated uses for lakes and wetlands in this watershed include expected aquatic life use, primary contact recreation, and food procurement.

Designated Uses - Lakes								
LAKE NAME	AL	CR	DS	FP	GR	IW	IR	LW
Alma City Lake	E	B	X	X		X		X
Cedar Crest Lake	E	B	O	X		O	O	O
Central Park Lake	E	B	O	X		O	O	O
Dornwood Park Lake	E	a	O	O		O	O	O
Gage Park Lake	E	B		X				
Jeffrey Energy Center W.A.	E	B		X		X		
Lake Jivaro	E	A		X				
Lake Shawnee	E	A		X				
Lake Sherwood	E	A		X				
Myer's Lake	E	B	O	X		O	O	O
Pillsbury Crossing W.A.	E	B		X				
Pottawatomie Co. SFL # 1	E	B		X				
Shawnee Co. SFL	E	B		X				
Topeka Public Golf Course Lake	E	B	O	O		O		O
Wabaunsee Co. Lake	E	A	X	X		X		
Wamego City Lake	E	B	O	X		O	O	O
Warren Park Lake	E	a	O	O		O	O	O
Washburn Rural Environmental Lab Lake	E	B		X				

AL = Aquatic Life Support
IW = Industrial Water Supply
FP = Food Procurement
GR = Groundwater Recharge
DS = Domestic Water Supply
LW = Livestock Water Supply
CR = Contact Recreation
R = Irrigation Water Supply

E = Expected Aquatic Life Use Water
A = Primary contact recreation stream segment is a designated public swimming area
B = Primary contact recreation stream segment is by law or written permission of the landowner open to and accessible by the public
a = Secondary contact recreation stream segment is by law or written permission of the landowner open to and accessible by the public
X = Referenced stream segment is assigned the indicated designated use

4.3.4 Total Maximum Daily Loads

Total Maximum Daily Load (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 overall 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 stream miles within HUC 8 10270102 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.

Stream Data	Total Miles – Major (100K Hydro GIS Layer)	1298
	303d/TMDL Listed Streams (DEQ)	1173

2006 Impaired Waters with TMDLs

Stream Segment	Stream/ Watershed/ Lake with TMDL	Priority for TMDL Implementation	Impairments
1,3,4	Kansas River (below Topeka)	Medium	Bacteria, Biological
24,25	Kansas River (Wamego)	Medium	Bacteria
10	Kansas River (at Topeka)	High	Ammonia
39,40	Shunganunga Creek Watershed	High	Bacteria, Dissolved Oxygen
15,16,17,18	Lower Vermillion Creek Watershed	High	Bacteria
10	Kansas River (at Topeka)	Medium	Bacteria
27,28,29	Mill Creek (Maple Hill) Watershed	High	Bacteria
9,9909	Upper Soldier Creek	High	Biology, Sediment
	Gage Park Lake	Low	Eutrophication
	Central Park Lake	Low	Eutrophication
	Warren Park Lake	Low	Eutrophication, Aquatic Plants
	Wamego City Lake	Low	Eutrophication
	Myers Pond	Low	Eutrophication

2006 Impaired Waters needing TMDLs

Impaired Stream/ Lake	Impairment
Kansas River above Topeka	Biological, Zinc
Kansas River at Wamego	Zinc
Halfday Creek	Biological
Mission Creek	Biological
Lower Vermillion Creek	Biological
Muddy Creek	Copper
Mission Creek	Copper
Shawnee Lake	Eutrophication
Lake Wabaunsee	Eutrophication
Pottawatomie County SFL #1	Eutrophication, Dissolved Oxygen

Impairment definitions:

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.

Biological: 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.

Ammonia: Ammonia is a chemical, which is toxic to fish and aquatic organisms. Sources of ammonia are livestock, septic tanks, fertilizer, and municipal and industrial waste. Conditions of high pH and temperature increase the toxicity of ammonia.

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.

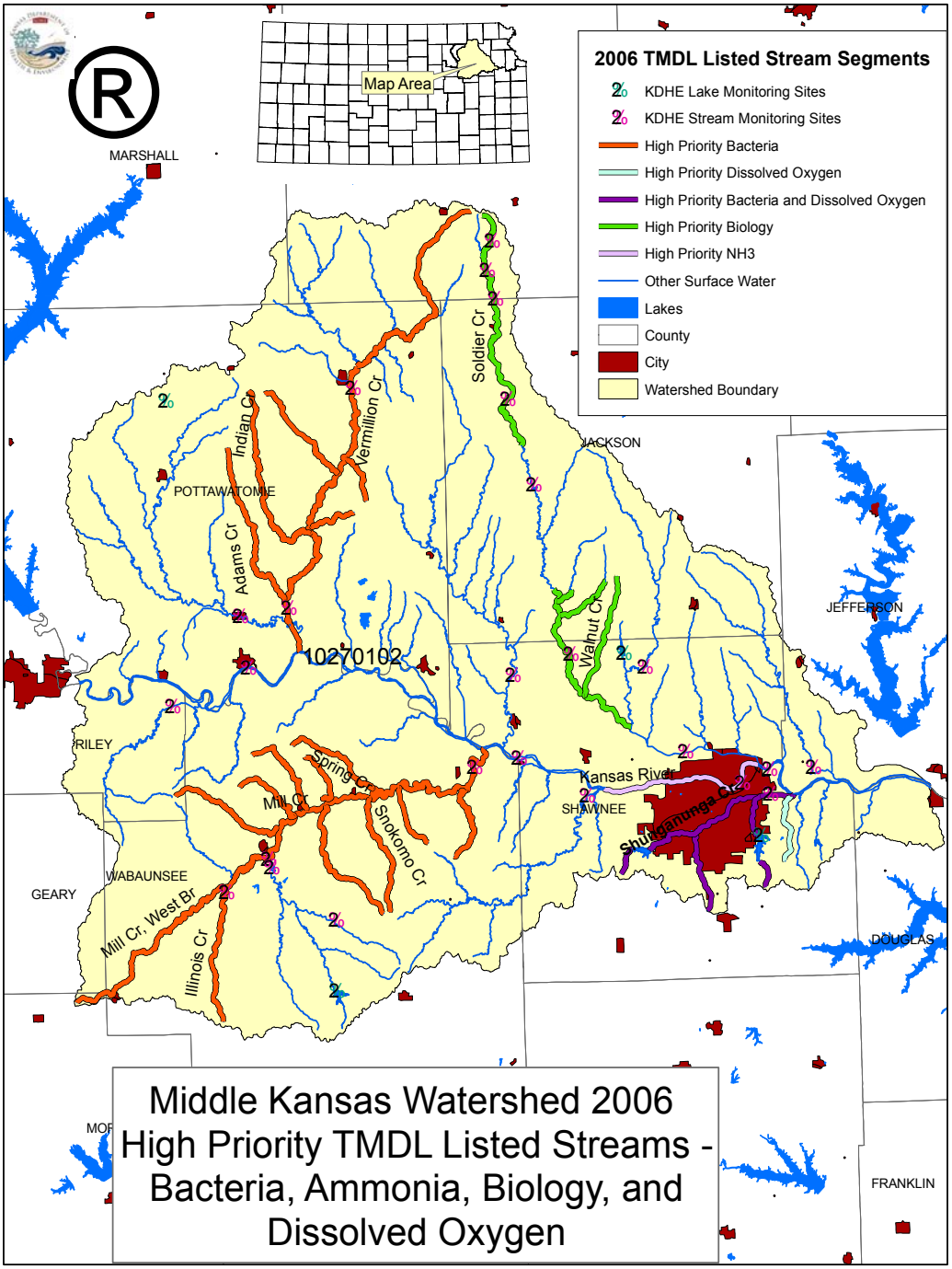
Middle Kansas – 10270102

DECEMBER 2006

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

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

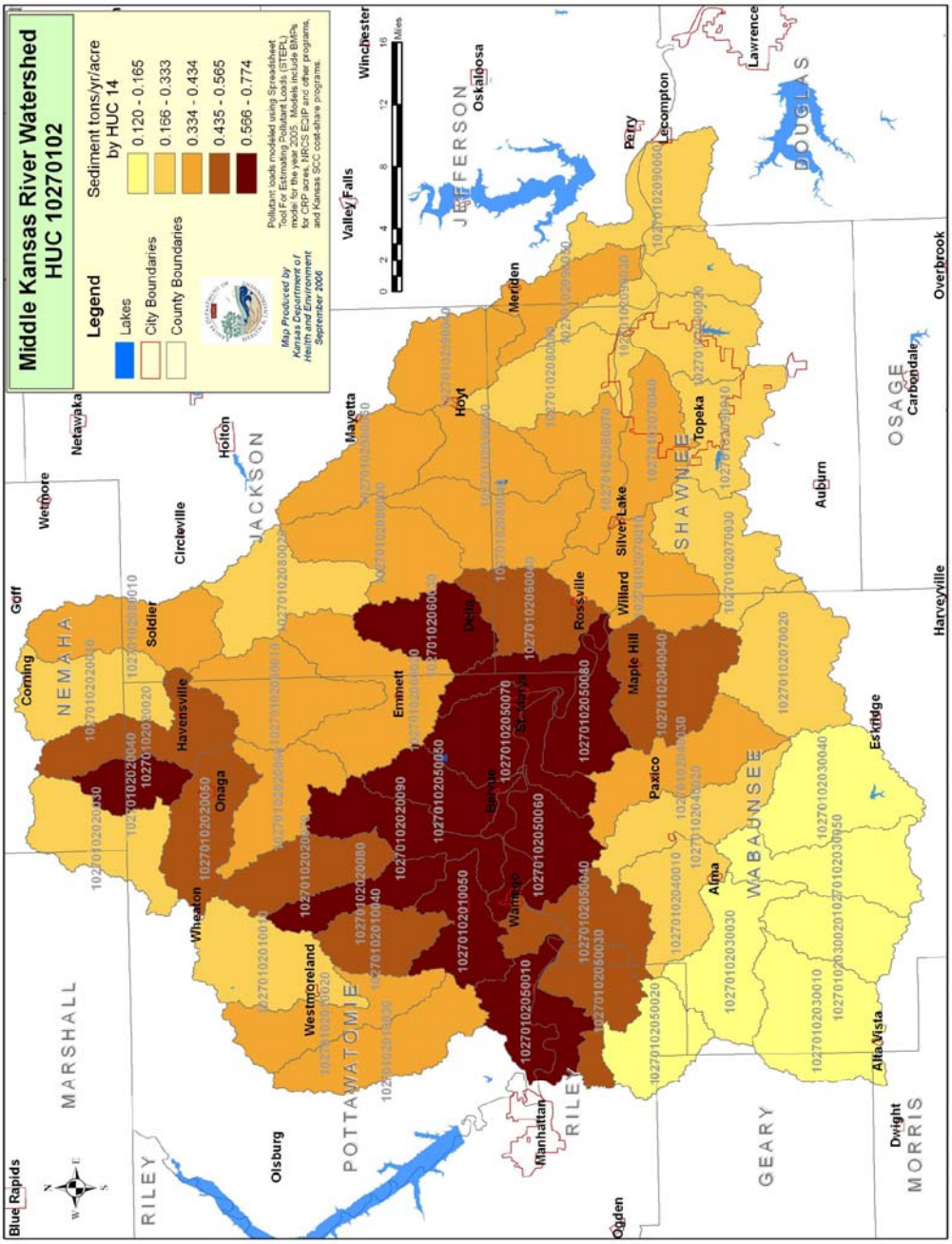
Copper, Zinc: Metals contained in sediments and runoff impairing aquatic life by toxic amounts in soft water.



4.3.5 Modeled Pollutant Loads

The following figures indicate pollutant loads (sediment, biological oxygen demand (BOD), 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



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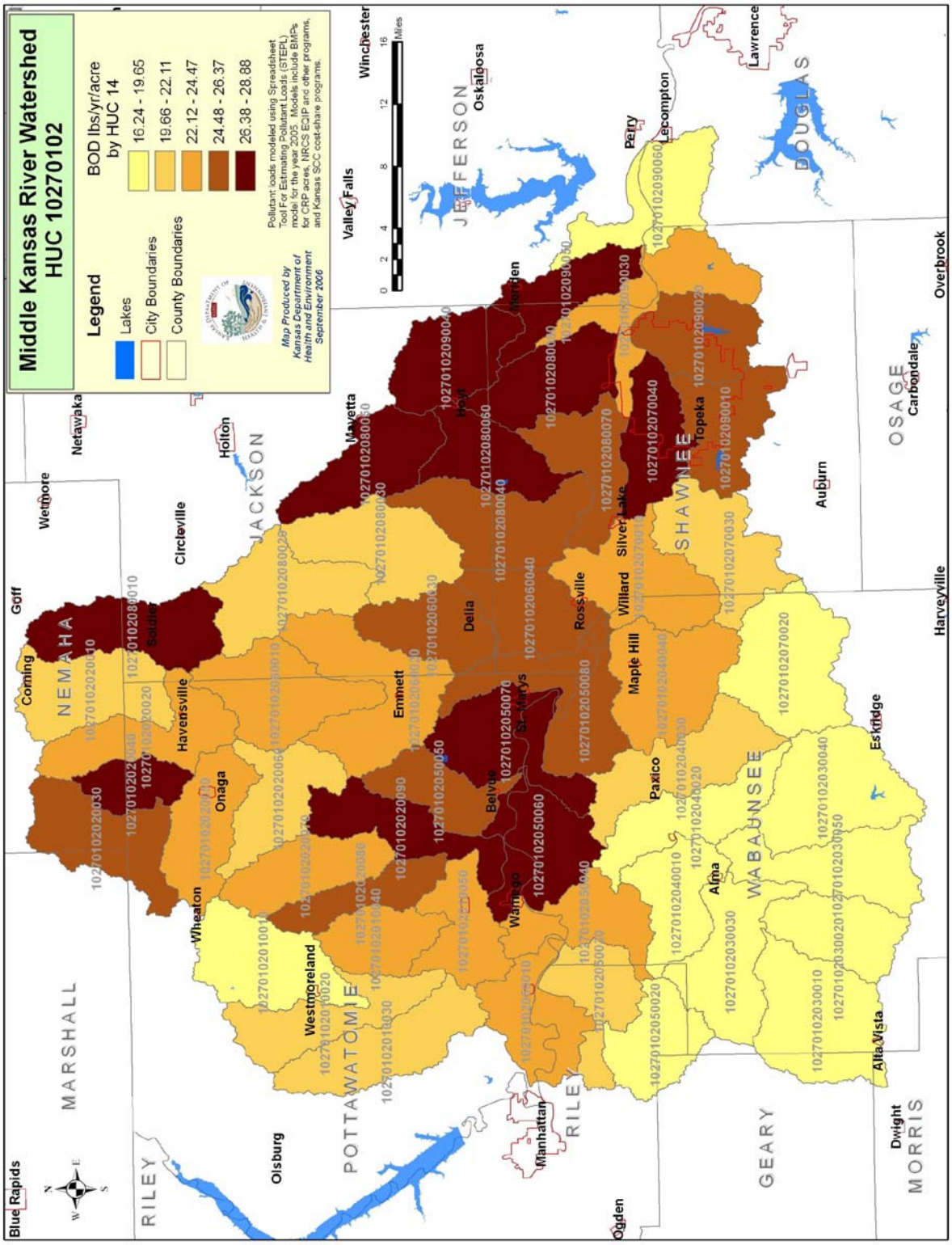
Middle Kansas – 10270102

DECEMBER 2006

Biological Oxygen Demand (BOD)



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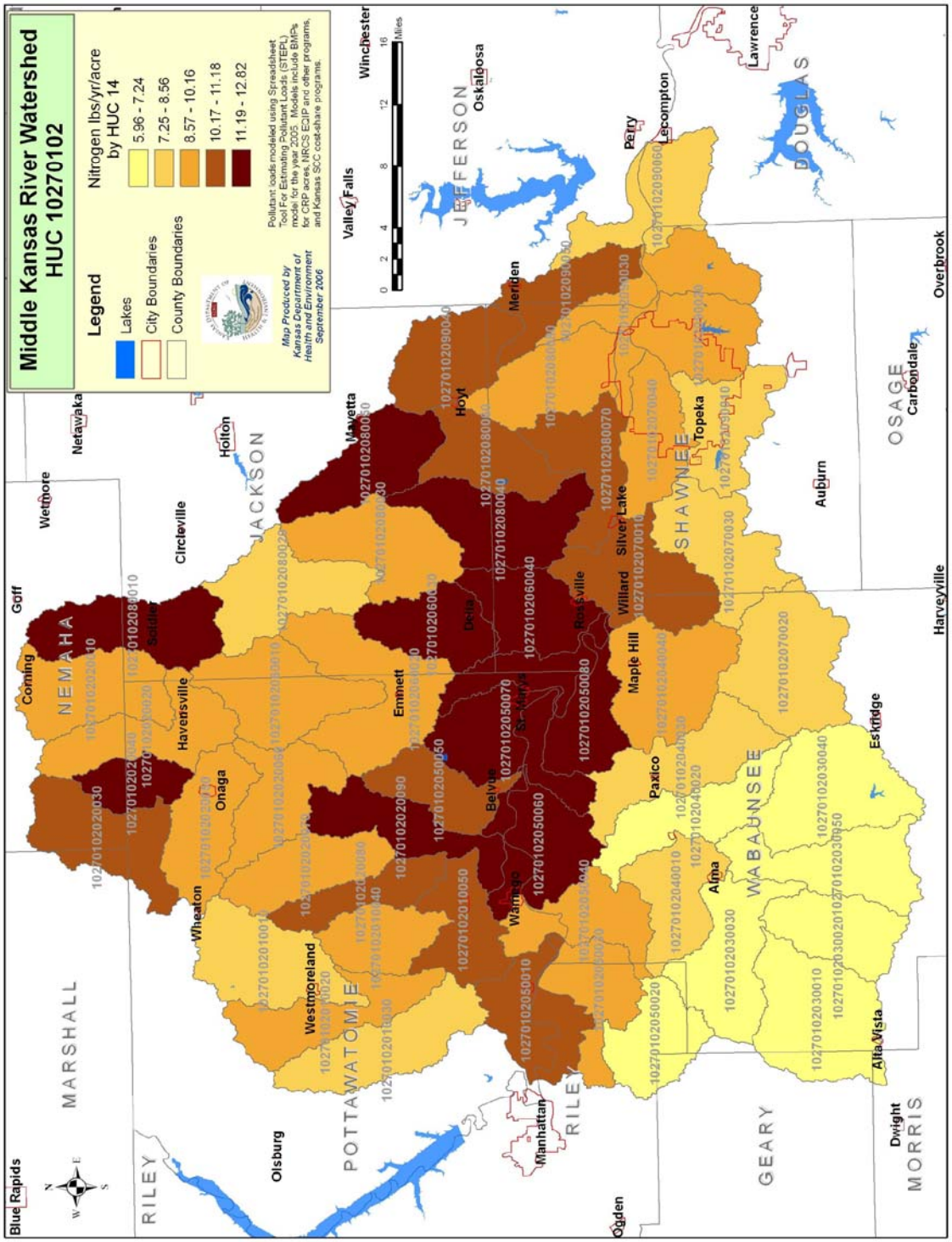
Middle Kansas – 10270102

DECEMBER 2006

Nitrogen



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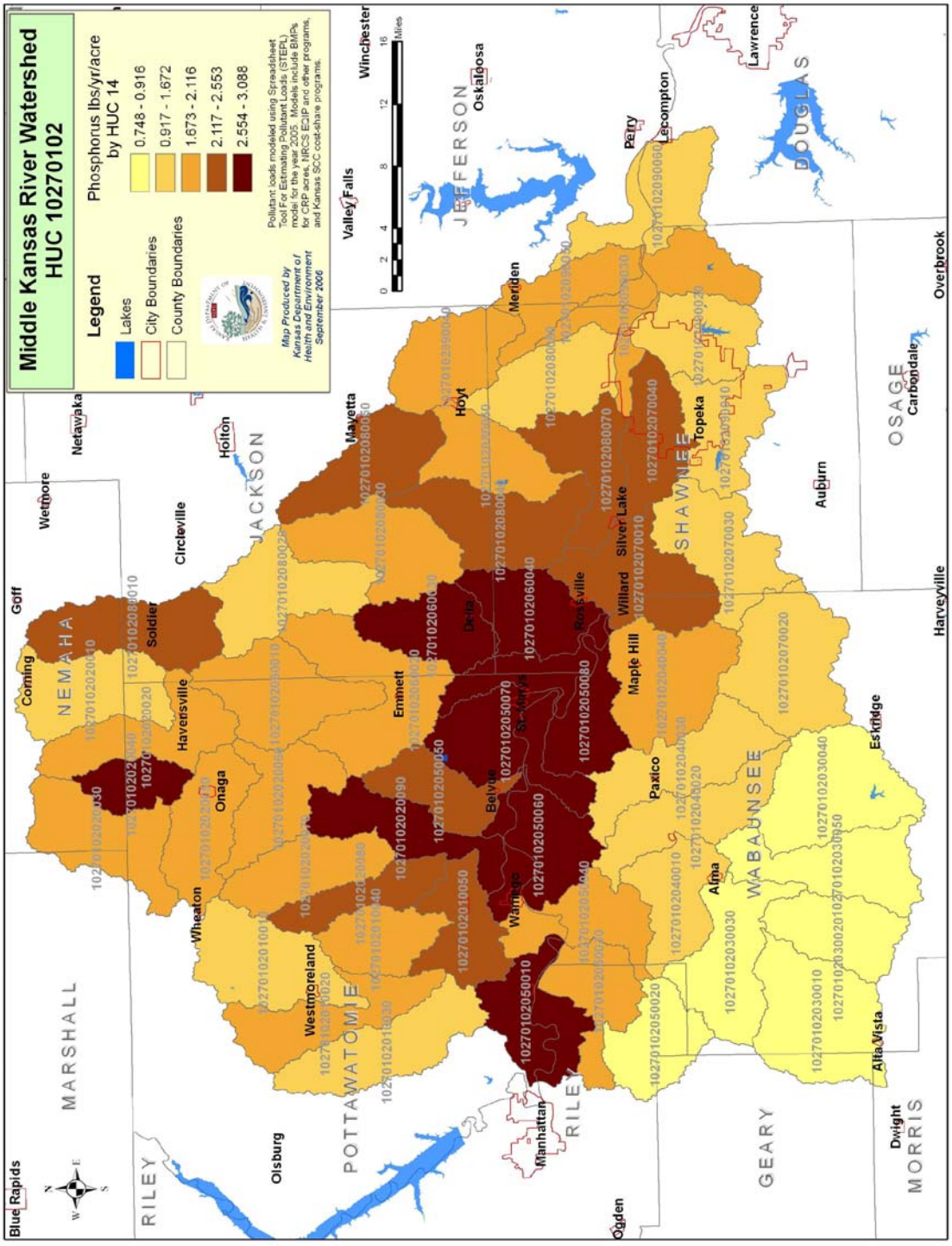
Middle Kansas – 10270102

DECEMBER 2006

Phosphorus

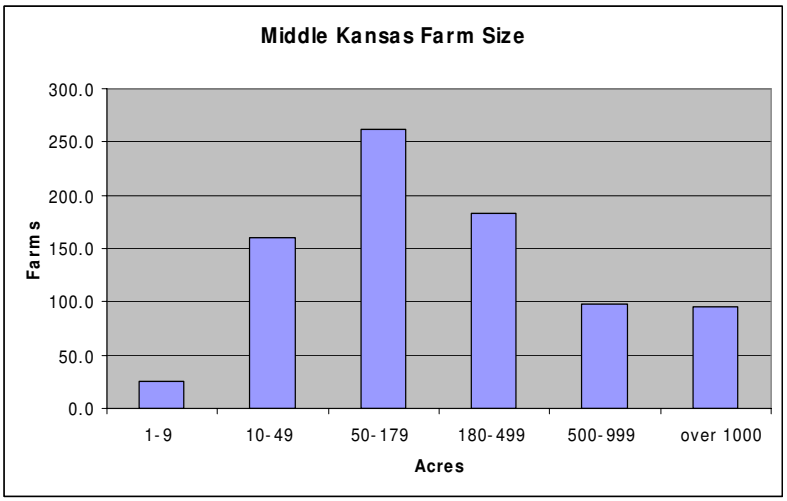


4.4 Threatened and Endangered Species Status[7]

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).

LISTED THREATENED AND ENDANGERED SPECIES			
Species Common Name (Scientific name)	***Threatened (T), Endangered (E), Proposed (P), Candidate (C)***	***Designated Critical Habitat (Y)es/(N)o***	***Listing: Federal (F), State (S)***
Animals, Vertebrates - Fishes			
Chestnut Lamprey *(Ichthyomyzon castaneus)*	T	N	S
Flathead Chub *(Platygobio gracilis)*	T	Y	S
Hornyhead Chub *(Nocomis biguttatus)*	T	N	S
Pallid Sturgeon *(Scaphirhynchus albus)*	E/E	N	F/S
Sicklefin Chub *(Macrhybopsis meeki)*	C/E	N	F/S
Silver Chub *(Macrhybopsis storeriana)*	E	N	S
Sturgeon Chub *(Macrhybopsis gelida)*	C/T	Y	F/S
Topeka Shiner *(Notropis topeka)*	E/T	N	F/S
Western Silvery Minnow *(Hybognathus argyritis)*	T	N	S
Animals, Vertebrate - Birds			
Bald Eagle *(Haliaeetus leucocephalus)*	T/T	Y	F/S
Eskimo Curlew *(Numenius borealis)*	E/E	N	F/S
Least Tern *(Sterna antillarum)*	E/E	Y	F/S
Peregrine Falcon *(Falco peregrinus)*	E	N	S
Piping Plover *(Charadrius melodus)*	T/T	Y	F/S
Snowy Plover *(Charadrius alexandrinus)*	T	N	S
Whooping Crane *(Grus Americana)*	E/E	N	F/S
Animals, Vertebrate - Reptiles			
Redbelly Snake *(Storeria occipitomaculata)*	T	Y	S
Smooth Earth Snake *(Virginia valeriae)*	T	N	S
Animals, Vertebrate – Mammals			
Eastern Spotted Skunk *(Spilogale putorius interrupta)*	T	N	S
Animals, Invertebrate - Insects			
American Burying Beetle *(Nicrophorus americanus)*	E/E	N	F/S

5.0 Census and Social Data (2000)[8]



Number of Farms: ***823***

- Average Farm Size (ac.): ***436***

Number of Operators: ***822***

- Full-Time Operators: ***458***

- Part-Time Operators: ***364***

5.1 Estimated Level of Willingness and Ability to Participate in Conservation[/9]

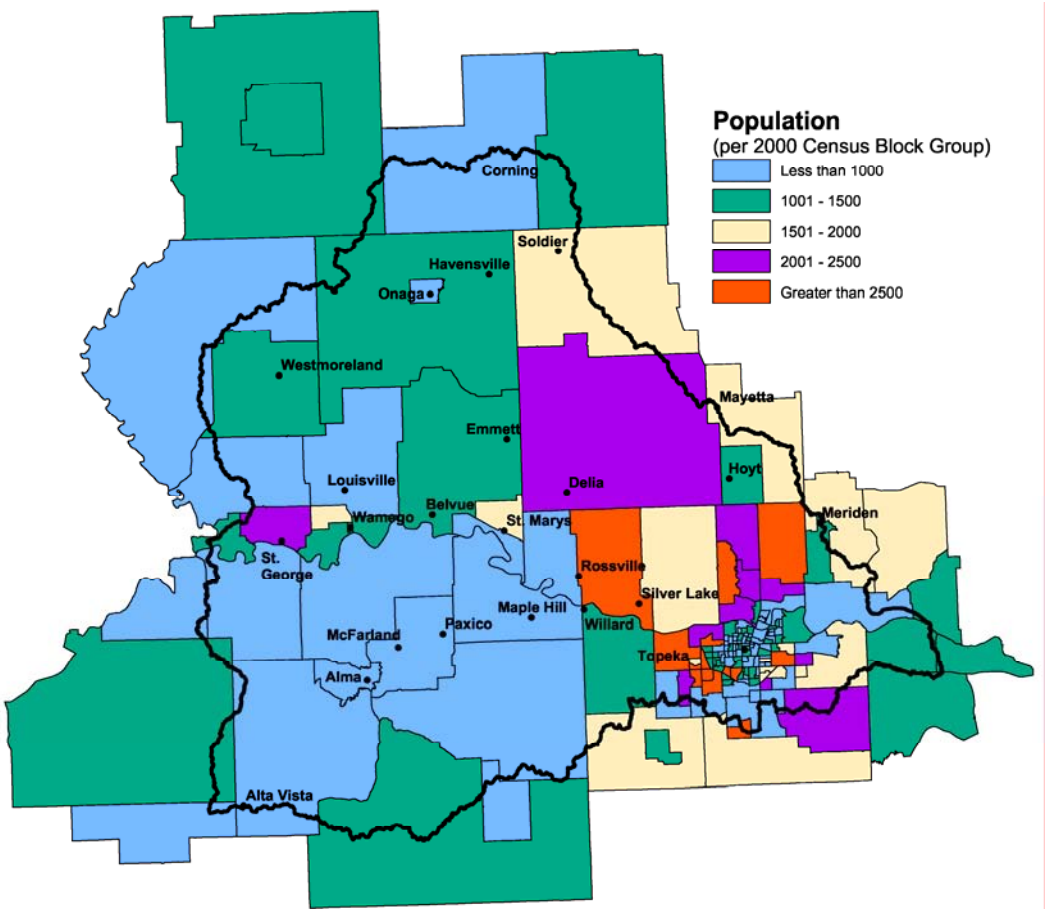
The Middle Kansas Watershed exhibits a good likelihood of full participation in the first five years of practice application, with moderate adjustments in technical and financial assistance and conservation marketing; although management skills and a combination of educational assistance and technical assistance could be increased to improve the participation rate. On average, there are no concerns with the availability of technical assistance in the watershed. The existing information and education delivery system may need minor modifications to improve effectiveness. Existing financial incentives need to be expanded or increased to achieve successful participation rates in a reasonable amount of time.

5.2 Evaluation of Social Capital[/10]

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 Middle Kansas sub-basin are reported to be somewhat effective at solving problems. Some small communities are willing to assist their neighbors by pooling their resources to overcome adversity. Dry climatic conditions over the past decade have affected the community economic capital and led to a decreased state of social well-being, which decreases the community's ability to address local resource concerns.

5.3 Population Distribution Map (2000)



6.0 Conservation Progress

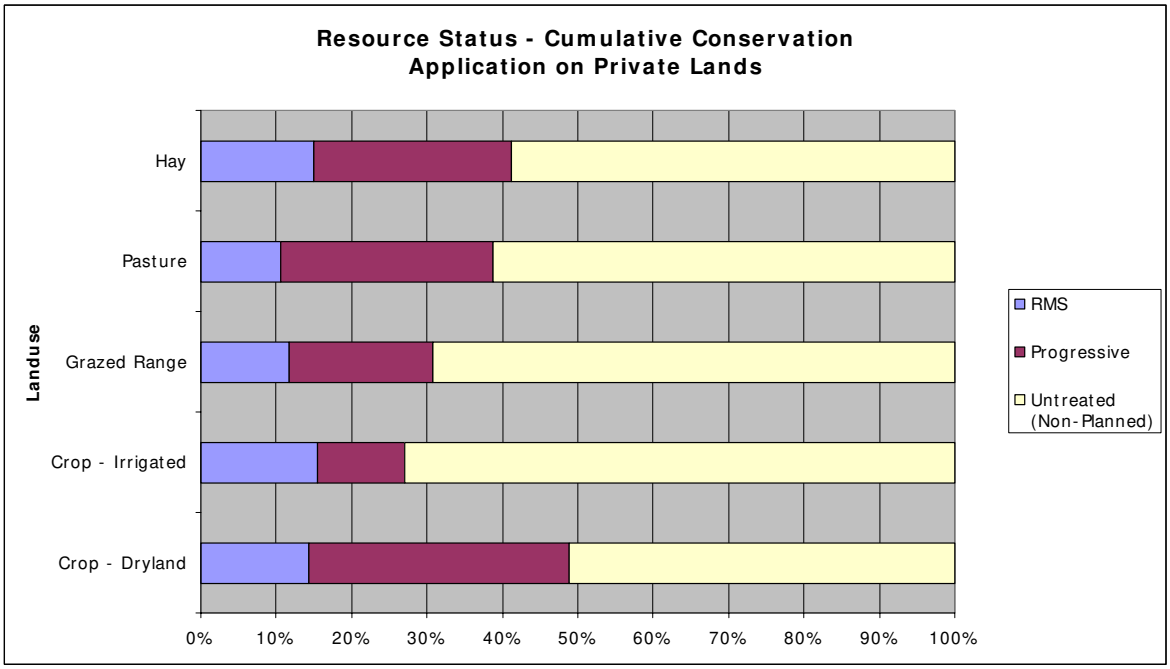
Conservation on the land is defined by the progress made by local landowners and operators addressing resource issues. Progress is typically accomplished through private, local, state, and federal funds. This data is current through the date the RWA was published. For up-to-date NRCS Performance Results 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)	27,595	26,846	N/A	38,332	35,581	32,089	128,354
Total Conservation Systems Applied (ac)	23,961	17,307	N/A	24,289	32,879	24,609	98,436
Conservation Treatment (Units/ Acres)							
Brush Management (ac)			3,217	6,270	7,145	5,544	16,632
Comprehensive Nutrient Management Plan (no)					1	1	1
Conservation Crop Rotation (ac)			1,880	2,626	2,323	2,276	6,829
Contour Buffer Strips (ac)	11		13			12	24
Contour Farming (ac)			1,171	1,515	1,508	1,398	4,194
Cover Crop (ac)			92	89	44	75	225
Critical Area Planting (ac)			314	108	10	144	432
Diversion (ft)			811		3,563	2,187	4,374
Fence (ft)			20,600	28,427	19,719	22,915	68,746
Field Border (ft)	20			1,800	26,214	9,345	28,034
Filter Strip (ac)	356	212	384	74	324	270	1,350
Forage Harvest Management (ac)			1,153	1,061	765	993	2,979
Forest Stand Improvement (ac)	10			16	34	20	60
Grassed Waterway (ac)	31	12	88	5	15	30	151
Irrigation System, Sprinkler (ac)			3	101	59	54	163
Irrigation Water Management (ac)			92	52	431	192	575
Nutrient Management (ac)	2,377	3,230	2,361	4,147	5,525	3,528	17,640
Pasture and Hay Planting (ac)			9	75	49	44	133
Pest Management (ac)	5,817	7,763	10,046	14,419	13,442	10,297	51,487
Pipeline (ft)			1,424	4,384	673	2,160	6,481
Planned Grazing System (ac)			828			828	828
Pond (no)			10	8	17	12	35
Prescribed Burning (ac)			4,082	4,012	3,675	3,923	11,769
Prescribed Grazing (ac)	2,792	7,211	10,097	8,710	14,085	12,671	42,895
Range Planting (ac)			258	337	956	517	1,551
Residue Management, Mulch Till (ac)	272	373	385	499	1,773	660	3,302
Residue Management, No-Till/Strip Till (ac)	536	686	208	2,002	2,125	1,111	5,557
Residue Management, Ridge Till (ac)			461			461	461
Residue Management, Seasonal (ac)			743	500	440	561	1,683
Restoration/Management of Rare/Declining Habitats (ac)			231	133	1,461	608	1,825
Riparian Forest Buffer (ac)	11	3	94			36	108
Sediment Basin (no)					34	34	34
Spring Development (no)			1	1	2	1	4
Streambank and Shoreline Protection (ft)	500			600		550	1,100
Terrace (ft)			96,461	48,920	44,101	63,161	189,482
Underground Outlet (ft)			5,160	5,110	9,387	6,552	19,657
Upland Wildlife Habitat Management (ac)	5,725	3,660	8,717	9,894	12,141	8,027	40,137
Use Exclusion (ac)			1,581	2,379	3,605	2,522	7,565
Waste Storage Facility (no)					2	2	2
Waste Utilization (ac)				57	211	134	268
Water and Sediment Control Basin (no)				2		2	2
Watering Facility (no)			2	8	6	5	16
Wetland Restoration (ac)		61	67			64	128
Wetland Wildlife Habitat Management (ac)	1	61	1			21	63
Windbreak/Shelterbelt Establishment (ft)				940		940	940

6.2 Cumulative Conservation Status

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



- Progress over the last 10 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 the land uses listed remain untreated.

Note: Estimates are based on information received from local conservationists in the watershed.

6.3 Other Watershed Projects

Watershed Projects, Plans, Studies, and Assessments		
NRCS Watershed Projects[11]		***Watershed Plans, Studies, and Assessments***[12]
Name	***Status***	***Name***
Cross Creek Watershed Joint District No. 42	Complete	Mill Creek Watershed Joint District No. 85
		Rock Creek Watershed Joint District No. 45
319 Projects, KDHE TMDL Plans[6], ***Watershed Restoration and Protection Strategy Plans***[13]		
Middle Kansas River Watershed Restoration and Protection Strategy (WRAPS) Development (Kansas Alliance for Wetlands and Streams)		
Kansas River Valley Information and Education (Friends of the Kaw)		
Topeka Water Festival (Kansas Association for Conservation and Environmental Education)		
Lake Shawnee Watershed Protection Project (Shawnee County Conservation District)		
Non-point Source Education for 4th Level "Wild World of Water" School Years 2000 through 2004 (Topeka USD 501 Public Schools)		
Performance Evaluation of Wetlands in Northeast Kansas, Part 3 (Kansas State University)		

6.4 Lands Removed from Production through Farm Bill Programs[/14]

Conservation Reserve Program (CRP)[a]:	**37,910 acres**
Wetlands Restoration Program (WRP):	**186 acres**
Grassland Reserve Program (GRP):	**None**
Farm and Ranch Lands Protection Program (FRPP):	**None**

[a]: Data 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 Areas – 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.

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

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.

Footnotes/ Bibliography Continued

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_Plng.html#Watershed%20Surveys%20and%20Plan.

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/.

7.1 Additional On-line Resources

1. U. S. 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=10270102.

2. U. S. EPA Surf Your Watershed at: http://cfpub.epa.gov/surf/huc.cfm?huc_code=10270102.

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 land uses. 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 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. 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 the Environmental Quality Incentives Program (EQIP), the Wildlife Habitat Incentive 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. 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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Middle Kansas - 10270102
December 2006

1.0 Cropland

1.1 Dryland

1.1.1 Current Conditions	Cultivated / Non-Cultivated*	Dryland	Irrigated	Total	
Total Cropland	380,000	360,000	20,000	380,000	Acres
Cropland Needing Treatment	200,000	188,000	12,000	200,000	Acres
Cropland Currently at RMS Level**	57,000	53,600	3,400	57,000	Acres
Cropland Currently at Progressive Level***	140,600	138,000	2,600	140,600	Acres
Cropland Currently at Untreated Level	182,400	168,400	14,000	182,400	Acres
Typical Cropland-Dryland 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 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, Surface	Human Economics	
BM1		Ac.	168,400			-3	-1	-3	-2	
	Conservation Cropping Rotation	Ac.	168,400							
	Residue Management	Ac.	168,400							
BM2			138,000			0	-1	-2	-1	
	Conservation Cropping Rotation	Ac.	138,000							
	Residue Management	Ac.	138,000							
	Terrace	Ac.	41,400							
RMS		Ac.	53,600			+1	0	0	+1	
	Conservation Cropping Rotation	Ac.	53,600							
	Terrace	Ac.	16,080							
	Conservation Tillage	Ac.	53,600							
	Nutrient Management	Ac.	53,600							
	Pest Management	Ac.	53,600							

Desired/ Estimated Participation Rates

	Proposed Practice Change	Rate	Acres
	Cropland-Dryland Conservation System	58%	109,040
	Cropland-Irrigation Conservation System	58%	6,960
		Total	116,000

Estimates:

16,600 Acres needing terraces
200,000 Acres needing treatment

90,960 Acres are not expected to be treated

Middle Kansas - 10270102
December 2006

1.1.2 Future Conditions		Total	BM1	BM2	RMS1	RMS2	RMS3						
	Crop - Dryland	360,000	78,944	118,416	124,476	4,362	33,802						
Future Conditions for Cropland - Dryland													
Management Systems		Quantity		Costs		Effects				Implementation			
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Soil Erosion	Soil Condition	Water Quality, Surface	Human Economics	EQIP	WHIP	WRP	Other
BM1		Ac.	78,944			-3	-1	-3	-2				
	Conservation Cropping Rotation	Ac.	78,944		$47,366								
	Residue Management	Ac.	78,944		$1,737								
BM2		Ac.	118,416			0	-1	-2	-1				
	Conservation Cropping Rotation	Ac.	118,416		$71,050								
	Residue Management	Ac.	118,416		$2,605								
	Terrace	Ac.	35,525		$4,220,346								
RMS1		Ac.	70,876			+1	+1	+1	+1				
	Conservation Cropping Rotation	Ac.	70,876	$425,256	$42,526					X			
	Grassed Waterway	Ac.	1,885	$1,885,000	$56,550					X			X
	Terrace	LF	4,976,400	$4,478,760	$111,969					X			X
	Conservation Tillage	Ac.	70,876	$637,884	$63,788					X			
	Terrace Restoration	LF	14,326,000	$12,893,400	$322,335					X			
	Filter Strip	Ac.	3,544	$212,628	$1,063					X			X
	Nutrient Management	Ac.	70,876	$567,008	$56,701					X			
	Pest Management	Ac.	70,876	$425,256	$42,526					X			
RMS2		Ac.	4,362			+4	+4	+4	+3				
	Conservation Cover	Ac.	4,362	$65,424,000	$654,240					X	X		X
	Native Grass Seeding	Ac.	4,362	$218,080	$1,090					X	X		X
RMS3		Ac.	87,402			+3	+2	+2	+2				
	Conservation Cropping Rotation	Ac.	87,402	$524,414	$52,441					X			
	Residue Management	Ac.	87,402	$96,143	$1,923					X			
	Nutrient Management	Ac.	87,402	$699,219	$69,922					X			
	Pest Management	Ac.	87,402	$524,414	$52,441					X			
	Terrace Restoration	Ft.	6,832,400	$6,149,160	$153,729					X			
	Filter Strip	Ac.	4,370	$262,207	$1,311					X			X
	Terrace	Ft.	2,373,360	$2,136,024	$53,401					X			X
	Grassed Waterway	Ac.	899	$899,000	$26,970					X			X
	Total RMS Costs			**$97,558,854**	**$6,081,060**								

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)		$955,439
Operator Investment (25% Cost Share)	$24,389,713	
Federal Costs (75% Cost Share)	$73,169,140	
Total RMS Costs	**$97,558,854**	**$6,081,060**
Estimated Level of Participation	58%	
Total acres projected to be in RMS System	162,640	
Total Annual Crop Production Benefit	$1,036,399	
Beneficial Effects of Proposed RMS System		
Decreases Soil Erosion		
Improves soil condition		
Reduces Transport of Pollutants and Sediment		
Potentially improves economic gains		

Middle Kansas - 10270102
December 2006

1.0 Cropland

1.2 Irrigated

1.2.1 Current Conditions	Cultivated / Non-Cultivated*	Dryland	Irrigated	Total	
Total Cropland	380,000	360,000	20,000	380,000	Acres
Cropland Needing Treatment	200,000	188,000	12,000	200,000	Acres
Cropland Currently at RMS Level**	57,000	53,600	3,400	57,000	Acres
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Cropland Currently at Untreated Level	182,400	168,400	14,000	182,400	Acres
Typical Cropland-Dryland 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 Cropland - Irrigated

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, Surface	Human Economics	
BM1		Ac.	14,000			-3	-1	-3	-2	
	Conservation Cropping Rotation	Ac.	14,000							
	Conventional Tillage	Ac.	14,000							
BM2			2,600			0	-1	0	-1	
	Conservation Cropping Rotation	Ac.	2,600							
	Residue Management	Ac.	2,600							
	Irrigation Water Management	Ac.	2,600							
RMS1		Ac.	3,400			+2	0	+1	+1	
	Conservation Cropping Rotation	Ac.	3,400							
	Conservation Tillage	Ac.	3,400							
	Nutrient Management	Ac.	3,400							
	Pest Management	Ac.	3,400							
	Irrigation Water Management	Ac.	3,400							

Desired/ Estimated Participation Rates

	Proposed Practice Change	Rate	Acres	Estimates:
	Cropland-Dryland Conservation System	58%	109,040	12,000 Acres needing treatment
	Cropland-Irrigation Conservation System	58%	6,960	
		Total	116,000	5,040 Acres are not expected to be treated

1.2.2 Future Conditions		Total	BM1	BM2	RMS1		RMS3	RMS4
	Crop - Irrigated	20,000	5,216	7,824	4,872		1,949	139

Future Conditions for Cropland - Irrigated

Management Systems		Quantity		Costs		Effects				Implementation			
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Soil Erosion	Soil Condition	Water Quality, Surface	Human Economics	EQIP	WHIP	WRP	Other
BM1		Ac.	5,216			-3	-1	-3	-2				
	Conservation Cropping Rotation	Ac.	5,216		$3,130								
	Residue Management	Ac.	5,216		$115								
BM2		Ac.	7,824			0	-1	0	-1				
	Conservation Cropping Rotation	Ac.	7,824		$4,694								
	Residue Management	Ac.	7,824		$172								
	Irrigation Water Management	Ac.	7,824		$8,606								
RMS1		Ac.	8,272			+2	0	+1	+1				
	Conservation Cropping Rotation	Ac.	8,272	$49,632	$4,963					X			
	Residue Management	Ac.	8,272	$9,099	$182					X			
	Nutrient Management	Ac.	8,272	$66,176	$6,618					X			
	Pest Management	Ac.	8,272	$49,632	$4,963					X			
	Irrigation Water Management	Ac.	8,272	$90,992	$9,099					X			
RMS3		Ac.	1,949			+3	+2	+2	+2				
(convert to dryland)	Conservation Cropping Rotation	Ac.	1,949	$11,693	$1,169					X			
	Conservation Tillage	Ac.	1,949	$17,539	$1,754					X			
	Nutrient Management	Ac.	1,949	$15,590	$1,559					X			
	Pest Management	Ac.	1,949	$11,693	$1,169					X			
RMS4		Ac.	139			+2	+1	+1	+1				
(convert to low pressure)	Conservation Cropping Rotation	Ac.	139	$835	$84					X			
	Conservation Tillage	Ac.	139	$1,253	$125					X			
	Irrigation Water Management	Ft.	139	$1,531	$153					X			
	Irrigation System, Sprinkler (conversion)	Ft.	139	$7,934,400	$39,672					X			X
	Total RMS Costs			**$8,260,066**	**$88,228**								

1.2.3 Potential RMS Effects Summary for Cropland - Irrigated

Cost Items and Programs	Costs	O&M Costs
Potential Farm Bill Programs		
Annual Management Incentives (3 yrs - Incentive Payments)		$31,839
Operator Investment (25% Cost Share)	$2,065,016	
Federal Costs (75% Cost Share)	$6,195,049	
Total RMS Costs	**$8,260,066**	**$88,228**
Estimated Level of Participation	58%	
Total acres projected to be in RMS System	6,960	
Total Annual Crop Production Benefit	$83,483	

Beneficial Effects of Proposed RMS System

Improves soil condition
Increases soil organic matter
Improves water quality by reducing erosion and sediment delivery to streams
Decreases aquifer overdraft

Middle Kansas - 10270102
December 2006

2.0 Grazed Range

2.1 Native Grassland

2.1.1 Current Conditions	Grazed	Ungrazed	Total	
Total Grazed Range	540,000	0	540,000	Acres
Grazed Range Needing Treatment	400,000	0	400,000	
Total Range with Brush Invasion	260,000	0	260,000	Acres
Typical Range Management Unit	160			

** 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.	400,000			-3	-3	-1	-2	
	Pond	No.	625							
	Watering Facility	No.	2,500							
	Fence	Mi.	5,000							
BM2		Ac.	140,000			+1	+1	+1	+1	
	Prescribed Grazing	Ac.	140,000							
	Pond	No.	219							
	Watering Facility	No.	875							
	Pipeline	Ft.	175,000							
	Fence	Mi.	1,750							

Desired/ Estimated Participation Rates

	Proposed Practice Change	Rate	Acres
	Grazing System	58%	232,000
	Brush Management	58%	150,800
	Prescribed Burning	58%	232,000

2.1.2 Future Conditions	Total	BM1	BM2	RMS
Grazed Range	540,000	168,000	140,000	232,000

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	EQIP	WHIP	WRP	Other
BM1		Ac.	168,000			-3	-3	-1	-2				
	Pond	No.	263		$31,500								
	Watering Facility	No.	1,050		$48,300								
	Fence	Mi.	2,100		$443,520								
BM2		Ac.	140,000			+1	+1	+1	+1				
	Prescribed Grazing	Ac.	140,000		$138,600								
	Pond	No.	219		$26,250								
	Watering Facility	No.	875		$40,250								
	Pipeline	Ft.	2,275,000		$40,950								
	Fence	Mi.	1,750		$369,600								
RMS		Ac.	232,000			+3	+3	+3	+2				
	Prescribed Grazing	Ac.	232,000	$696,000	$229,680					X			
	Fence	LF	1,740,000	$3,480,000	$69,600					X			X
	Brush Management	Ac.	150,800	$7,540,000	$226,200					X	X		
	Prescribed Burning	Ac.	232,000	$464,000	$464					X	X		
	Pond	No.	348	$4,176,000	$41,760					X	X		X
	Watering Facility	No.	377	$867,100	$17,342					X			X
	Pipeline	Ft.	52,780	$95,004	$950					X			X
	Spring Development	No.	261	$652,500	$13,050					X			X
	Pest Management	Ac.	92,800	$556,800	$55,680					X	X		X
	Streambank & Shoreline Protection	Ft.	533,600	$32,016,000	$640,320					X			X
	Total RMS Costs			**$50,543,404**	**$2,434,016**								

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)		$285,824
Operator Investment (25% Cost Share)	$12,635,851	
Federal Costs (75% Cost Share)	$37,907,553	
Total RMS Costs	**$50,543,404**	**$2,434,016**
Estimated Level of Participation	58%	
Total acres projected to be in RMS System	232,000	
Total Annual Grazing Production Benefits	$529,774	

Beneficial Effects of Proposed RMS System

- Reduces Soil Erosion
- Improves plant condition, health and vigor
- Increases Available Stockwater Supply
- Potentially improves economic gains

3.0 Pasture/ Hay Land

3.1 Non-irrigated Pasture/ Hay Land

3.1.1 Current Conditions	Grazed	Ungrazed	Total	
Total Pasture/Hay Land	120,000	0	120,000	Acres
Pasture/Hay Land Needing Treatment	36,000	0	36,000	Acres
Typical Pasture/Hay Land Management Unit	80			

** 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 Non-irrigated Pasture/ Hay Land

Pasture		Quantity		Costs		Effects	
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Plant Condition	
BM1		Ac.	36,000			-3	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).
	Pond	No.	225				
	Watering Facility	No.	225				
	Pipeline	Ft.	45,000				
	Fence	Mi.	675				
BM2		Ac.	84,000			+1	
	Prescribed Grazing	Ac.	84,000				
	Pond	No.	131				
	Watering Facility	No.	919				
	Pipeline	Ft.	183,750				
	Fence	Mi.	1,575				

Desired/ Estimated Participation Rates

	Proposed Practice Change	Rate	Acres
	Pasture/Hay Land System	58%	20,880

3.1.2 Future Conditions	Total	BM1	BM2	RMS
Pasture/Hay Land	120,000	15,120	84,000	20,880

Future Conditions for Non-irrigated Pasture/ Hay Land

Pasture/Hay Land		Quantity		Costs		Effects	Implementation			
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Plant Condition	EQIP	WHIP	WRP	Other
BM1		Ac.	15,120			-3				
	Pond	No.	24		$2,835					
	Water Facility	No.	71		$8,505					
	Fence	Mi.	189		$39,917					
BM2		Ac.	84,000			+1				
	Prescribed Grazing	Ac.	84,000		$83,160					
	Pond	No.	131		$15,750					
	Water Facility	No.	394		$47,250					
	Pipeline	Ft.	1,023,750		$18,428					
	Fence	Mi.	1,050		$221,760					
RMS		Ac.	20,880			+3				
	Prescribed Grazing	Ac.	20,880	$62,640	$20,671		X			
	Nutrient Management	Ac.	20,880	$167,040	$16,704		X			
	Pest Management	Ac.	20,880	$125,280	$12,528		X			
	Water Facility	No.	261	$1,566,000	$31,320		X			X
	Pipeline	Ft.	287,100	$516,780	$5,168		X			X
	Total RMS Costs			**$2,437,740**	**$523,995**					

3.1.3 Potential RMS Effects Summary for Non-irrigated Pasture/ Hay Land

Cost Items and Programs	Costs	O&M Costs
Potential Farm Bill Programs		
Annual Management Incentives (3 yrs - Incentive Payments)		$49,903
Operator Investment (25% Cost Share)	$609,435	
Federal Costs (75% Cost Share)	$1,828,305	
Total RMS Costs	**$2,437,740**	**$523,995**
Estimated Level of Participation	58%	
Total acres projected to be in RMS System	20,880	
Total Annual Forage Production Benefits	$29,617	

Beneficial Effects of Proposed RMS System

Improves plant condition, health and vigor

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Middle Kansas - 10270102
December 2006

4.0 Animal Feeding Operations (AFO)

4.1 AFO - Private

4.1.1 Current Conditions	Permitted CAFOs	Confined Livestock Facilities	Concentrated Non-confined Livestock Operations	Total	
Estimated AFO (no.)	83	640	1,355	2,078	No.
AFO Needing Treatment	0	640	1,355	1,995	No.

** 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, untreated units and progressive systems will be treated to RMS level at the expected adoption rate.

Current Conditions for AFO - Private

Management Systems		Quantity		Costs		Effects	Note:
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Water Quality, Surface	
BM1		No.	1,995			-4	Effects are described as a numerical value placed on benchmark conditions and degree of change from benchmark conditions by various conservation systems. Scale ranges from -5 (most damaging to resources) to +5 (least damaging, best protection offered by treatment).
	No Treatment	No.	1,995				
RMS		No.	83			+3	
	Waste Storage Facility	No.	42				
	Pond Sealing or Lining	No.	42				
	Manure Transfer	No.	83				
	Composting Facility	No.	25				
	Animal Mortality Facility	No.	25				
	Waste Treatment Lagoon	No.	66				
	Solid/Liquid Waste Separation Facility	No.	25				
	Critical Area Seeding	Ac.	415				
	Fence	LF	83,000				

Desired/ Estimated Participation Rates

	Proposed Practice Change	Rate	Acres
	Conservation System AFO - Private	58%	1,157
		Total	1,157

4.1.2 Future Conditions	Total	BM1	RMS
Conservation Systems AFO - Private (No.)	2,078	838	1,240

Future Conditions for AFO - Private

Management Systems		Quantity		Costs		Effects	Implementation			
	Practices	Unit	Quantity	Investment Cost	Annual O&M Cost	Water Quality, Surface	EQIP	WHIP	WRP	Other
BM1		No.	838			-4				
	No Treatment	No.	838							
RMS		No.	1,240			+3				
	Waste Storage Facility	No.	372	$18,601,500	$186,015		X			X
	Pond Sealing or Lining	No.	372	$4,241,142	$21,206		X			X
	Manure Transfer	No.	372	$2,529,804	$25,298		X			
	Composting Facility	No.	372	$5,580,450	$55,805		X			X
	Animal Mortality Facility	No.	372	$3,348	$67		X			X
	Waste Treatment Lagoon	No.	372	$6,324,510	$63,245		X			X
	Solid/Liquid Waste Separation Facility	No.	372	$22,322	$446		X			X
	Critical Area Seeding	Ac.	6,201	$682,055	$6,821		X			X
	Fence	LF	1,240,100	$2,480,200	$49,604		X			X
	Total RMS Costs			**$40,465,331**	**$408,506**					

4.1.3 Potential RMS Effects Summary for AFO - Private

Cost Items and Programs	Costs	O&M Costs
Potential Farm Bill Programs		
Annual Management Incentives (3 yrs - Incentive Payments)		$25,298
Operator Investment (25% Cost Share)	$10,116,333	
Federal Costs (75% Cost Share)	$30,348,998	
Total RMS Costs	**$40,465,331**	**$408,506**
Estimated Level of Participation	58%	
Total Annual Animal Feeding Operation Benefit	$408,738	

Beneficial Effects of Proposed RMS System

Reduces Excessive Organics and Nutrients from Entering Stream Systems and Degrading Water Quality