Prairie Dog Creek/Keith Sebelius Lake Watershed Plan

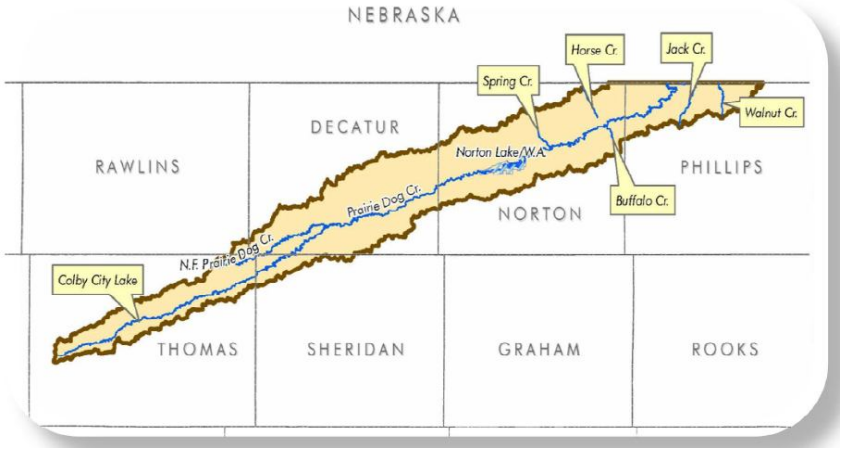
Watershed Restoration and Protection Strategy

Water Quality Impairments Directly Addressed:

- Upper Prairie Dog Creek/Norton Lake Total Phosphorus/Eutrophication TMDL (High Priority)
- Lower Prairie Dog Creek Total Phosphorus 303d List

Water Quality Impairments Positively Impacted:

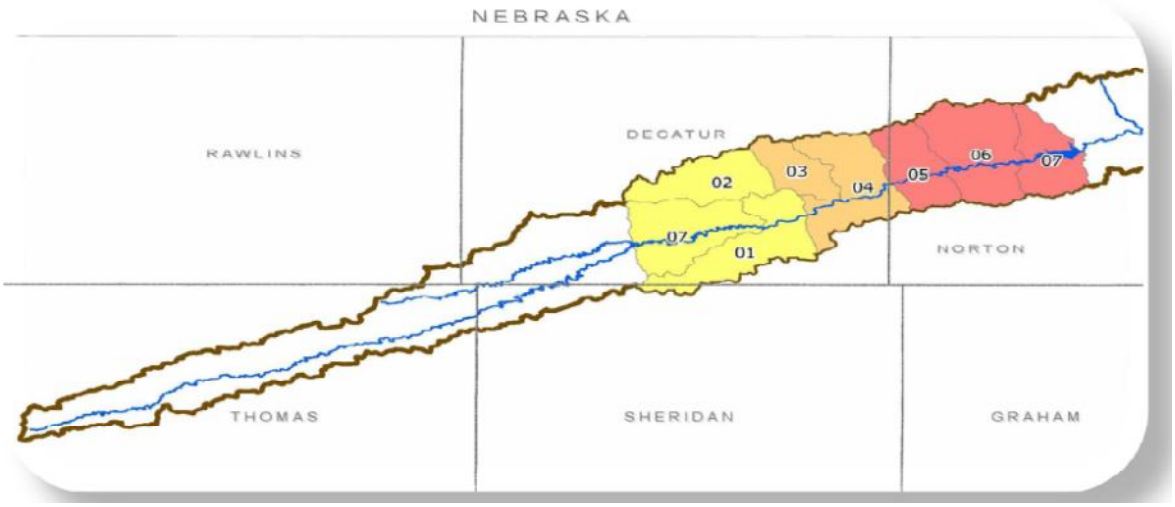
- Norton Lake Low Dissolved Oxygen and pH TMDLs (Low Priority)
- Lower Prairie Dog Creek Low Dissolved Oxygen TMDL (High Priority)
- Upper Prairie Dog Creek Low Dissolved Oxygen 303d List



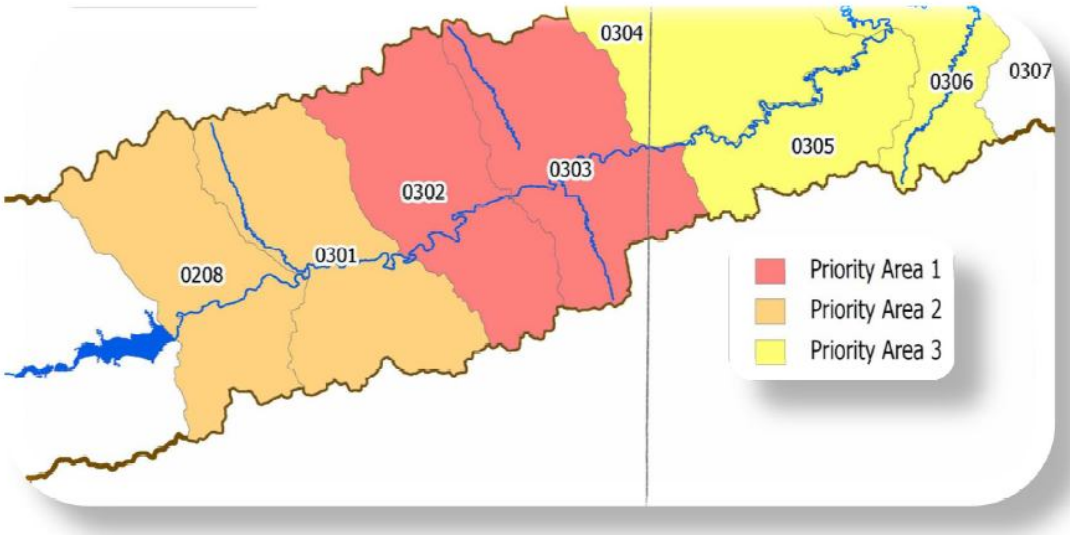
Determination of Priority Areas

- Presence of High Priority TMDLs within HUC 12 considered
- Interpretation of available information for High Priority TMDL watersheds such as STEPL maps as well as other assessments of HUC 8 watersheds within the project area such as the KAWS and KWO assessments as well as information developed by KDHE in support of TMDL development within the Missouri River Basin.
- Opinion of the leadership team members, which include local County Conservation District and NRCS staff, of areas that have potential for greatest pollutant load reductions if best management practices are applied
- A subjective opinion of which areas are most likely to have landowners and producers who are cooperative and receptive to best management practices and learning programs by the SLT

Upper Prairie Dog Creek/Norton Lake Priority Areas for BMP Implementation



Lower Prairie Dog Creek Priority Areas for BMP Implementation



Best Management Practice and Load Reduction Goals

Upper Prairie Dog Creek/Norton Lake Phosphorus Load Reduction Goal = 11,195 lbs/yr

Lower Prairie Dog Creek Total Phosphorus Load Reduction Goal = 15,846 lbs/yr

BMPs to be implemented in association with Watershed Plan:

- Agricultural BMPs
  - Grassland Management
  - Terraces
  - Terrace Rebuilds
  - Nutrient Management
  - Buffer/Filter Strips
  - Field Borders
  - Relocation of Feeding Sites
- Other BMPs
  - Septic System Upgrade
  - Abandoned Well Plugging

Load Reduction Goals for Watershed Plan Met within 18 Years if BMPs are Implemented as Scheduled

Total BMP implementation schedule to address identified conservation needs within watershed covers 43 years

Prairie Dog Creek/Keith Sebelius Lake Watershed Plan

EPA's Nine Required Elements for Watershed Plans to Repair Impaired Water Bodies

Watershed Restoration And Protection Strategy

Funding for the development of this plan was provided through an EPA 319 grant from the Kansas Department of Health and Environment.

Prairie Dog Creek WRAPS

Leadership Team (LT)

Keith VanSkike
Lee Juenemann
Dallas McMullen
Bart Brooks
Cheryl Smith
Toby Kuhn
Twila Dizmang
Lari Ann Nickell
George Carter

John C. Fremont the first European descendant documented to step foot in what is now Norton in May of 1843, he named our river the “Prairie Dog” on one of his famous expeditions with companion Kit Carson.

Project Staff

Twila Dizmang, Norton County Conservation District, Project Administrator
Lari Ann Nickell, Norton County Conservation District, Project Coordinator

KDHE Project Officer

Matt Unruh, KDHE Watershed Management Section

Program Support

Norton County Conservation District (NCCD)
Phillips County Conservation District (PCCD)
Decatur County Conservation District (DCCD)
Thomas County Conservation District (TCCD)
Rawlins County Conservation District (RCCD)
Norton County Commissioners
City of Norton
Kansas Alliance for Wetlands and Streams (KAWS)
Upper Republican Basin Advisory Committee (URBAC)
Kansas Water Office (KWO)
Natural Recourses Conservation Service (NRCS)
Farm Service Agency (FSA)
K-State Research and Extension (Twin Creeks Extension District #9)
Kansas Department of Wildlife, Parks and Tourism (KDWP&T)

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1.0 Goal Statement

The goal of the Prairie Dog Creek WRAPS Watershed Plan is to protect and restore waters to meet water quality standards within the Kansas portion of the Prairie Dog Creek Watershed (HUC 10250015). The Prairie Dog Creek Leadership Team (LT) will concentrate on addressing phosphorus loading which is contributing to Total Maximum Daily Load (TMDL) impairments in areas that include Upper Prairie Dog Creek/Keith Sebelius Lake (Norton Lake), the Lower Prairie Dog Creek and tributaries. The Prairie Dog Creek Watershed has been awarded an EPA 319 Grant. EPA 319 funds will be used to move forward with the goals of the Prairie Dog Creek WRAPS project and to implement this watershed plan. The goals for this watershed are:

- Improve educational efforts through programs and field demonstrations about conservation practices.
- Promote incentives to encourage and support landowner adoption of BMPs (Best Management Practices), including cost share assistance for installing a variety of conservation practices.
- Prioritize and implement BMPs for agriculture in priority sub-watersheds or tributaries.
- Conduct water quality assessments and document reductions in nutrients, sediment and bacteria due to the installation of BMPs.
- Protect and restore water quality throughout the watershed.
- Protect the water storage capacity and recreational use of Keith Sebelius Lake.
- Enhance wildlife in the watershed.
- Help to secure the productivity of agriculture lands in the watershed.

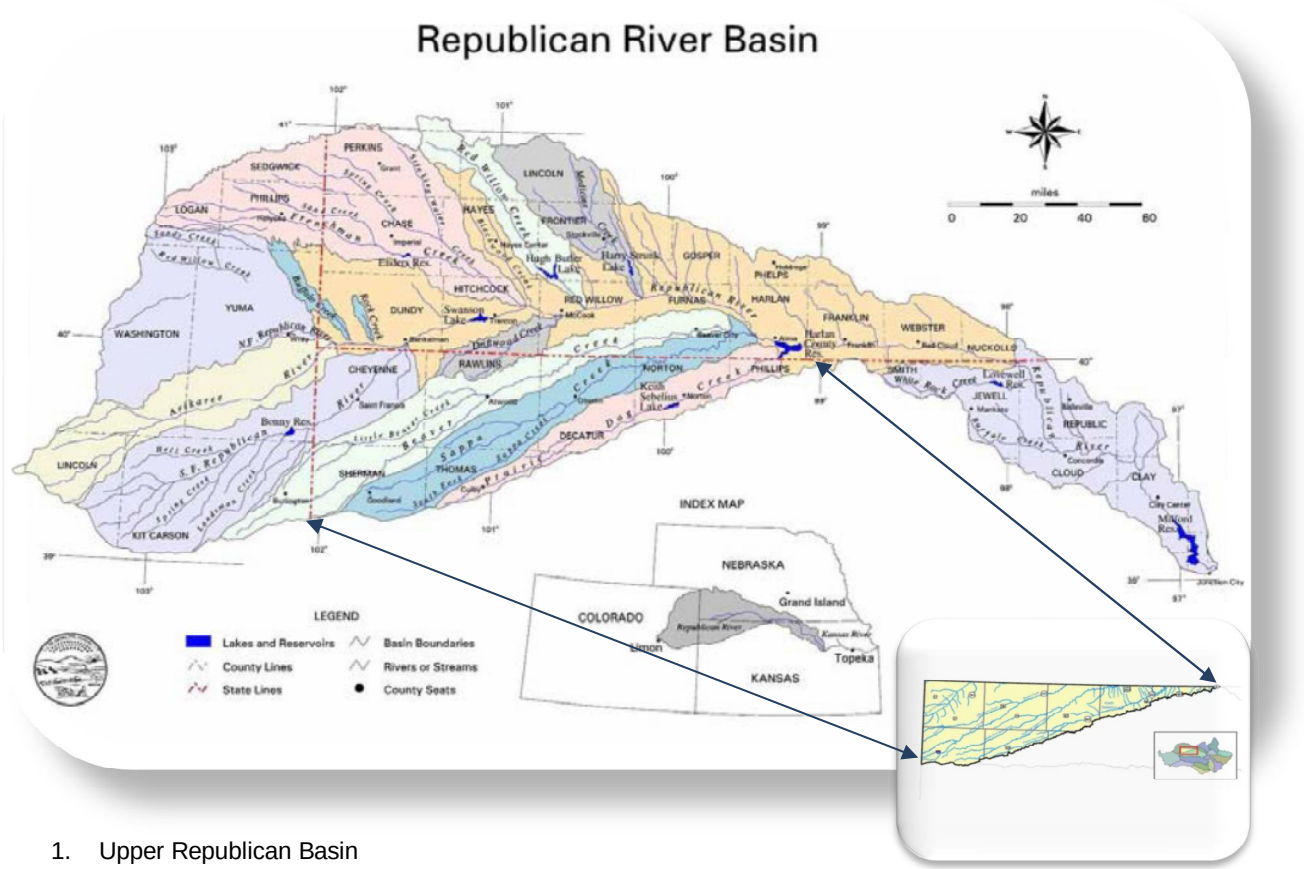
2.0 Introduction

The WRAPS process involves many entities working together to achieve the water quality standards approved by EPA. The Prairie Dog Creek/Keith Sebelius Lake WRAPS Leadership Team (LT) is comprised of a diverse group of people representing landowners, producers, business men and women and community leaders. Together, using our Watershed Plan and technical assistance from local, state and government agencies, the LT will be able to make educated decisions about our watershed and be able to lead, monitor, assess, plan and implement our WRAPS project. The LT has established a list of needs and concerns. These concerns include but are not limited to;

- Keith Sebelius Reservoir (Norton Lake)
- Winter feeding sites and concentrated animal feeding sites
- Abandon Wells
- Failing septic systems
- Aging waste water infrastructures
- New terraces or terrace rebuilds

3.0 Description

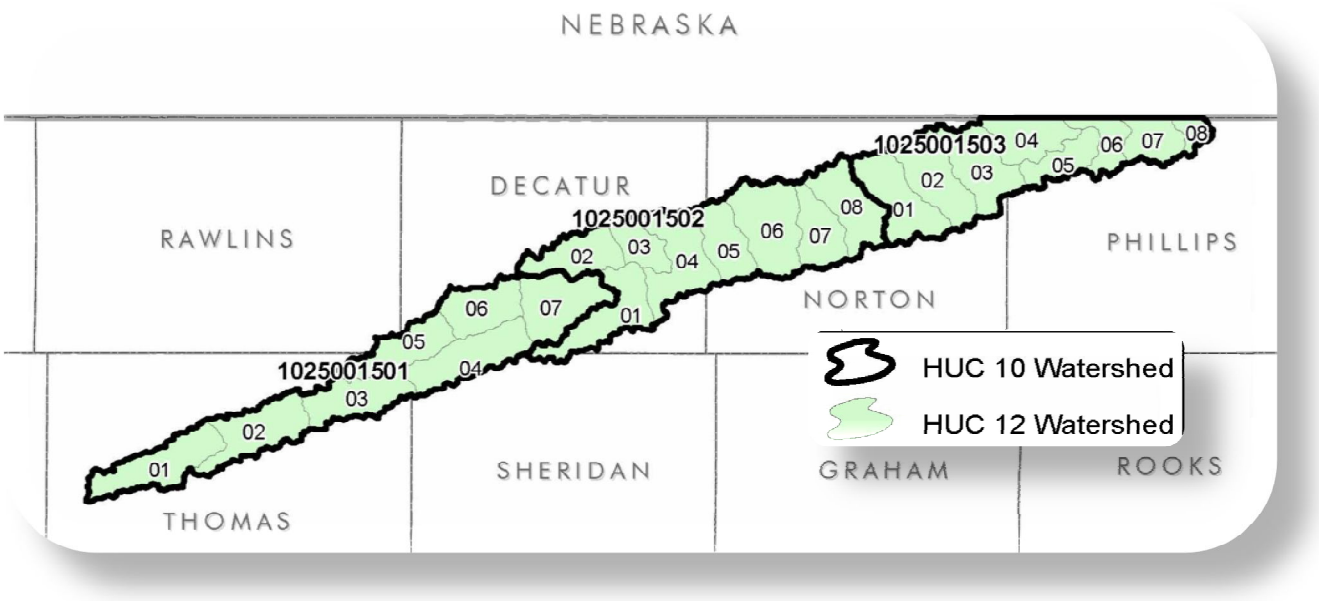
The Upper Republican Basin is located in the High Plains physiographic region of western Kansas. The Kansas portion of the basin is bordered by Colorado on the west and Nebraska on the north covering approximately 4,900 square miles. The basin covers all or parts of Cheyenne, Rawlins, Decatur, Norton, Phillips, Sherman, Thomas and Sheridan counties. The basin includes hydrologic unit codes (HUCs) 10250001, 10250003, 10250012, 10250013, 10250014 and 10250015 in Kansas.



1. Upper Republican Basin

4.0 Hydrologic Unit Codes

HUC (Hydrologic Unit Codes) are a way to identify watersheds. The HUC 8 for the Prairie Dog Creek Keith Sebelius Lake watershed is 10250015 which can then be broken down into smaller land mass areas called HUC 10s and even smaller into HUC 12s.



2. Prairie Dog Creek HUC 12

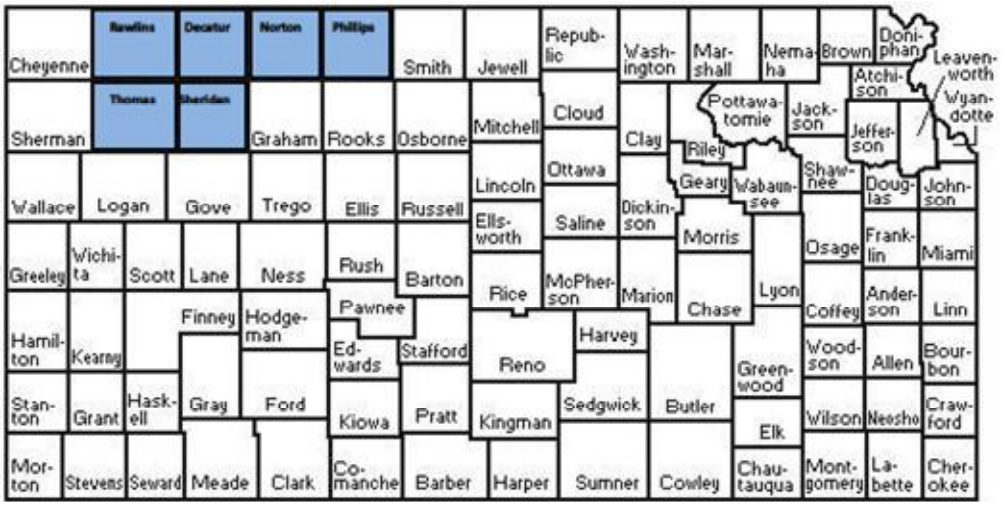
Prairie Dog Creek/Keith Sebelius Lake watershed is located within the Prairie Dog Creek HUC 8 (10250015) of northwest Kansas. This sub-basin drains into the Republican River as it flows from the southwest to the northeast into Nebraska. The Kansas drainage area of the watershed is approximately 1030 square miles (660,000 acres). Portions of Thomas, Sheridan, Rawlins, Decatur, Norton and Phillips counties are all included within the watershed.

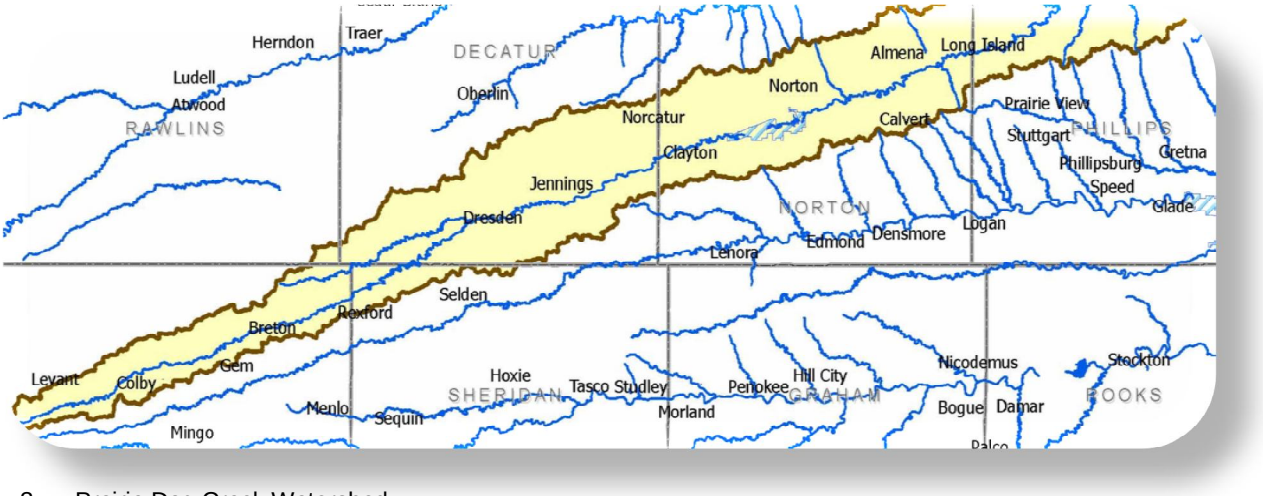
5.0 Culture

The population of the entire watershed is approximately 13,332 people. Most of the population resides in Colby, Ks (Thomas County) and Norton (Norton County). Urbanized areas within the watershed include the City of Levant, City of Colby, Breton, City of Dresden, City of Clayton, City of Jennings, City of Norcatur, City of Leoville, City of Norton, Norton Correctional Facility, Calvert, City of Almena, and the City of Long Island.

All six Counties in the Prairie Dog Creek Watershed have County Conservation Districts, and Natural Resource Conservation Service (NRCS) field offices to provide assistance in the watershed for conservation practices.

Thomas County Conservation District
Sheridan County Conservation District
Rawlins County Conservation District
Decatur County Conservation District
Norton County Conservation District
Phillips County Conservation District

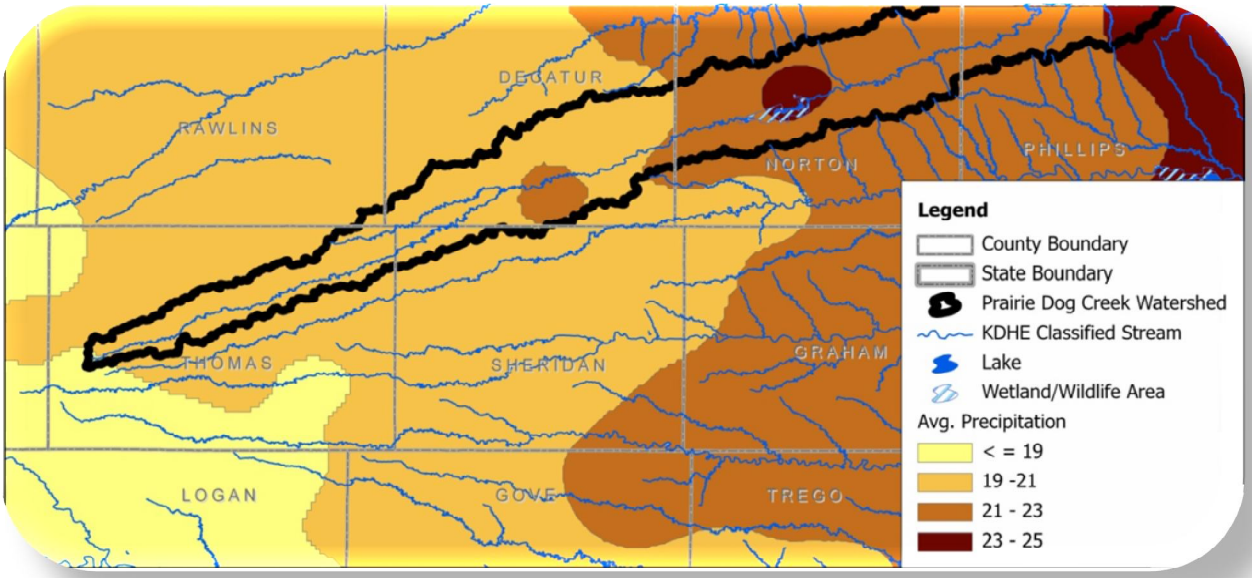




3. Prairie Dog Creek Watershed

6.0 Climate

The climate in the Prairie Dog Creek watershed is characterized by low to moderate precipitation, high winds velocities, high rates of evaporation, wide temperature ranges, and sometimes very quick and dangerous changes in weather. The average rainfall is 19 inches in the west to 25 inches in the east. Most precipitation occurs April through September and runoff varies from 0.2 inches in the west to 1.1 inches in the eastern part of the watershed. Evaporation averages 55 inches per year from high wind movements and low humidity in the watershed. Excessive rainfall can occur, primarily from thunderstorms of short duration in a localized area. The most common flood months have been June and July, but flood problems have occurred throughout the year. The combination of limited channel capacity and flat floodplain can result in large portions of the valleys being flooded.

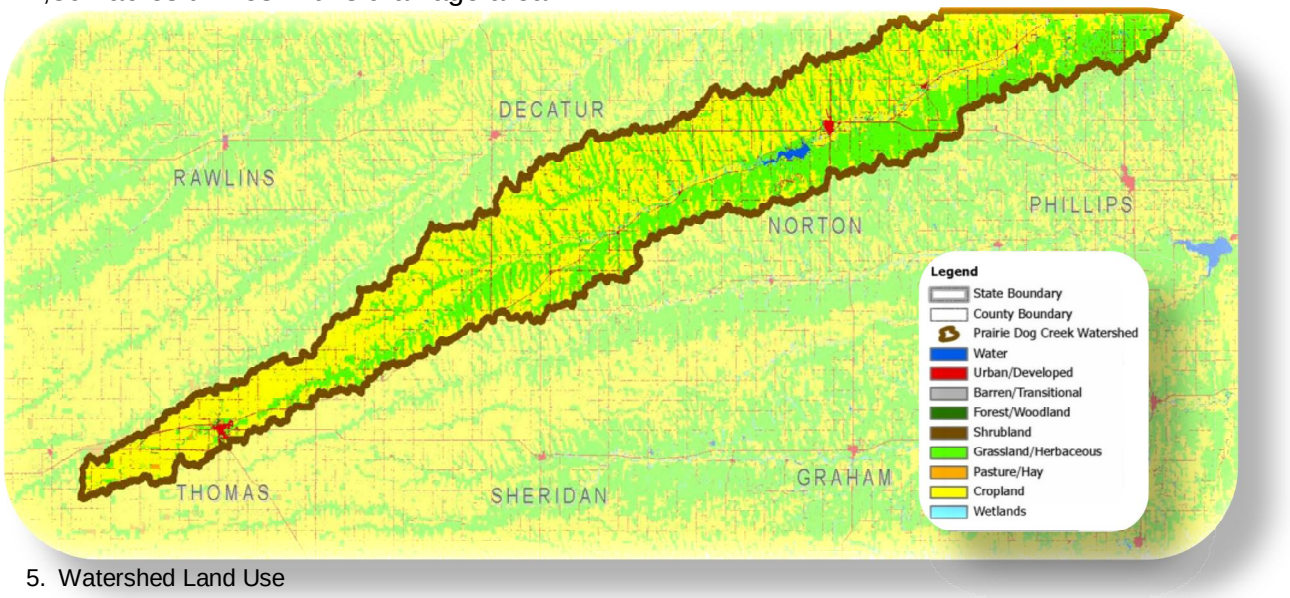


4. Annual Average Precipitation

1. Flooding in the Prairie Dog and Norton Lake May 2008.

7.0 Land Cover/Land Uses

The Prairie Dog Creek watershed has open areas of flat lands and gentle rolling hills that were once covered by a short-grass prairie. Approximately 51 percent of the watershed is cropland and 43% is grassland, pasture, and hay. An estimation of 441 farms with an average size of 1,307 acres thrives in this drainage area.



5. Watershed Land Use

7.1 Agriculture

Agriculture is the primary land use in the watershed, with crops including wheat, corn, grain sorghum, soybeans, forage sorghum, alfalfa and sunflower. The predominant land use in the watershed is cultivated cropland and grassland. Runoff from cropland, rangeland, and livestock waste can contribute to the non point source (NPS) pollution within the Watershed. The primary impairment concern within the Prairie Dog Creek Watershed is phosphorus loading contributing to the degradation of Keith Sebelius Lake and Lower Prairie Dog Creek. As referenced within the KDHE TMDLs for Keith Sebelius Lake and Lower Prairie Dog Creek, phosphorus loading from agriculture runoff is mentioned as a key contributor to these impairments. Over application of nutrients and organics has created surface water quality concerns. Residue, nutrient, and pest management, vegetative practices and structural practices are necessary to control erosion, and protect and improve water quality.

Table 1. General Land Use

Land Use	Area (Acres)
Cultivated Cropland	335,987
Grassland	314,559
Developed	4,118
Wetlands	202
Open Water	3,125
Forest	4,146

7.2 Cultivated Cropland

There are two major land uses in the watershed, cropland and rangeland. No-till is becoming increasingly popular throughout the watershed as government programs promote this practice. Buffer incentives and Conservation Reserve Program (CRP) are ongoing programs with the Farm Service Agency (FSA) and NRCS to assist with planning and cost share to implement programs. With unusually large amounts of rainfall recently and conventional farming practices the watershed has the potential for an increased amount of sediment entering the streams and creeks. This sediment can be the carrier for fertilizers and other chemicals to enter the water which contributes to the phosphorus-related impairments within the Prairie Dog Creek Watershed.

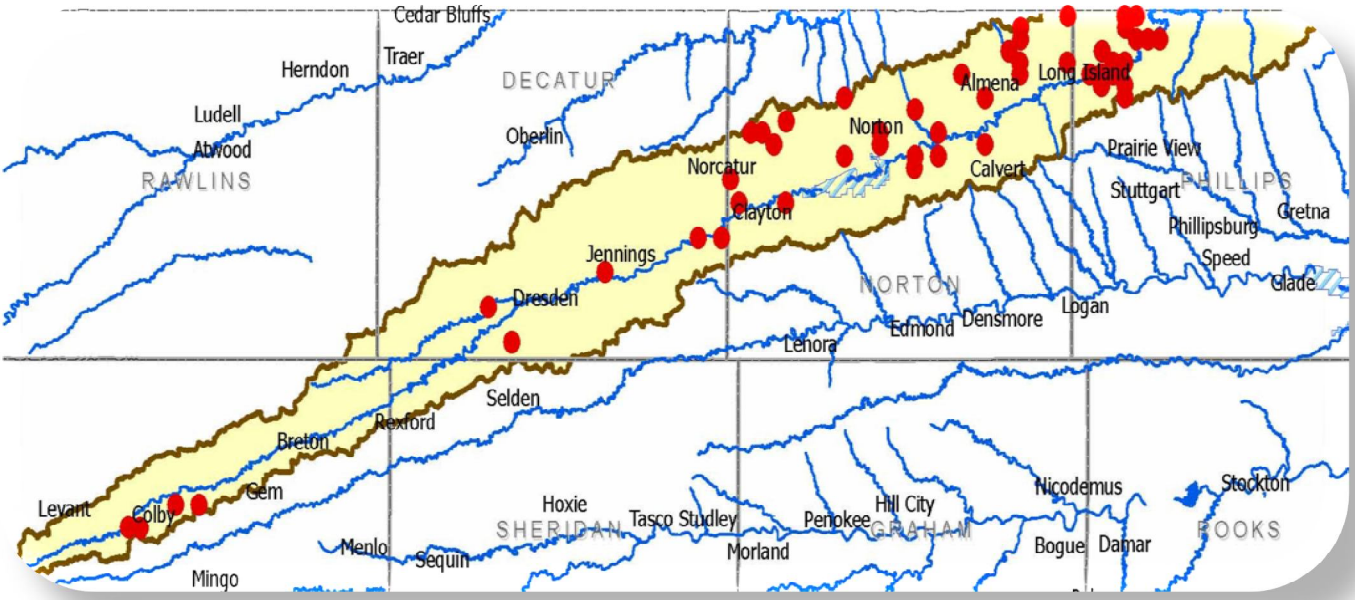
7.3 Livestock

7.3.1 CAFOs-

There are 52 certified or permitted Confined Animal Feeding Operations (CAFOs) within the Prairie Dog Creek Watershed. In Kansas, animal feeding operations with greater than 300 animal units must register with KDHE. Confined animal feeding operations (CAFOs), those with more than 999 animal units, must be permitted with EPA. CAFOs are not allowed to release manure from the operation. However, they are allowed to spread manure on cropland fields for distribution. If this application is followed by a rainfall event or the manure is applied on frozen ground, it can run off into the stream. All of these livestock facilities have waste management systems designed to minimize runoff entering their operation and control runoff draining from their facilities. These facilities are designed to retain a 25-year, 24-hour rainfall/runoff event as well as two weeks normal wastewater from their operations. The total potential number of animals is approximately 246,150 head in the watershed, the actual number of animals at feedlot operations is typically less than the allowable permitted number. Smaller operations are not regulated by the state. Many of these operations are located along streams because of historic preferences by early settlers.

2. Winter feeding site on the Prairie Dog.

Table 2. Total Animal Units By County		
County	**Type**	**Animal Total Units**
Thomas	Beef	8,100
Thomas	Swine	500
Decatur	Beef	1,300
Decatur	Swine	800
Norton	Beef	11,347
Norton	Dairy	80
Norton	Swine	60,306
Phillips	Beef	5,270
Phillips	Dairy	135
Phillips	Swine	62,738



6. Confined Animal Feeding Operations (CAFO)

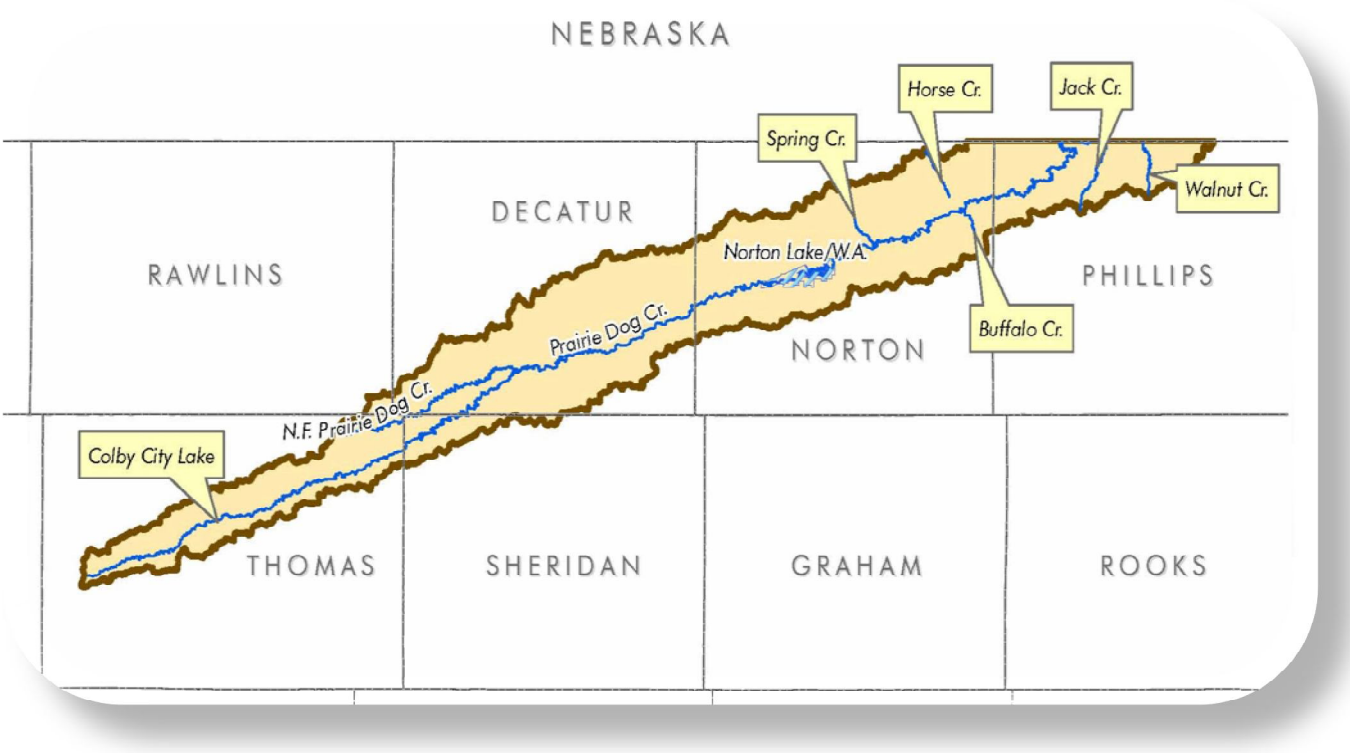
7.3.2 Rangeland-

Grazing livestock with access to waterways and streams can contribute to water pollution. Rangeland is frequently overgrazed which leads to invasive plants entering the grazing supply causing the animals to graze in specific locations and not utilizing the entire food source. Over grazing can lead to wind and soil erosion problems as well as allowing more runoff to enter the water supply. Water flowing across pastures, turnouts and dry lots, and other areas can pick up particles of sediment and manure. Nutrients attach to sediment particles and can be transported to nearby water bodies where they can negatively impact stream health and fish and wildlife. Producers allowing livestock to graze on or near waterways and creeks is also an ongoing concern. Movement of feeding sites away from the streams and stream inlets providing alternate watering sites is important to the prevention of pollutants from entering the stream.

3. Possible overgrazed pasture, Prairie Dog Creek tributary.

8.0 Designated Uses: Prairie Dog Creek Watershed

Water body designated uses for the Prairie Dog Creek and tributaries are; secondary contact recreation, aquatic life support, domestic water supply, food procurement, ground water recharge, industrial water supply, irrigation, and livestock watering use. The designated uses for the Norton Lake are primary contact recreation, expected aquatic life support, domestic water supply, food procurement, ground water recharge, industrial water supply, irrigation, and livestock watering use. Surface waters are given certain "designated uses" based on what the waters will be used for as stated in the Kansas Surface Water Register issued by KDHE. For example, waters that will come into contact with human skin should be of higher quality than waters used for watering livestock. Therefore, each "designated use" category has a different water quality standard associated with it. When water does not meet its "designated use", the water quality standard for that water is considered "impaired."



7. KDHE Classified Water Bodies

Table 3. Designated Use Information											
Water Body	Segment	Type	Class	AL	CR	DS	FP	GR	IW	IR	LW
Buffalo Creek	All		GP	E	b	X	X				
Horse Creek	All		GP	E	b	X	X				
Jack Creek	All		GP	E	b						
Prairie Dog Creek	2		GP	E	C	X	X	X	X	X	X
Prairie Dog Creek	4		GP	E	a	X	X	X	X	X	X
Prairie Dog Creek	8		GP	E	b	X	X	X	X	X	X
Prairie Dog Creek	10		GP	E	b	X	X	X	X	X	X
Prairie Dog Creek	12		GP	E	b	X	X	X	X	X	X
Prairie Dog Creek, N. Fork	All		GP	E	b	X	X	X	X	X	X
Spring Creek	All		GP	E	b	X	O	X	X	X	X
Walnut Creek	All		GP	E	b	O	O	X	O	O	O
Colby City Lake		L	GP	E	B	X	X	O	X	X	X
Norton Lake (Sebelius Lake)		L	GP	E	A	X	X	X	X	X	X
Norton W.A.		W	GP	E	a	X	X	X	X	X	X

GP = general purpose water
AL = designated for aquatic life use
E = expected aquatic life use water
CR = designated for contact recreation use
A = Primary contact recreation water body that have a posted/designated public swimming area
B = Primary contact recreation water body that is by law or written permission of the landowner open to and accessible by the public
C = Primary contact recreation water body that is not open to and accessible by the public under Kansas law
a = Secondary contact recreation water body that is by law or written permission of the landowner open to and accessible by the public
b = Secondary contact recreation water body that is not open to and accessible by the public under Kansas law
DS = designated for domestic water supply use
FP = designated for food procurement use
GR = designated for ground water recharge
IW = designated for industrial water supply
LW = designated for livestock watering use
X = Water body is assigned the indicated designated
O = Water body does not support the indicated designated use

9.0 Public Water Supply

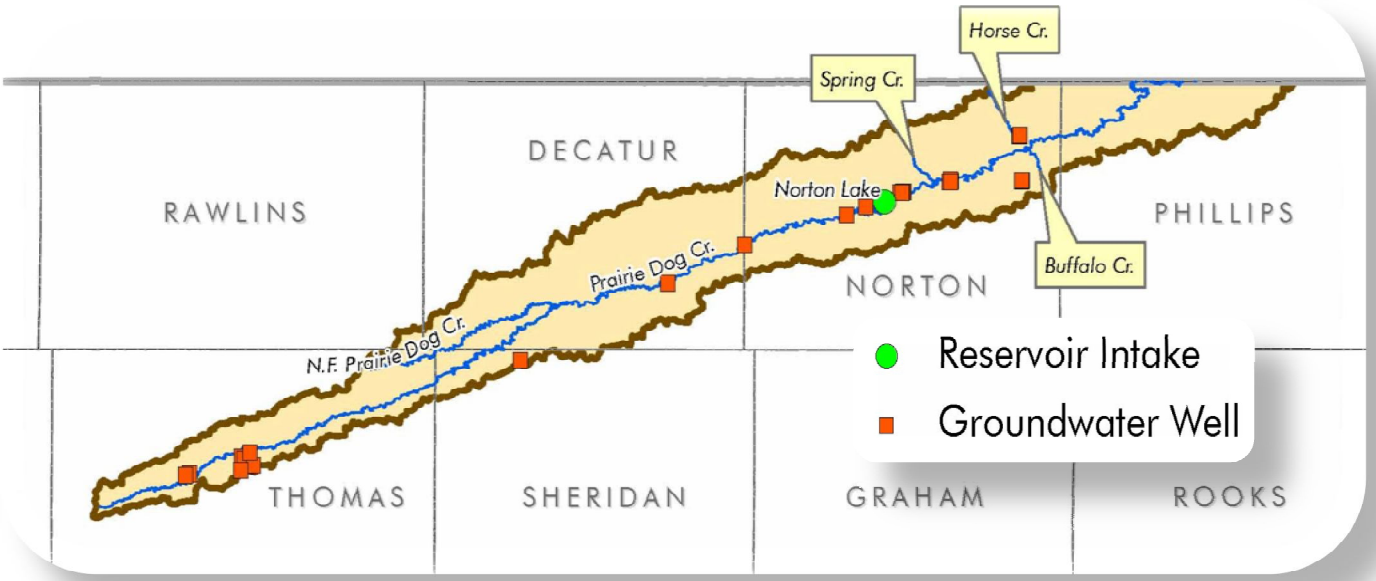
There are 12 Public Water Supplies (PWS) that are served by ground and surface water within the Prairie Dog Creek Watershed. The primary public water supply source within the watershed is groundwater, with all 12 PWS's obtaining water from groundwater wells. With all PWS's in the Prairie Dog Creek Watershed obtaining all or some of their drinking water supply from groundwater sources, it is essential that the surface waters which recharge these underground aquifers are as pollutant-free as possible. Potential pollutants of concern for these groundwater sources include microbiological, inorganic compounds, nitrates, synthetic organic compounds, pesticides, and volatile organic compounds. Additional information regarding potential sources of pollution to PWS's with Kansas can be found on the Kansas Source Water Assessment Program's website, a program administered through the Kansas Department of Health and Environment (KDHE) Bureau of Water (BOW). Source Water Assessment (SWA) reports for specific public water supplies can be found at http://www.kdheks.gov/nps/swap/SWreports.html.

4. City Of Norton Water Treatment Plant.

The City of Norton is the lone supplier which obtains surface water from the watershed, with Norton Lake being the source of water. Potential pollutants of concern for surface waters include nutrients leading to eutrophication and sedimentation in addition to those listed for groundwater sources. The primary pollutants noted in the Susceptibility Likelihood Scores for Assessment Area for the City of Norton surface water intake (Norton Lake) in the City of Norton SWA Report are sedimentation and eutrophication. As noted within the Norton Lake eutrophication TMDL, the primary contribution sources to phosphorus loading within the lake are cropland and animal waste. Overland runoff also collects soil during heavy rainfall events, contributing to sediment loading of the lake. This SWA Report can be found at http://www.kansas.gov/uaa/swap/download/NORTONCITYOF.pdf.

Water quality improvements resulting from implementation of this watershed plan will help to maintain the viability of Norton Lake as a PWS source. There is also potential for implementation activities to help with protection of ground water wells within the watershed which serve as PWS sources.

Table 4. Public Water Supply Information				
Public Water Supplier	Water Type	Water Source	Surface Water Body Source	System Population (KDHE)
Almena	Groundwater	Well	N/A	425
Clayton	Groundwater	Well	N/A	60
Colby	Groundwater	Well	N/A	4,803
Jennings	Groundwater	Well	N/A	116
KDOT Colby Rest Area EB	Groundwater	Well	N/A	25
KDOT Colby Rest Area WB	Groundwater	Well	N/A	25
KDOT Norton Reservoir Rest Area	Groundwater	Well	N/A	25
Norton Correctional Facility	Groundwater	Well	N/A	950
Norton	Groundwater and Surface Water	Well and Reservoir	Norton Lake	2,657
Prairie Dog State Park	Groundwater	Well	N/A	25
Selden	Groundwater	Well	N/A	173
Total Population				9,284



8. Public Water Sources

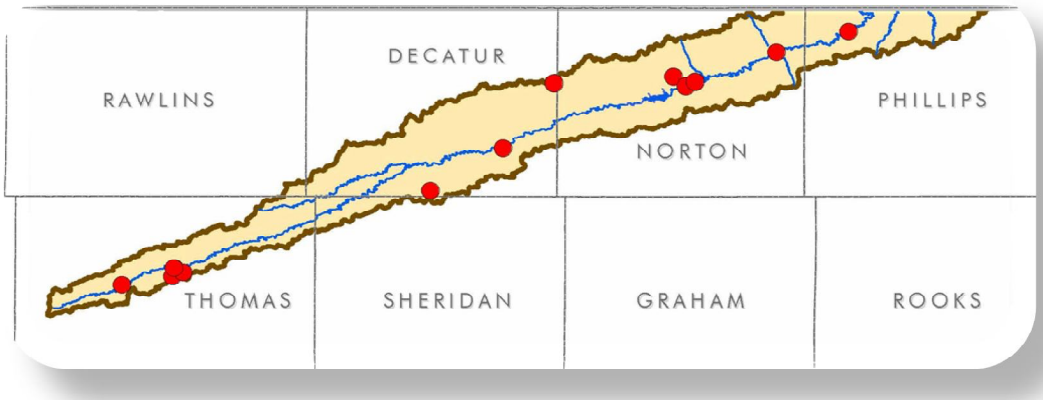
10.0 Nonpoint Source and Point Source Pollution

Pollution normally occurs when water washes over the land, and picks up any group of contaminants including agricultural chemicals from farmland, livestock waste form concentrated feeding sites, livestock overgrazing on rangeland, and nutrients and toxic materials from urban and suburban areas. Land use in the Prairie Dog Creek Watershed is primarily for agriculture use. Practices implemented on this land can affect nutrient loading in the Keith Sebelius (Norton) Lake and Prairie Dog Creek. Excess nutrients can originate from any land use that contributes to phosphorus in surface waters. Some of the causes may be from sediment loading from soil erosion into the lake, fertilizer runoff from agricultural and urban lands, runoff from domestic livestock in close proximity to streams and rivers, failing septic systems, and abandon wells. This run off finds its way into our rivers and lakes. The term nonpoint is used to distinguish this type of pollution from point source pollution, which comes from specific sources such as sewage treatment plants or industrial facilities.

Wastewater treatment facilities are permitted and regulated through KDHE. These facilities are considered point sources for pollutants. National Pollutant Discharge Elimination System (NPDES) permits specify the maximum amount of pollutants allowed to be discharged to surface waters. Having these point sources located on streams or rivers could potentially impact water quality within the waterways of the Prairie Dog Creek Watershed. Pollutants originating from NPDES facilities within the watershed could include suspended solids, biological pollutants that reduce oxygen in the water column, and inorganic compounds or bacteria. Wastewater is treated to remove solids and organic materials, disinfected to kill bacteria and viruses, and discharged to surface waters. Any pollutant discharge from point sources that is allowed by the state is considered to be Wasteload Allocation and is reflected within TMDLs noted for the WRAPS Project Area.

Soil type also has an influence on runoff and erosion throughout the watershed. Soils are classified into four hydrologic soil groups (HSG). The soils within each of these groups have the same runoff potential after a rainfall event, if the same conditions exist, such as plant cover or storm intensity. Soils are categorized into four groups: A, B, C and D. The high priority areas of the watershed is primarily soil group B. Soil group B has moderate infiltration rates even when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well drained to well drained soils with moderately fine to moderately coarse textures.

Table 5. NPDES Permitted Facilities Prairie Dog Creek						
Facility	NPDES#	Ks Permit#	Type	Rec Stream	Design Q (MGD)	Permit Expires
Colby Implement	KSJ000473	I-UR06-NO04	2 Concrete Sumps		Non-Overflowing	2/28/2013
Tarbet Ready Mix	KSG110145	I-UR06-PR01	Concrete Plant General Permit	Prairie Dog Creek	NA	9/30/2012
KDOT-Thomas Co Rest Area	KSJ000246	M-UR06-NO02	2 Cell Lagoon		Non-Overflowing	5/31/2013
City of Colby	KS0098698	M-UR06-OO02	UV/Effluent reuse/holding pond	Unnamed Tributary, PDC	1.0 MGD	1/31/2012
City of Jennings	KSJ000253	M-UR11-NO01	3 cell Lagoon		Non-Overflowing	1/31/2013
City of Norcatur	KSJ000253	M-UR15-NO01	4 Cell Lagoon		Non-Overflowing	3/31/2013
Loeville Improvement District	KSJ000243	M-UR19-NO01	2 Cell Lagoon		Non-Overflowing	10/31/2013
City of Norton WTF	KS0097730	M-UR16-OO03	Activated Sludge, Digesters, UV	Prairie Dog Creek	0.45MGD	12/31/2013
Norton Correction Facility WTF	KS0095834	M-UR-OO02	6 Cell lagoon	Prairie Dog Creek via Robinson Cr	0.109MGD	6/30/2012
Norton Water Treatment Plant	KS0098931	I-UR16-POO01	Lagoon Wastewater Overflow	Prairie Dog Creek	0.06 MGD	1/31/2012
City of Almena WTF	KS0096768	M-UR-01-OO02	3 Cell Lagoon	Prairie Dog Creek	0.043	9/30/2012
City of Long Island WTF	KSJ000251	M-UR13-NO01	4 Cell Lagoon	Non-Overflowing	0	9/30/2013



9. NPDES Permitted Facilities

11.0 Assessment Tools

As described in the description of the Prairie Dog Creek is primarily an agricultural watershed with mostly rural communities. A windshield tour was completed on the Upper Prairie Dog Creek/Keith Sebelius Lake in October 2006. After locating initial critical targeted areas, the area was driven and a windshield assessment was completed. We used this method to determine what BMPs are currently being utilized in the watershed and to pinpoint other concerns. This survey was conducted by local agency personnel and members of the SLT that are familiar with the area and its use history. The windshield tour provides current information on BMPs and additional water quality concerns not included in the watershed modeling data. This assessment revealed several concerns for the watershed with the following being top priorities

- Keith Sebelius Reservoir as a public water supply for the City of Norton
- Winter Feeding sites and concentrated feeding sites
- Terraces
- Abandon Wells
- Failing Septic Systems

12.0 Watershed Tour and Data Collected

Since the tour of the Upper Prairie Dog Creek /Keith Sebelius Lake another windshield tour was completed in March 2008, of the Lower Prairie Dog Creek with most of the concerns found being confined feeding areas and rangeland issues.

In August of 2009 the Project Coordinator, Project Assistant, NRCS Staff and a member of the LT participated in a program presented by K-State Citizen Science.
Results are documented using the Citizen Science Interpretation Guide

1- Poor
2- Fair
3- Good
4- Best

Water Sampling 8-13-2009											
Location	Color	Odor	pH	Nitrate	Nitrite	Ammonia	Ortho-posphate	E.Coli	Coliform		
Pasture Pond North of Norton in TMDL	3	4	4	4	4	3	1	4	1		
North of Calvert PD Creek	4	4	4	3	4	4	2	4	2		
East of Almena PD Creek	4	4	4	4	4	4	2	2	2		
Kansas/Nebraska State Line PD Creek	4	4	4	3	4	3	2				
East of Long Island PD Creek	4	4	4	2	4	3	2				
PD Creek west of Lake	3	4	4	4	4	3	3				
Keith Sebelius Lake	4	4	4	4	4	3	2				

13.0 Total Maximum Daily Load Prairie Dog Creek

The term TMDL (total maximum daily load) designates the maximum amount of a pollutant that the specific body of water can receive without defying the surface water-quality values to support their designated uses. The water quality impairment for the Prairie Dog Creek and tributaries are Total Phosphorus, and Dissolved Oxygen. Prairie Dog Creek WRAPS, in consultation with KDHE, have reviewed the list of all impaired waters for the Prairie Dog Creek watershed. During this review process the priority impairments to be addressed through watershed plan implementation were determined. The water quality impairments which will be directly addressed through watershed plan are the draft High Priority TMDLs for Upper Prairie Dog Creek/Norton Lake and Lower Prairie Dog Creek. Both of these draft TMDLs have been submitted by KDHE-TMDL Section staff to EPA and are still under review/revision as of March 2011. Once these draft TMDLs have been approved by EPA the necessary load reduction goals to meet these two TMDLs will be reviewed by Prairie Dog Creek WRAPS staff to determine if estimated load reductions resulting from BMP implementation meet necessary TMDL reductions. Soil loss through water erosion causes water quality impairments as pollutants are attached to soil and are transported into streams during runoff events.

The impairments which will be directly addressed through implementation activities noted within this watershed plan cover two areas of the Prairie Dog Creek Watershed. These areas include (1) the upper portion of the watershed from Norton Lake dam to the headwaters of the Prairie Dog Creek watershed in the vicinity of Colby and (2) the lower portion of the watershed from the outlet of Norton Lake to the Kansas-Nebraska state line. Within the context of this watershed plan these areas will be referenced as Upper Prairie Dog Creek and Lower Prairie Dog Creek. The impairments noted within each of these areas which will be directly addressed by this watershed plan are as follows:

- Upper Prairie Dog Creek
    - Norton Lake
        - Dissolved Oxygen (TMDL)
        - Eutrophication (TMDL)
        - pH (TMDL)
    - Prairie Dog Creek Near Dellvale
        - Total Phosphorus (Draft TMDL)
- Lower Prairie Dog Creek
    - Prairie Dog Creek Near Woodruff
        - Dissolved Oxygen (TMDL)
        - Total Phosphorus (Draft TMDL)

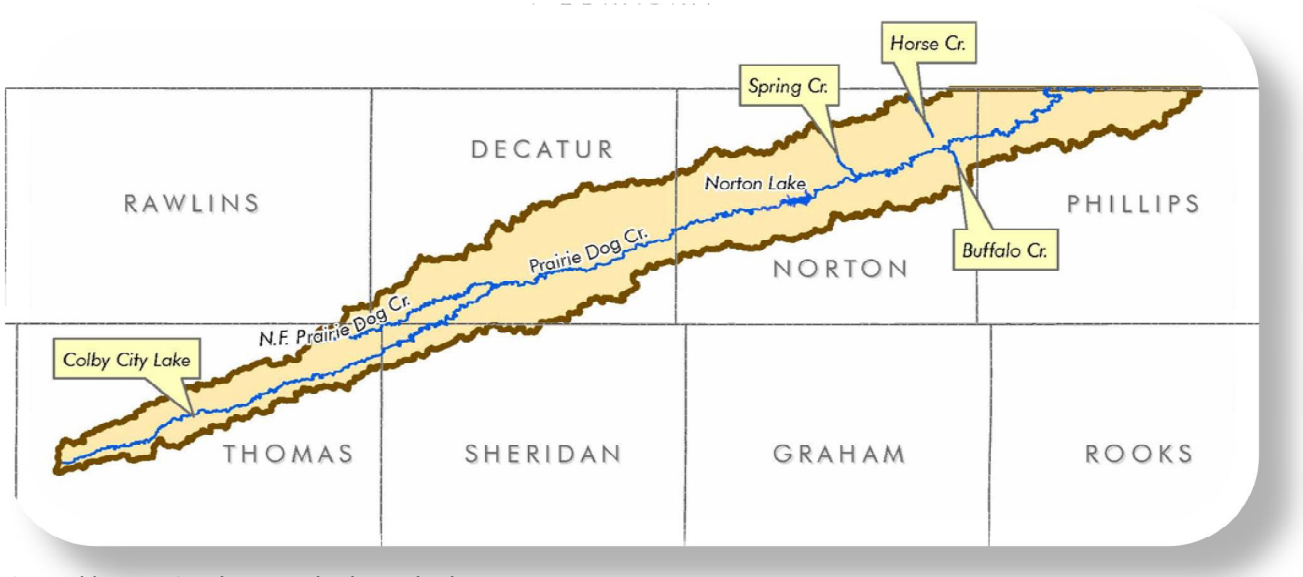
To address the impairments noted for Upper and Lower Prairie Dog Creek, Prairie Dog Creek WRAPS consulted with KDHE to determine load reductions targets needed to directly address the impairments noted for the Upper Prairie Dog Creek and Lower Prairie Dog Creek portions of the project area. The load reduction targets for these two portions of the watershed are as follows:

- Upper Prairie Dog Creek/Norton Lake
    - Total Phosphorus load reduction of 11,195 lbs/yr
- Lower Prairie Dog Creek
    - Total Phosphorus load reduction of 15,846 lbs/yr

Table 6. Impaired Waters with EPA Approved TMDLs			
Water Body	Impairment	Priority	KDHE Monitoring Station(s)
#Norton Lake (Sebelius Lake)	Dissolved Oxygen	Low	LM010001
#Norton Lake (Sebelius Lake)	pH	Low	LM010001
#Prairie Dog Creek Near Woodruff	Dissolved Oxygen	High	SC230
Colby City Lake	Eutrophication	Low	LM071301
***Upper Prairie Dog Creek/Norton Lake**	Total Phosphorus/Eutrophication	High	SC549, LM010001
Impaired Waters with Draft TMDLs (March 2011)			
*Lower Prairie Dog Creek	Total Phosphorus	High	SC230
Non-TMDL Impaired Waters (303d List)			
Prairie Dog Creek Near Dellvale	Arsenic	Low	SC549
#Prairie Dog Creek Near Dellvale	Dissolved Oxygen	Low	SC549
***Prairie Dog Creek Near Dellvale**	Total Phosphorus	Low	SC549
Prairie Dog Creek Near Woodruff	Arsenic	Low	SC230
***Prairie Dog Creek Near Woodruff**	Total Phosphorus	Low	SC230
Colby City Lake	Lead	N/A	LM071301

*Impairment directly addressed in watershed plan

Impairment positively impacted by watershed plan



10. Prairie Dog Creek Watershed Impaired Waters

Table 7. Upper Republican River Basin TMDL Development Cycle			
Year Ending In	Implementation Period	Possible TMDLs to Revise	TMDLs to Evaluate
2009	2010-2019	2003	N/A
2014	2015-2024	2003, 2004	2003, 2004, 2006
2019	2020-2029	2003, 2004, 2009	2003, 2004, 2006, 2009

14.0 Best Management Practice (BMP)

BMPs have been selected by the SLT to address NPS (nonpoint source Pollution) sources. In relation to the impairments that are being directly addressed by this watershed plan BMPs have been selected to address Phosphorus loading. Assessment activities within the Prairie Dog Creek watershed indicate that the primary sources of phosphorus loading result from cropland runoff, from livestock/grazing sources, and failing onsite waste water systems. With this in mind BMPs have been selected to address these primary sources of non point source pollution. The effectiveness of BMP implementation will be based on acceptability of these practices by the landowners, cost efficiency, and pollutant load reduction effectiveness.

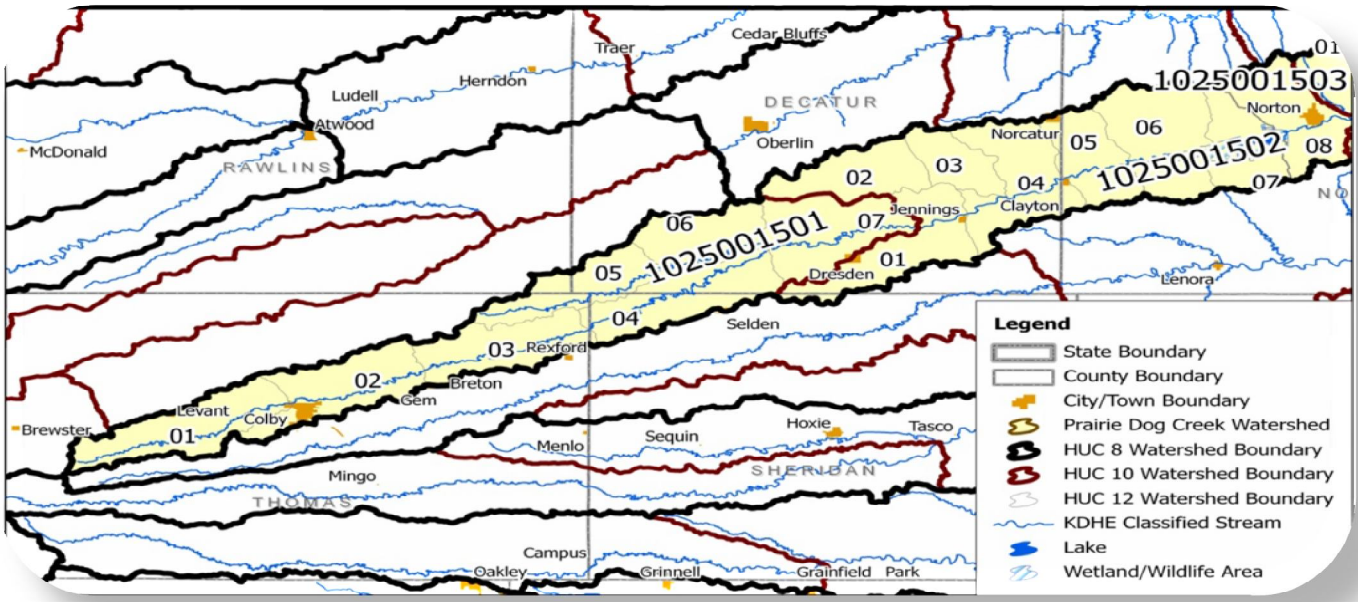
Initial BMP implementation plans were developed for all three priority areas of Upper and Lower Prairie Dog Creek. This included this types and quantities of overall BMPs which could be reasonably expected for implementation within each of these areas. Once these types and quantities of BMPs to address cropland and livestock-related nonpoint source pollution were identified, Prairie Dog Creek WRAPS worked with KDHE to determine pollutant load reductions for these identified BMPs. In this process it was determined that a detailed implementation schedule would be first developed for the top priority areas identified within the Upper and Lower portions. If estimated phosphorus reductions did not meet the overall pollutant load reduction goals for both the Upper and Lower portions of the watershed, then detailed annual BMP implementation schedules would be developed for the 2nd tier priority areas. This process would continue until phosphorus load reduction goals for both Upper Prairie Dog Creek/Norton Lake and Lower Prairie Dog Creek were met.

In the case of this watershed plan, phosphorus load reductions goals to address Upper Prairie Dog Creek/Norton Lake as well as Lower Prairie Dog Creek water quality impairments can be met by focused BMP implementation within the top priority area in each portion of the watershed. With this in mind, annual BMP implementation schedules were developed to cover the following areas:

- Upper Prairie Dog Creek/Norton Lake
    - HUC 12 Watersheds
        - 102500150206
        - 102500150207
        - 102500150208
- Lower Prairie Dog Creek
    - HUC 12 Watersheds
        - 102500150302
        - 102500150303

Individual BMP implementation schedules and cost information are provided within this watershed plan for both the Upper and Lower portions of the watershed as a whole for BMPs to be implemented within the accompanying HUC 12 watersheds previously identified. BMP implementation schedules and cost information were not developed for each of the HUC 12 watersheds within the top priority area for each section of the watershed. If individual BMP

implementation schedules are to be developed for each HUC 12 within the top priority area in the Upper and Lower portion of the watershed, Prairie Dog Creek WRAPS will determine the percent area within each HUC 12 watershed as compared to each top priority area as a whole, then multiply that percent area for each HUC 12 by the annual quantity of each BMP type to estimate the quantities of BMPs to be implemented within each HUC 12 for each year of the watershed plan. A glossary of BMPs selected for the Prairie Dog Creek WRAPS are included within Appendix 25.0 of this document.



11. Upper Prairie Dog Creek Watershed with HUC Boundaries

The primary goal that is focused on within the Prairie Dog Creek WRAPS Watershed Plan is restoration of water quality of Norton Lake and Prairie Dog Creek for designated uses supportive of aquatic life, domestic water supply, recreation, and other designated uses for the Prairie Dog Creek watershed within Kansas. The plan specifically addresses several TMDLs and 303(d) listings for Norton Lake and Prairie Dog Creek. The following is a list of the impairments being directly addressed by the plan:

Norton Lake Lake (KDHE Station LM010001)

- Low Priority Eutrophication TMDL
- *High Priority draft Eutrophication TMDL pending (9/20/2011)*

Prairie Dog Creek Near Dellvale (KDHE Station SC549)

- *High Priority Total Phosphorus TMDL pending 9/20/2011*

Prairie Dog Creek Near Woodruff (KDHE Station SC230)

- High Priority Bacteria DO TMDL
- *High Priority draft Total Phosphorus TMDL pending (9/20/2011)*

In order to reach the load reduction goals associated with the Prairie Dog Creek WRAPS Project Area impairments, an implementation schedule for BMP implementation spanning 18 years for Upper Prairie Dog Creek/Norton Lake and 41years for Lower Prairie Dog Creek has been developed.

The selected practices included in the plan will be implemented throughout the targeted areas in the Prairie Dog Creek watershed. Water quality milestones have been developed for Norton Lake and Prairie Dog Creek along with additional indicators of water quality. The purpose of the milestones and indicators is to measure water quality improvements associated with the implementation schedule contained in this plan.

15.0 BMP Implementation Schedule Development

In order to develop a BMP implementation schedule which is reasonable for a particular watershed, one must first determine what the current on-the-ground conservation needs are. Once BMPs needs have been determined for a watershed, a BMP implementation schedule can be developed which takes into consideration the needs identified for that area. A process such as this was utilized to characterize BMP needs towards developing a BMP implementation schedule for the Prairie Dog Creek WRAPS project area.

Priority area needs where determined by

1. State Cost Share Applications submitted by producers
2. EQIP applications
3. Consulting with in house professionals
    a. NRCS District Conservationist
    b. NRCS Technician
    c. Farm Service Agency Staff)
4. KDHE Specialists
5. C reating a BMP needs inventory for priority areas.
6. Information gathered from the 2006-2008 windshield tours.

Prairie Dog Creek WRAPS utilized a process similar to that employed by the WRAPS Work Group from 2005 to 2006. During this time frame a statewide survey of non-point source treatment needs was initiated by the Work Group to provide baseline data for WRAPS projects, as they assess their non-point pollution sources, and associated BMP needs to develop a Kansas Non-Point Source Needs Inventory. To solicit this information for Kansas, a survey was sent to every county conservation district with a request for updated land treatments needs. This information, which was acquired at the county-level, was then prorated to the HUC 8 watershed level based off of the percent are within the reporting county which was within a particular HUC 8 watershed. Since it is demonstrated that the load reductions can be met by first addressing priority area 1 in both the Upper and Lower watersheds the Watershed Plan will be developed for that area.

As a starting point to characterize BMP needs within each of the 3 identified priority areas for Upper Prairie Dog Creek/Norton Lake and Lower Prairie Dog Creek the Kansas Non-Point Source Needs Inventory for the Prairie Dog Creek HUC 8 Watershed (10250015) was utilized.

This HUC 8-level inventory provides acres and percentages of cropland and pasture/rangeland in need of treatment. From this framework, the total acres of cropland and grassland noted within each of the priority areas for Upper Prairie Dog Creek/Norton Lake and Lower Prairie Dog Creek were inserted into a needs inventory spreadsheet. Then the percentages depicted on the needs inventory where modified to estimate current needs for each of the priority areas. These estimates were determined by consulting within the local NRCS District Conservationist and Technician, Farm Service Agency (FSA) staff, Norton County Conservation District staff, and Prairie Dog Creek WRAPS staff. The result of this multi-agency collaboration was development of a needs inventory for each of the priority areas identified for Upper Prairie Dog Creek/Norton Lake and Lower Prairie Dog Creek. The priority area needs inventories are included within Appendix 24.0 of this document.

For the BMP implementation schedules and the associated load reductions, water quality load reduction goals are met by year 2021 for the Upper Prairie Dog Creek/Norton Lake portion of the plan and in 2029 for the Lower Prairie Dog Creek portion. Based off of the BMP needs identified in both of these areas, the duration of the plan extends beyond the dates in which load reduction goals are met. Because of this, the focus of this watershed plan is restoration of impaired waters prior to the date load reduction goals are met and then shifts to protection for the remainder of the watershed plan.

Table 8. Upper Prairie Dog Creek/ Norton Lake BMP Implementation Schedule

Fiscal Year	Grassland Management	Terraces	Terrace Rebuilds	Nutrient Management	Buffer/ Filter Strips	Field Borders	Relocate Feeding Site	*Septic System	*Abandon Wells
2012	1324	802	1000	772	50	30		2	2
2013	1324	802	1000	772				2	2
2014	1324	802	1000	772			1	2	2
2015	1324	802	1000	772		30		2	2
2016	1324	802	1000	772				2	2
2017	1324	802	1000	772	50			2	2
2018	1324	802	1000	772				2	2
2019	1324	802	1000	772			1	2	2
2020	1324	802	1000	772		30		2	2
2021	1324	802	1000	772				2	2
2022	1324	802	1000	772	50			2	2
2023	1324	802	1000	772				2	2
2024	1324	802	1000	772			1	2	2
2025	1324	802	1000	772		30		2	2
2026	1324	802	1000	772				2	2
2027	1324	802	1000	772	50			2	2
2028	1324	802	1000	772				2	2
2029	1321	810	174	774		30	1	2	2
	23829	14444	17174	13898	200	150	*4	*36	*36

*** Indicates # of Units**

Table 9. Lower Prairie Dog Creek BMPs Implementation Schedule

Fiscal Year	Grassland Management	Terraces	Terrace Rebuilds	Nutrient Management	Buffer/Filter Strips	Field Borders	Relocate Feeding Site	*Septic System	*Abandon Wells
2012	2000			304	50	20		1	
2013	2000		630	304				1	1
2014	2000			304				1	
2015	2000		630	304		20		1	1
2016	2000	630		304			1	1	
2017	2000		630	304				1	1
2018	2000			304		20		1	
2019	2000		630	304	50			1	1
2020	2000			304				1	
2021	2000	630	630	304		20	1	1	1
2022	2000			304				1	
2023	2000		630	304				1	1
2024	2000			304		20		1	
2025	2000		630	304				1	1
2026	2000	630		304	50		1	1	
2027	2000		630	304		20		1	1
2028	2000			304				1	
2029	2000		630	304				1	1
2030	2000			304		20		1	
2031	2000	630	630	304			1	1	1
2032	2000			304				1	
2033	2000		630	304	50	20		1	1
2034	2000			304				1	
2035	2000		630	304				1	1
2036	2000	630		304		20	1	1	
2037	2000		630	304				1	1
2038	2000			304				1	
2039	2000		630	304		20		1	1
2040	2000			304	50			1	
2041	2000	630	630	304			1	1	1
2042	2000			304		20		1	
2043	2000		630	304				1	1
2044	2000			304				1	
2045	2000		630	304		20		1	1
2046	2000	630		304			1	1	
2047	2000		630	304	50			1	1
2048	2000			304		20		1	
2049	2000		630	304				1	1
2050	2000			304				1	
2051	2000	630	239	304		20		1	1
2052	2000			304				1	
2053	2000	253		304				1	
2054	317			310	50	20		1	
	82317	5293	12209	12774	350	300	*7	*41	*20

*** Indicates # of Units**

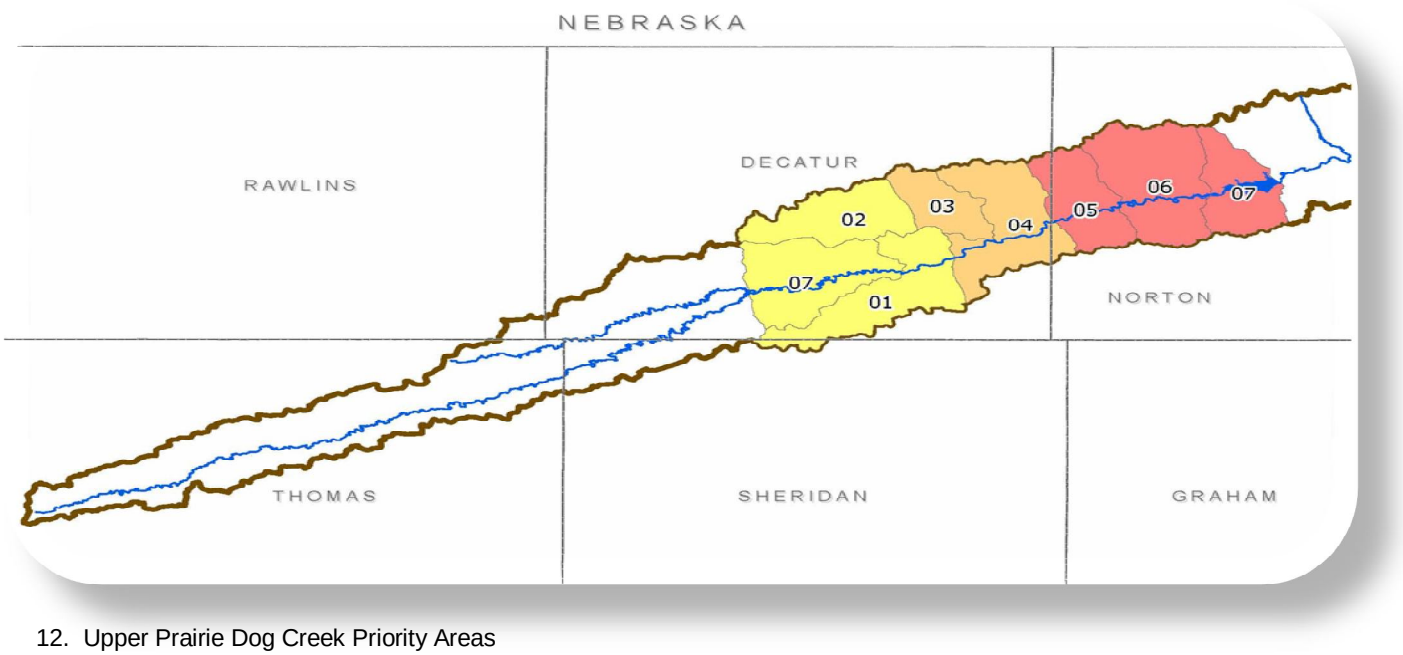
16.0 Upper Prairie Dog Creek Priority Areas

The Upper Prairie Dog Creek/Norton Lake draft TMDL is a paired TMDL for total phosphorus on Prairie Dog Creek itself and eutrophication on Norton Lake. This TMDL indicates that decreased phosphorus loading on Prairie Dog Creek above Norton Lake will lead to decreased phosphorus inflow into Norton Lake. A phosphorus load decrease is necessary for Norton Lake to improve from its currently eutrophic state. Analysis of water quality data indicates that a phosphorus load decrease of 11,195 lbs/yr at KDHE monitoring station SC549 on Prairie Dog Creek could produce load reductions for both Upper Prairie Dog Creek and Norton Lake to attain water quality standards and designated uses pertaining to this TMDL. With this in mind, within the Prairie Dog Creek WRAPS Watershed Plan, a load reduction goal of 11,195 lbs/yr of phosphorus has been determined for the Norton Lake watershed including Prairie Dog Creek.

STEPL results show that the portion of the watershed with higher estimated nutrient loads is below the confluence of North Fork Prairie Dog Creek and Prairie Dog Creek, so as a first priority we selected areas below the confluence as the initial priority area for the upper Prairie Dog Creek. In proximity to Lake the closer to the Lake you are, the higher likelihood there is of nutrients and sediment reaching the Lake. This thought process is justified within the Keith Sebelius/Norton Lake Watershed, where there is not a lot of surface water. During runoff events the flows that would more than likely reach the lake would originate closer to the Lake. As you travel farther up the watershed those flows have more opportunity for absorption into the soil. The Upper Prairie Dog has three priority areas beginning where the North Fork Prairie Dog Creek joins the Prairie Dog Creek and ends at the Keith Sebelius Lake Dam.

Erosion from cropland runoff within the Prairie Dog Creek watershed is thought to be a contributing source of nutrient loading which is contributing to phosphorus loading contributing to directly to the Eutrophication and Total Phosphorus impairments noted for Prairie Dog Creek as well as Norton Lake. A variety of tools can be utilized to characterize nutrient loading within a watershed. For the Prairie Dog Creek WRAPS Project Area, KDHE has developed a STEPL model to characterize nutrient and sediment loading originating from HUC 12 watersheds. STEPL, or Spreadsheet Tool for Estimating Pollutant Loads, is a Microsoft Excel based model which utilizes algorithms to calculate estimated nutrient and sediment loads resulting from differing land uses for selected watersheds. This tool can also be utilized to evaluate estimated load reductions resulting from BMP implementation within modeled watersheds. Results of the STEPL model are shown within this watershed atlas. Additional information regarding STEPL can be found at the following website: http://it.tetratech-ffx.com/steplweb/.

Table 10. Upper Prairie Dog Creek Priority Area Acres			
Priority Area	HUC 12	Cropland Acres	Grassland Acres
1	102500150205	13850	10531
	102500150206	26309	14669
	102500150207	9477	12988
Total Acres Priority Area 1		49636	38188
2	102500150203	11031	5423
	102500150204	22361	14730
Total Acres Priority Area 2		33392	20153
3	102500150107	23402	12887
	102500150201	22278	13039
	102500150202	19587	7561
Total Acres Priority Area 3		65268	33487
Total Acres All Areas		148,296	91,828



12. Upper Prairie Dog Creek Priority Areas

Table 11. Upper Prairie Dog Creek Priority Area 1 Annual Phosphorus Load Reductions (lbs/yr)												
Fiscal Year	Grassland Management	Terraces	Terrace Rebuilds	Nutrient Management	Buffer/ Filter Strips	Field Borders	Relocate Feeding Site	*Septic System	*Abandon Wells	**Annual TOTAL**	**Cumulative TOTAL**	**% Reduction Achieved**
2012	297	265	325	155	42	34	0	45	0	**1162**	**1162**	**10%**
2013	297	265	325	155	0	0	0	45	0	**1086**	**2248**	**20%**
2014	297	265	325	155	0	0	83	45	0	**1169**	**3417**	**31%**
2015	297	265	325	155	0	34	0	45	0	**1120**	**4537**	**41%**
2016	297	265	325	155	0	0	0	45	0	**1086**	**5623**	**50%**
2017	297	265	325	155	42	0	0	45	0	**1129**	**6752**	**60%**
2018	297	265	325	155	0	0	0	45	0	**1086**	**7838**	**70%**
2019	297	265	325	155	0	0	83	45	0	**1169**	**9007**	**80%**
2020	297	265	325	155	0	34	0	45	0	**1120**	**10127**	**90%**
2021	297	265	325	155	0	0	0	45	0	**1086**	**11213**	**100%**
2022	297	265	325	155	42	0	0	45	0	**1129**	**12342**	**110%**
2023	297	265	325	155	0	0	0	45	0	**1086**	**13428**	**120%**
2024	297	265	325	155	0	0	83	45	0	**1169**	**14597**	**130%**
2025	297	265	325	155	0	34	0	45	0	**1120**	**15717**	**140%**
2026	297	265	325	155	0	0	0	45	0	**1086**	**16803**	**150%**
2027	297	265	325	155	42	0	0	45	0	**1129**	**17932**	**160%**
2028	297	265	325	155	0	0	0	45	0	**1086**	**19018**	**170%**
2029	296	267	56	156	0	34	83	45	0	**937**	**19955**	**178%**
Total	5340	4769	5573	2795	169	169	330	810	0	**19955**		

Load Reduction will be met in year 2021

Table 12. Upper Prairie Dog Creek Priority Area 1 Annual Sediment Load Reductions (tons/yr)											
Fiscal Year	Grassland Management	Terraces	Terrace Rebuilds	Nutrient Management	Buffer/ Filter Strips	Field Borders	Relocate Feeding Site	*Septic System	*Abandon Wells	**Annual TOTAL**	**Cumulative TOTAL**
2012	210	151	184	0	27	24	0	0	0	596	596
2013	210	151	184	0	0	0	0	0	0	545	1141
2014	210	151	184	0	0	0	0	0	0	545	1685
2015	210	151	184	0	0	24	0	0	0	569	2254
2016	210	151	184	0	0	0	0	0	0	545	2799
2017	210	151	184	0	27	0	0	0	0	571	3370
2018	210	151	184	0	0	0	0	0	0	545	3915
2019	210	151	184	0	0	0	0	0	0	545	4459
2020	210	151	184	0	0	24	0	0	0	569	5028
2021	210	151	184	0	0	0	0	0	0	545	5573
2022	210	151	184	0	27	0	0	0	0	571	6144
2023	210	151	184	0	0	0	0	0	0	545	6689
2024	210	151	184	0	0	0	0	0	0	545	7233
2025	210	151	184	0	0	24	0	0	0	569	7802
2026	210	151	184	0	0	0	0	0	0	545	8347
2027	210	151	184	0	27	0	0	0	0	571	8918
2028	210	151	184	0	0	0	0	0	0	545	9463
2029	209	152	32	0	0	25	0	0	0	418	9880
Total	3778	2715	3159	0	107	121	0	0	0	9880	

17.0 BMP Implementation

The SLT has determined that specific BMPs will be targeted with implementation funds for cropland and rangeland practices. The BMPs that the LT has identified could potentially address more than one water quality impairment, therefore being more economical. However, the challenge we face is to be able to acquire the dollars necessary to help the producer put these practices on the ground. The cost share $ for the BMPs in the following table is based off the amounts currently used for federal and state cost share funding. Appendix 24.7 of this document shows the current county average rate per BMP.

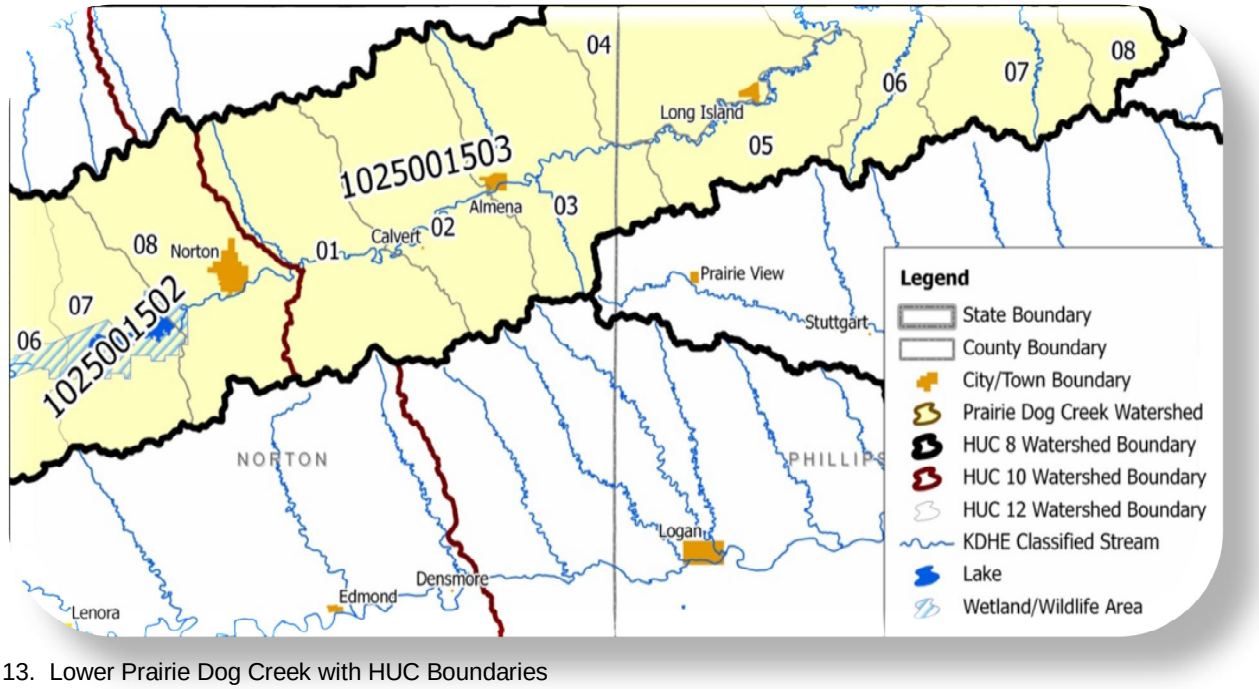
Table 13. Upper Prairie Dog Creek Total Cost for BMPs and I&E for Cost Share with 3% Annual Inflation

Year	Grassland Management Acres	Terraces Acres	Terrace Rebuilds Acres	Nutrient Management Acres	Buffer/Filter Strips Acres	Field Borders Acres	Feeding Site Relocation Units	Septic Upgrade/ Replacement Units	Abandon Wells Units	Total
1	$ 15,888.00	$ 176,440.00	$ 140,000.00	$ 25,476.00	$5,600.00	$ 8,550.00		$ 8,000.00	$ 676.00	$ 380,630.00
2	$ 16,364.64	$ 181,733.20	$ 144,200.00	$ 26,240.28				$ 8,240.00	$ 696.28	$ 377,474.40
3	$ 16,855.58	$ 187,185.20	$ 148,526.00	$ 27,027.49			$ 26,522.50	$ 8,487.20	$ 717.17	$ 415,324.13
4	$ 17,361.25	$ 192,800.75	$ 152,981.78	$ 27,838.31		$ 9,342.82		$ 8,741.82	$ 738.68	$ 409,809.41
5	$ 17,882.08	$ 198,584.77	$ 157,571.23	$ 28,673.46				$ 9,004.07	$ 760.84	$ 412,481.47
6	$ 18,418.55	$ 204,542.32	$ 162,298.37	$ 29,533.67	$6,491.93			$ 9,274.19	$ 783.67	$ 431,342.70
7	$ 18,971.10	$ 210,678.59	$ 167,167.32	$ 30,419.68				$ 9,552.42	$ 807.18	$ 437,596.29
8	$ 19,540.24	$ 216,998.94	$ 172,182.34	$ 31,332.27			$ 30,746.85	$ 9,838.99	$ 831.39	$ 481,471.02
9	$ 20,126.44	$ 223,508.91	$ 177,347.81	$ 32,272.23		$10,830.88		$ 10,134.16	$ 856.34	$ 475,076.78
10	$ 20,730.24	$ 230,214.18	$ 182,668.25	$ 33,240.40				$ 10,438.19	$ 882.03	$ 478,173.28
11	$ 21,352.14	$ 237,120.61	$ 188,148.29	$ 34,237.61	$7,525.93			$ 10,751.33	$ 908.49	$ 500,044.41
12	$ 21,992.71	$ 244,234.22	$ 193,792.74	$ 35,264.74				$ 11,073.87	$ 935.74	$ 507,294.03
13	$ 22,652.49	$ 251,561.25	$ 199,606.52	$ 36,322.68			$ 35,644.02	$ 11,406.09	$ 963.81	$ 558,156.87
14	$ 23,332.06	$ 259,108.09	$ 205,594.72	$ 37,412.36		$12,555.96		$ 11,748.27	$ 992.73	$ 550,744.20
15	$ 24,032.03	$ 266,881.33	$ 211,762.56	$ 38,534.74				$ 12,100.72	$1,022.51	$ 554,333.88
16	$ 24,752.99	$ 274,887.77	$ 218,115.44	$ 39,690.78	$8,724.62			$ 12,463.74	$1,053.19	$ 579,688.52
17	$ 25,495.58	$ 283,134.40	$ 224,658.90	$ 40,881.50				$ 12,837.65	$1,084.78	$ 588,092.82
18	$ 26,260.44	$ 291,628.44	$ 40,263.37	$ 42,107.95		$14,131.85	$ 41,321.19	$ 13,222.78	$1,117.32	$ 470,053.34

18.0 Lower Prairie Dog Creek Priority Areas

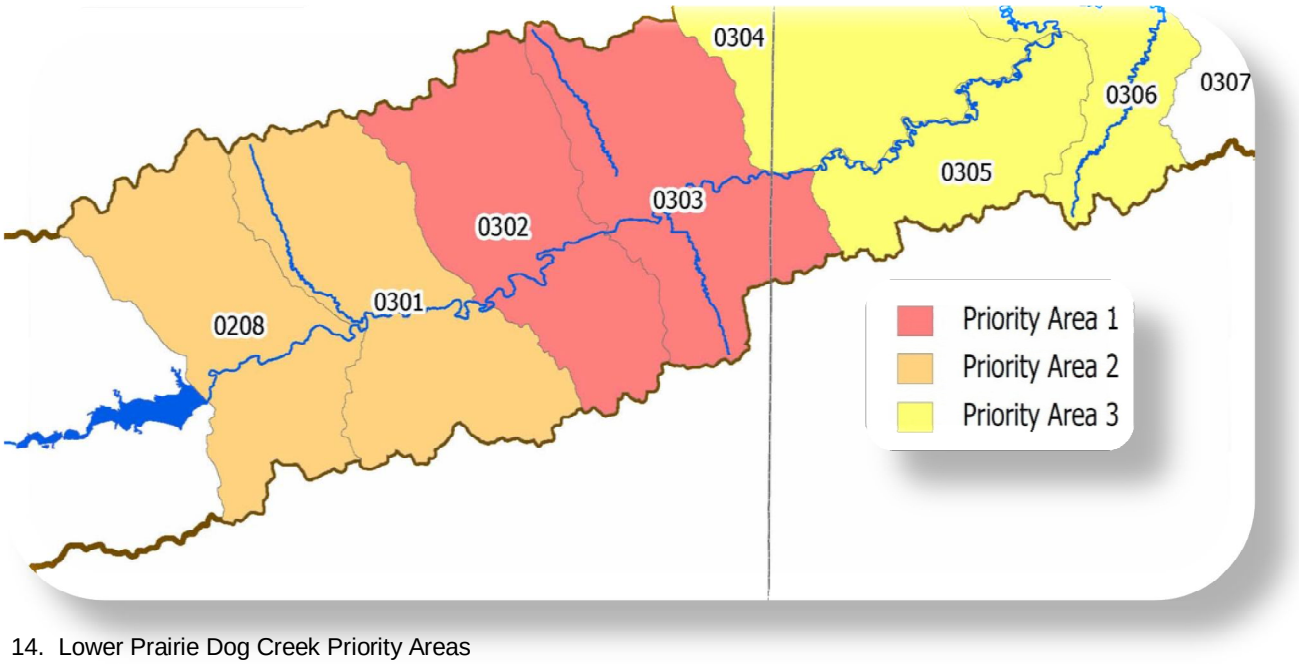
Lower Prairie Dog Creek currently has a draft TMDL for total phosphorus. The Lower Prairie Dog Creek TMDL indicates that decreased phosphorus loading on the portion of Prairie Dog Creek below Norton Lake will likely result in attainment of water quality standards and designated uses pertaining to this TMDL. Analysis of water quality data shows that a phosphorus load decrease of 15,846 lbs/yr at KDHE monitoring station SC230 could produce load reductions necessary to meet this TMDL. Within the context of this watershed plan, load reduction estimates from BMP implementation to take place in the Prairie Dog Creek watershed below Norton Lake should result in an estimated reduction of 15,846 lbs/yr of phosphorus. This phosphorus load reduction will be the watershed plan goal for Lower Prairie Dog Creek.

The Lower Portion of the Prairie Dog Creek begins at the outfall of the Keith Sebelius Lake and extends northeast to the Nebraska State line. The priority areas for the Lower PDC were broke up by the HUC 12s from the Norton lake to the Stateline into 3 priority areas based off the STEPL model results noted on page 29 of the Lower PDC draft TMDL.



13. Lower Prairie Dog Creek with HUC Boundaries

Table 14. Lower Prairie Dog Creek Priority Area Acres			
Priority Area	HUC 12	Cropland Acres	Grassland Acres
1	1025001500302	17539	65199
	102500150303	17739	66720
Total Acres Priority Area 1		35279	131919
2	102500150208	16267	62974
	102500150301	15741	84735
Total acres Priority Area 2		32008	147709
3	102500150304	18492	27219
	102500150305	6118	53190
	102500150306	7059	34400
Total Acres Priority Area 3		31669	114809
Total Acres All Priority Areas		98,956	394,437



14. Lower Prairie Dog Creek Priority Areas

Table 15. Lower Prairie Dog Creek Priority Area 1 Annual Phosphorus Load Reduction (lbs/yr)												
Fiscal Year	Grassland Management	Terraces	Terrace Rebuilds	Nutrient Management	Buffer/ Filter Strips	Field Borders	Relocate Feeding Site	*Septic System	*Abandon Wells	**Annual TOTAL**	**Cumulative TOTAL**	**% Reduction Achieved**
2012	396	0	0	62	40	21	0	23	0	**542**	**587**	**5%**
2013	396	0	212	62	0	0	0	23	0	**692**	**1279**	**11%**
2014	396	0	0	62	0	0	0	23	0	**481**	**1760**	**16%**
2015	396	0	212	62	0	21	0	23	0	**713**	**2474**	**22%**
2016	396	230	0	62	0	0	82	23	0	**793**	**3266**	**29%**
2017	396	0	212	62	0	0	0	23	0	**692**	**3959**	**35%**
2018	396	0	0	62	0	21	0	23	0	**502**	**4460**	**40%**
2019	396	0	212	62	40	0	0	23	0	**732**	**5193**	**46%**
2020	396	0	0	62	0	0	0	23	0	**481**	**5673**	**51%**
2021	396	230	212	62	0	21	82	23	0	**1025**	**6699**	**60%**
2022	396	0	0	62	0	0	0	23	0	**481**	**7179**	**64%**
2023	396	0	212	62	0	0	0	23	0	**692**	**7872**	**70%**
2024	396	0	0	62	0	21	0	23	0	**502**	**8373**	**75%**
2025	396	0	212	62	0	0	0	23	0	**692**	**9066**	**81%**
2026	396	230	0	62	40	0	82	23	0	**832**	**9898**	**88%**
2027	396	0	212	62	0	21	0	23	0	**713**	**10612**	**95%**
2028	396	0	0	62	0	0	0	23	0	**481**	**11092**	**99%**
2029	396	0	212	62	0	0	0	23	0	**692**	**11785**	**105%**
2030	396	0	0	62	0	21	0	23	0	**502**	**12286**	**110%**
2031	396	230	212	62	0	0	82	23	0	**1004**	**13291**	**119%**
2032	396	0	0	62	0	0	0	23	0	**481**	**13771**	**123%**
2033	396	0	212	62	40	21	0	23	0	**753**	**14525**	**130%**
2034	396	0	0	62	0	0	0	23	0	**481**	**15005**	**134%**
2035	396	0	212	62	0	0	0	23	0	**692**	**15698**	**140%**
2036	396	230	0	62	0	21	82	23	0	**814**	**16511**	**147%**
2037	396	0	212	62	0	0	0	23	0	**692**	**17204**	**154%**
2038	396	0	0	62	0	0	0	23	0	**481**	**17685**	**158%**
2039	396	0	212	62	0	21	0	23	0	**713**	**18398**	**164%**
2040	396	0	0	62	40	0	0	23	0	**521**	**18918**	**169%**
2041	396	230	212	62	0	0	82	23	0	**1004**	**19923**	**178%**
2042	396	0	0	62	0	21	0	23	0	**502**	**20425**	**182%**
2043	396	0	212	62	0	0	0	23	0	**692**	**21117**	**189%**
2044	396	0	0	62	0	0	0	23	0	**481**	**21598**	**193%**
2045	396	0	212	62	0	21	0	23	0	**713**	**22311**	**199%**
2046	396	230	0	62	0	0	82	23	0	**793**	**23104**	**206%**
2047	396	0	212	62	40	0	0	23	0	**732**	**23836**	**213%**
2048	396	0	0	62	0	21	0	23	0	**502**	**24338**	**217%**
2049	396	0	212	62	0	0	0	23	0	**692**	**25030**	**224%**
2050	396	0	0	62	0	0	0	23	0	**481**	**25511**	**228%**
2051	396	230	80	62	0	21	0	23	0	**812**	**26323**	**235%**
2052	396	0	0	62	0	0	0	23	0	**481**	**26803**	**239%**
2053	396	92	0	62	0	0	0	23	0	**573**	**27376**	**245%**
2054	63	0	0	63	40	21	0	23	0	**210**	**27586**	**246%**
Total	**16694**	**1932**	**4100**	**2653**	**279**	**316**	**574**	**989**	**4**	**27541**		

Table 16. Lower Prairie Dog Creek Priority Area 1 Annual Sediment Load Reduction (tons/yr)											
Fiscal Year	Grassland Management	Terraces	Terrace Rebuilds	Nutrient Management	Buffer/ Filter Strips	Field Borders	Relocate Feeding Site	*Septic System	*Abandon Wells	**Annual TOTAL**	**Cumulative TOTAL**
2012	272	0	0	0	25	15	0	0	0	**311**	**311**
2013	272	0	121	0	0	0	0	0	0	**393**	**704**
2014	272	0	0	0	0	0	0	0	0	**272**	**975**
2015	272	0	121	0	0	15	0	0	0	**408**	**1383**
2016	272	134	0	0	0	0	0	0	0	**406**	**1789**
2017	272	0	121	0	0	0	0	0	0	**393**	**2181**
2018	272	0	0	0	0	15	0	0	0	**286**	**2468**
2019	272	0	121	0	25	0	0	0	0	**418**	**2886**
2020	272	0	0	0	0	0	0	0	0	**272**	**3157**
2021	272	134	121	0	0	15	0	0	0	**542**	**3699**
2022	272	0	0	0	0	0	0	0	0	**272**	**3971**
2023	272	0	121	0	0	0	0	0	0	**393**	**4363**
2024	272	0	0	0	0	15	0	0	0	**286**	**4650**
2025	272	0	121	0	0	0	0	0	0	**393**	**5043**
2026	272	134	0	0	25	0	0	0	0	**431**	**5473**
2027	272	0	121	0	0	15	0	0	0	**408**	**5881**
2028	272	0	0	0	0	0	0	0	0	**272**	**6153**
2029	272	0	121	0	0	0	0	0	0	**393**	**6545**
2030	272	0	0	0	0	15	0	0	0	**286**	**6832**
2031	272	134	121	0	0	0	0	0	0	**527**	**7359**
2032	272	0	0	0	0	0	0	0	0	**272**	**7630**
2033	272	0	121	0	25	15	0	0	0	**433**	**8063**
2034	272	0	0	0	0	0	0	0	0	**272**	**8335**
2035	272	0	121	0	0	0	0	0	0	**393**	**8727**
2036	272	134	0	0	0	15	0	0	0	**421**	**9148**
2037	272	0	121	0	0	0	0	0	0	**393**	**9541**
2038	272	0	0	0	0	0	0	0	0	**272**	**9812**
2039	272	0	121	0	0	15	0	0	0	**408**	**10220**
2040	272	0	0	0	25	0	0	0	0	**297**	**10517**
2041	272	134	121	0	0	0	0	0	0	**527**	**11044**
2042	272	0	0	0	0	15	0	0	0	**286**	**11330**
2043	272	0	121	0	0	0	0	0	0	**393**	**11723**
2044	272	0	0	0	0	0	0	0	0	**272**	**11994**
2045	272	0	121	0	0	15	0	0	0	**408**	**12402**
2046	272	134	0	0	0	0	0	0	0	**406**	**12808**
2047	272	0	121	0	25	0	0	0	0	**418**	**13225**
2048	272	0	0	0	0	15	0	0	0	**286**	**13512**
2049	272	0	121	0	0	0	0	0	0	**393**	**13905**
2050	272	0	0	0	0	0	0	0	0	**272**	**14176**
2051	272	134	46	0	0	15	0	0	0	**467**	**14643**
2052	272	0	0	0	0	0	0	0	0	**272**	**14915**
2053	272	54	0	0	0	0	0	0	0	**326**	**15240**
2054	43	0	0	0	25	15	0	0	0	**83**	**15323**
Total	11451	1128	2343	0	175	223	0	0	4		

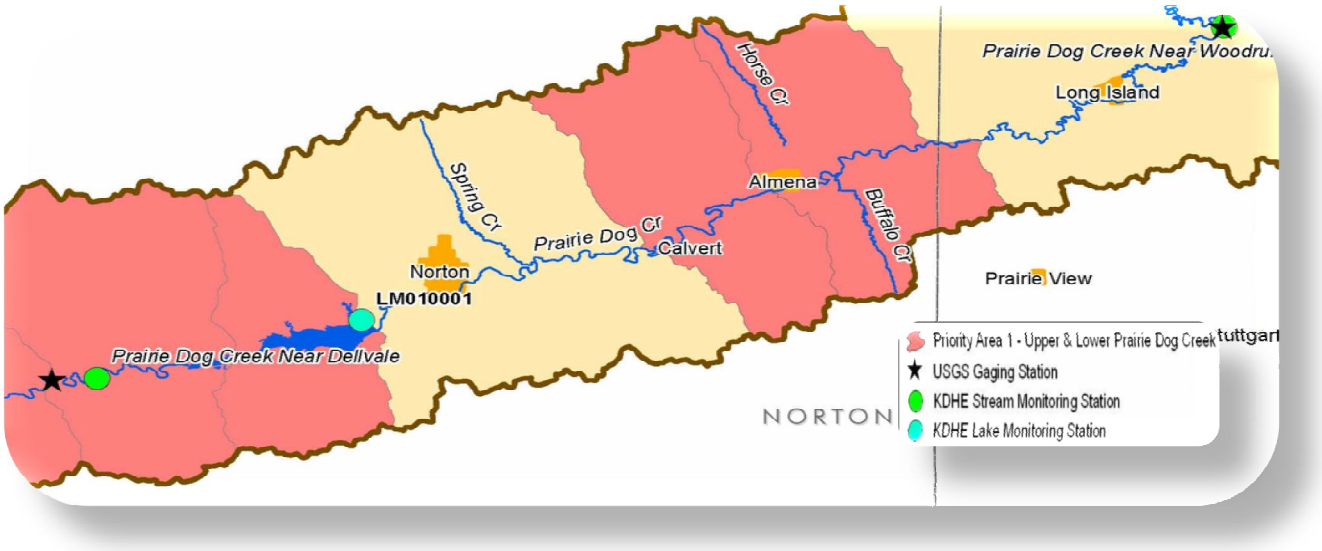
Table 17. Lower Prairie Dog Creek Total Cost for BMPs and I&E for Cost Share with 3% Annual Inflation										
Year	Grassland Management Acres	Terraces Acres	Terrace Rebuilds Acres	Nutrient Management Acres	Buffer/Filter Strips Acres	Field Borders Acres	Feeding Site Relocation Units	Septic Upgrade/ Replacement Units	Abandon Wells Units	Total
1	$24,000			$9,945	$5,600	$5,700		$4,000		$49,245
2	$24,720		$90,125	$10,243				$4,120	$348	$129,556
3	$25,462			$10,551				$4,244		$40,256
4	$26,225		$95,614	$10,867		$6,229		$4,371	$369	$143,675
5	$27,012	$155,320		$11,193			$28,138	$4,502		$226,165
6	$27,823		$101,436	$11,529				$4,637	$392	$145,817
7	$28,657			$11,875		$6,806		$4,776		$52,114
8	$29,517		$107,614	$12,231	$6,887			$4,919	$416	$161,585
9	$30,402			$12,598				$5,067		$48,068
10	$31,315	$180,059	$114,168	$12,976		$7,437	$32,619	$5,219	$441	$384,234
11	$32,254			$13,365				$5,376		$50,995
12	$33,222		$121,120	$13,766				$5,537	$468	$174,113
13	$34,218			$14,179		$8,127		$5,703		$62,227
14	$35,245		$128,497	$14,605				$5,874	$496	$184,717
15	$36,302	$208,737		$15,043	$8,471		$37,815	$6,050		$312,418
16	$37,391		$136,322	$15,494		$8,880		$6,232	$527	$321,790
17	$38,513			$15,959				$6,419		$331,444
18	$39,668		$144,624	$16,438				$6,611	$559	$341,387
19	$40,858			$16,931		$9,704		$6,810		$351,629
20	$42,084	$241,984	$153,432	$17,439			$43,838	$7,014	$593	$362,178
21	$43,347			$17,962				$7,224		$373,043
22	$44,647		$162,776	$18,501	$10,418	$10,604		$7,441	$629	$384,235
23	$45,986			$19,056				$7,664		$395,762
24	$47,366		$172,689	$19,627				$7,894	$667	$407,634
25	$48,787	$280,526		$20,216		$11,587	$50,820	$8,131		$419,863
26	$50,251		$183,206	$20,823				$8,375	$708	$432,459
27	$51,758			$21,447				$8,626		$445,433
28	$53,311		$194,363	$22,091		$12,661		$8,885	$751	$458,796
29	$54,910			$22,753	$12,812			$9,152		$472,560
30	$56,558	$325,206	$206,199	$23,436			$58,914	$9,426	$797	$486,737
31	$58,254			$24,139		$13,835		$9,709		$501,339
32	$60,002		$218,757	$24,863				$10,000	$845	$516,379
33	$61,802			$25,609				$10,300		$531,870
34	$63,656		$232,079	$26,377		$15,118		$10,609	$896	$547,827
35	$65,566	$377,003		$27,169			$68,298	$10,928		$564,261
36	$67,533		$246,213	$27,984	$15,758			$11,255	$951	$581,189
37	$69,559			$28,823		$16,520		$11,593		$598,625
38	$71,645		$261,207	$29,688				$11,941	$1,009	$616,584
39	$73,795			$30,579				$12,299		$635,081
40	$76,009	$437,050	$105,349	$31,496		$18,052		$12,668	$1,070	$654,134
41	$78,289			$32,441				$13,048		$673,758
42	$80,638	$186,202		$33,414				$13,440		$693,970
43	$83,057			$35,096	$19,380	$19,726		$13,843		$673,758
Total	***$2,051,613***	***$2,392,087***	***$3,175,791***	***$850,817***	***$79,325***	***$170,987***	***$320,441***	***$341,936***	***$12,931***	***$15,938,911***

Table 18. Prairie Dog Creek Watershed Total Plan Cost				
Year	I & E	TA	BMP Implementation	Total
2012	$10,550	$36,400	$429,875	$476,825
2013	$11,867	$37,492	$507,031	$556,389
2014	$11,192	$38,617	$455,580	$505,389
2015	$11,528	$39,775	$553,484	$604,788
2016	$11,874	$40,969	$638,647	$691,489
2017	$13,230	$42,198	$577,160	$632,588
2018	$12,597	$43,464	$489,711	$545,771
2019	$12,975	$44,767	$643,056	$700,798
2020	$13,364	$46,110	$523,144	$582,619
2021	$15,765	$47,494	$862,407	$925,666
2022	$14,178	$48,919	$551,039	$614,136
2023	$14,604	$50,386	$681,407	$746,397
2024	$15,042	$51,898	$620,384	$687,324
2025	$17,493	$53,455	$735,461	$806,408
2026	$15,958	$55,058	$866,752	$937,768
2027	$16,437	$56,710	$901,479	$974,625
2028	$16,930	$58,411	$919,537	$994,878
2029	$19,438	$60,164	$811,441	$891,042
2030	$17,961	$61,969	$351,629	$431,558
2031	$18,499	$63,828	$362,178	$444,505
2032	$19,054	$65,742	$373,043	$457,840
2033	$21,626	$67,715	$384,235	$473,575
2034	$20,215	$69,746	$395,762	$485,723
2035	$20,821	$71,839	$407,634	$500,294
2036	$21,446	$73,994	$419,863	$515,303
2037	$24,089	$76,214	$432,459	$532,762
2038	$22,752	$78,500	$445,433	$546,685
2039	$23,435	$80,855	$458,796	$563,086
2040	$24,138	$83,281	$472,560	$579,978
2041	$26,862	$85,779	$486,737	$599,378
2042	$25,608	$88,352	$501,339	$615,299
2043	$26,376	$91,003	$516,379	$633,758
2044	$27,167	$93,733	$531,870	$652,771
2045	$29,982	$96,545	$547,827	$674,354
2046	$28,822	$99,441	$564,261	$692,524
2047	$29,686	$102,425	$581,189	$713,300
2048	$30,577	$105,497	$598,625	$734,699
2049	$33,494	$108,662	$616,584	$758,740
2050	$32,439	$111,922	$635,081	$779,442
2051	$33,412	$115,280	$654,134	$802,826
2052	$34,414	$118,738	$673,758	$826,910
2053	$36,447	$122,300	$693,970	$852,718
2054	$37,540	$125,969	$673,758	$837,267
Total	**$921,885**	**$3,111,614**	**$24,546,698**	**$28,580,197**

19.0 Monitoring Sites in the Prairie Dog Creek WRAPS Project Area

Water quality milestones contained in this section are tied to the sampling stations that KDHE continues to monitor for water quality in each of the water bodies that will be positively affected by the BMP implementation schedule included in this plan. KDHE has several monitoring stations located with the Prairie Dog Creek WRAPS Project Area. The stations listed below will be utilized to measure water quality improvements throughout the implementation of the plan.

Table 19. Monitoring Sites in the Prairie Dog Creek Watershed		
Station ID	Water Body	Type of Station
SC230	Prairie Dog Creek near Woodruff	Permanent
SC549	Prairie Dog Creek near Dellvale	Permanent
LM010001	Norton Lake	



15. KDHE Monitoring Stations within the watershed.

The previous map shows KDHE stream monitoring stations as well as monitored lakes located within the Prairie Dog Creek WRAPS Project Area as well as the targeted areas for implementation that have been identified and discussed in previous sections of this plan. The permanent monitoring sites are continuously sampled, while the rotational sites are typically sampled every four years. The stream monitoring sites are sampled for nutrients, *E. Coli* bacteria, chemicals, turbidity, alkalinity, dissolved oxygen, pH, ammonia and metals. The KDHE lake monitoring sites are typically sampled once every 3 years between April and October. Lake monitoring sites are sampled for chlorophyll a, total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), turbidity, dissolved oxygen, and secchi disk depth. The pollutant indicators tested for at each site may vary depending on the season at collection time and other factors.

In addition to the KDHE monitoring stations, the Prairie Dog Creek Watershed has several USGS gauging stations located within the watershed that provides real-time flow information. Stream flow information for these sites as well as other gauging stations within Kansas can be found at http://ks.water.usgs.gov/.

20.0 Additional Water Quality Indicators

In addition to the monitoring data, other water quality indicators can be utilized by KDHE and the SLT. Such indicators may include anecdotal information from the SLT and other citizen groups within the watershed (skin rash outbreaks, fish kills, nuisance odors), which can be used to assess short-term deviations from water quality standards. These additional indicators can act as trigger-points that might initiate further revisions or modifications to the WRAPS plan by KDHE and the SLT.

- Taste and odor issues from public water supplies utilizing water from Norton Lake
- Occurrence of algal blooms in Norton Lake
- Visitor traffic to Norton Lake
- Boating traffic in Norton Lake
- Trends of quantity and quality of fishing in Norton Lake
- Beach closings

21.0 Evaluation of Monitoring Data

Monitoring data in the Prairie Dog Creek watershed will be used to determine water quality progress, track water quality milestones, and to determine the effectiveness of the implementation of conservation practices outlined in the plan. The schedule of review for the monitoring data will be tied to the water quality milestones that have been developed, as well as the frequency of the sampling data.

The implementation schedule and water quality milestones for the Prairie Dog Creek watershed extend through a 41-year period from 2011 to 2051. Throughout that period, KDHE will continue to analyze and evaluate the monitoring data collected. After the first ten years of monitoring and implementation of conservation practices, KDHE will evaluate the available water quality data to determine whether the water quality milestones have been achieved. If milestones are not achieved, KDHE will assist the Prairie Dog Creek WRAPS group to analyze and understand the context for non-achievement, as well as the need to review and/or revise the water quality milestones included in the plan. KDHE and the SLT can address any necessary modifications or revisions to the plan based on the data analysis. In 2051, at the end of the plan, a final determination can be made as to whether the water quality standards have been attained for Norton Lake as well as Prairie Dog Creek.

In addition to the planned review of the monitoring data and water quality milestones, KDHE and the SLT may revisit the plan in shorter increments. This would allow the group to evaluate newer available information, incorporate any revisions to applicable TMDLs, or address any potential water quality indicators that might trigger an immediate review.

In the year 2015, the plan will be reviewed and revised (if needed) according to results acquired from monitoring data. At this time, the SLT will review the following criteria in addition to any other concerns that may occur at that time:

1. The SLT will request a report from KDHE on water quality conditions in the watershed.
2. The SLT will request a report from KDHE concerning the 2014 TMDL revisions.
3. The SLT will request reports from the US Bureau of Reclamation (USBOR) and Kansas Department of Wildlife, Parks and Tourism (KDWPT) concerning water quality and quantity, wildlife, and any other concerns or observations at Norton Lake.

4 The SLT will request reports from NRCS and the Conservation Districts concerning BMP adoption rates and any other water quality and quantity issues.

5. The SLT will use all data and assistance available to determine progress toward achieving implementation milestones and progress toward achieving the water quality milestones listed in plan.
6. The SLT will discuss impairments on the 303d list and the possibility of addressing these impairments prior to them being listed as TMDLs.
7. The SLT will discuss the possible need for additional assessment data.
8. The SLT will discuss the possible need for revision of the pollution load reduction goals and BMP implementation schedule.

9. The SLT will discuss necessary adjustments and revisions needed to this plan to reach pollution load reduction goals.

22.0 BMP Implementation Milestones for Prairie Dog Creek

As previously stated, this plan estimates that it will take 43 years to fully implement the planned BMPs necessary to meet the load reduction goals for the impairments being addressed in the Prairie Dog Creek WRAPS Project Area. The Upper Prairie Dog Creek/Norton Lake BMP implementation schedule covers 19 years while the Lower Prairie Dog Creek BMP implementation schedule takes 43 years to fully implement. Several milestones and indicators have been developed, as included herein. The table below includes short term, mid-term, and long term goals for various parameters monitored in the watershed.

Table 20. Water Quality Milestones for Prairie Dog Creek Watershed

	Current Condition (2001-2010) Median TP	10 Year Goal		Long Term Goal	
		Improved Condition (2011-2020) Median TP	Total Reduction Needed	Improved Reduction Median TP	Total Reduction needed
Sampling Site	Total Phosphorus (median of data collected during indicated period) ppb				
Prairie Dog Creek Near Dellvale SC549	323	295	9%	200	38%
Prairie Dog Creek Near Woodruff SC230	752	628	16%	200	73%

Table 21. Water Quality Milestones for Norton Lake

	10 year Goal			Long Term Goal		Current condition (1986-2010) Average TP	10-Year Goal		Long Term Goal	
	Current Condition (1986-2010) Average TP	Improved Condition (2011-2020) Average TP	Total Reduction Needed	Improved Condition Average TP	Total Reduction Needed		Improved Condition (2011-2020) Average TP	Total reduction Needed	Improved Condition Average TP	Total Reduction Needed
Sampling Site	Total Phosphorus (average of data collected during indicated period),µg/L					Total Nitrogen(average of data collected during indicated period), mg/L				
Norton Lake LM010001	115	78	32%	45	61%	134%	1.17	13%	103%	23%

	10 year Goal			Long Term Goal		Current condition (1986-2010) Secchi (Avg)	10-Year Goal	Long Term Goal
	Current Condition (1986-2010) Chlorophyll a	Improved Condition (2011-2020) Chlorophyll a	Total Reduction Needed	Improved Condition Chlorophyll a	Total Reduction Needed		Improved Condition (2011-2020) Secchi (Avg)	Improved Condition Secchi (Avg)
Sampling Site	Total Phosphorus (average of data collected during indicated period),µg/L					Total Nitrogen(average of data collected during indicated period), mg/L		
Norton Lake LM010001	15.3	12.2	20%	9.4	39%	0.98	1.05	>1.10

Table 22. Upper Prairie Dog Creek Milestones									
Fiscal Year	Grassland Management	Terraces	Terrace Rebuilds	Nutrient Management	Buffer/ Filter Strips	Field Borders	Relocate Feeding Site	*Septic System	*Abandon Wells
2012	1324	802	1000	772	50	30		2	2
2013	1324	802	1000	772				2	2
2014	1324	802	1000	772			1	2	2
2015	1324	802	1000	772		30		2	2
Short Term Milestone	5296	3208	4000	3088	50	60	1	8	8
2016	1324	802	1000	772				2	2
2017	1324	802	1000	772	50			2	2
2018	1324	802	1000	772				2	2
2019	1324	802	1000	772			1	2	2
2020	1324	802	1000	772		30		2	2
Mid Term Milestone	11916	7218	9000	6948	100	90	2	18	18
2021	1324	802	1000	772				2	2
2022	1324	802	1000	772	50			2	2
2023	1324	802	1000	772				2	2
2024	1324	802	1000	772			1	2	2
2025	1324	802	1000	772		30		2	2
2026	1324	802	1000	772				2	2
2027	1324	802	1000	772	50			2	2
2028	1324	802	1000	772				2	2
2029	1321	810	174	774		30	1	2	2
Long Term Milestone	23829	14444	17174	13898	200	150	*4	*36	*36
*Indicates # of Units									

Table 23. Lower Prairie Dog Creek Milestones									
Fiscal Year	Grassland Management	Terraces	Terrace Rebuilds	Nutrient Management	Buffer/ Filter Strips	Field Borders	Relocate Feeding Site	*Septic System	*Abandon Wells
2012	2000			304	50	20		1	
2013	2000		630	304				1	1
2014	2000			304				1	
2015	2000		630	304		20		1	1
Short Term Milestone	8000		1260	1216	50	40		4	2
2016	2000	630		304			1	1	
2017	2000		630	304				1	1
2018	2000			304		20		1	
2019	2000		630	304	50			1	1
2020	2000			304				1	
2021	2000	630	630	304		20	1	1	1
2022	2000			304				1	
2023	2000		630	304				1	1
2024	2000			304		20		1	
2025	2000		630	304				1	1
2026	2000	630		304	50		1	1	
2027	2000		630	304		20		1	1
2028	2000			304				1	
2029	2000		630	304				1	1
2030	2000			304		20		1	
Mid Term Milestone	38000	1890	5670	5776	150	140	3	14	9
2031	2000	630	630	304			1	1	1
2032	2000			304				1	
2033	2000		630	304	50	20		1	1
2034	2000			304				1	
2035	2000		630	304				1	1
2036	2000	630		304		20	1	1	
2037	2000		630	304				1	1
2038	2000			304				1	
2039	2000		630	304		20		1	1
2040	2000			304	50			1	
2041	2000	630	630	304			1	1	1
2042	2000			304		20		1	
2043	2000		630	304				1	1
2044	2000			304				1	
2045	2000		630	304		20		1	1
2046	2000	630		304			1	1	
2047	2000		630	304	50			1	1
2048	2000			304		20		1	
2049	2000		630	304				1	1
2050	2000			304				1	
2051	2000	630	239	304		20		1	1
2052	2000			304				1	
2053	2000	253		304				1	
2054	317			310	50	20		1	
Long Term Milestone	82317	5293	12209	12774	350	300	*7	*23	*20
* Indicates # of Units									

23.0 Information and Education Activities

The SLT has determined which information and education activities will be needed in the watershed. These activities are important in providing residents/landowners in the watershed with a higher awareness of watershed issues. Ultimately this could lead to an increase in adoption rates of BMPs. Overall I&E success will be measured by using tools to evaluate the effectiveness of the I&E activity. Evaluations will include; feedback forms, pre and post surveys, and follow up one on one contact, phone calls or emails.

Table 24. Potential Financial/Technical Assistance Sources

Potential Financial/Technical Sources	Programs Offered	Technical Assistance	Financial Assistance
Natural Resources Conservation Service NRCS	Environmental Quality Incentives Program (EQIP)	X	X
	Conservation Reserve Program (CRP)	X	
	Wildlife Habitat Incentive Program (WHIP)	X	X
	State Acres for Wildlife Enhancement (SAFE)	X	
	Grassland Reserve Program (GRP)	X	X
	Wetland Reserve Program (WRP)	X	X
	Farmable Wetlands Program (FWP)	X	X
Farm Service Agency FSA	Conservation Reserve Program (CRP)	X	X
	State Acres for Wildlife Enhancement (SAFE)	X	X
Environmental Protection Agency EPA **Kansas Department of Health and Environment** KDHE	319 Grant Funding	X	X
Division Of Conservation DOC **County Conservation Districts**	State Cost Share		X
Kansas Department of Wildlife and Parks KDWP		X	
Kansas Alliance for Wetlands and Streams KAWS		X	
Pheasants Forever		X	
National Wild Turkey Federation		X	
Quail Unlimited		X	
Ducks Unlimited		X	
Upper Republican Basin Advisory Committee URBAC		X	
Kansas Rural Center KRC		X	
Northwest Local Environmental Protection Group NWLEPG		X	
K-State Research and Extension KSRE		X	
Kansas Forest Service KFS		X	
Us Fish and Wildlife		X	

Table 25. BMP Information and Education Activities

BMP	Demographic	I&E Activity	Time Frame	Estimated Cost	Technical/financial Assistance
Grassland Management	Landowners & Producers in High Priority TMDL areas	Demonstration Channel Rock Crossing	1 every 10 years	$2,800.00	NRCS, Norton County Conservation District, Twin Creeks Extension
		Newsletter Articles	Biannual		
		Newspaper Articles	Biannual		
		Outreach through Website	Monthly		
		Grazing Informational Meeting	1 every 4 years		
		Demonstration on Solar Pumps	1 every 4 years		
		One on One meetings with Producers	Ongoing		
New Terraces/ Terrace Rebuilds	Landowners & Producers in High Priority TMDL areas	Display Tabletop Model	All Informational Meetings	$1,100.00	NRCS, Norton County Conservation District
		Newsletter Articles	Biannual		
		Newspaper Articles	Biannual		
		Outreach through Website	Monthly		
		One on One meetings with Producers	Ongoing		
Nutrient Management	Landowners & Producers in High Priority TMDL areas	Demonstration Streambank Stabilization	1 every 10 years	$400.00	NRCS, Norton County Conservation District, Twin Creeks Extension
		Newsletter Articles	Biannual		
		Newspaper Articles	Biannual		
		Outreach through Website	Monthly		
		Nutrient Management Informational Meeting	1 every 4 years		
		One on One meetings with Producers	Ongoing		
Buffer/ Filter Strips & Field Borders	Landowners & Producers in High Priority TMDL areas	Newsletter Articles	Biannual	$125.00	NRCS, Norton County Conservation District, Twin Creeks Extension, FSA, Longspur Pheasants Forever Chapter
		Newspaper Articles	Biannual		
		Outreach through Website	monthly		
		One on One meetings with Producers	Ongoing		
Feeding Site Relocation	Landowners & Producers in High Priority TMDL areas	Demonstration Project	1 every 7 yrs	$1,000.00	NRCS, Norton County Conservation District,
		Newsletter Articles	Biannual		
		Newspaper Articles	Biannual		
		Outreach through Website	Monthly		
		One on One meetings with Producers	Ongoing		
Septic System Upgrade/Replacement & Abandon Wells	Property Owners in TMDL	One on One Contact with Producers	Ongoing	$125.00	Norton County Conservation District
		Newsletter Articles	Biannual		
		Newspaper Articles	Biannual		
		Outreach through Website	Monthly		
Youth Education	Youth Throughout the Prairie Dog Creek Watershed	Poster & Essay Contest Pre K- 6th Grade	Annually	$2,500.00	NRCS, Norton County Conservation District, Twin Creeks Extension, FSA, Farm Bureau
		WACKY Day at Kirwin Reservoir	Annually		
		Water Jamboree at Harlan Lake	Annually		
		Kids Round Up in Oberlin	Annually		
Adult Education	Adults Throughout the Prairie Dog Creek Watershed	Newsletter	Biannual	$2,500.00	NRCS, Norton County Conservation District, Norton County Extension, FSA, Farm Bureau
		Newspaper	Biannual		
		All Demonstration Projects			
		Lawn & Garden Workshop	Biannual		
		Educational Meetings for NRCS Programs	1 every 4 years		

24.0 Appendix

Appendix Table 24.1 Prairie Dog Creek Watershed Needs Inventory						
Upper Prairie Dog Creek TMDL Total Phosphorus/Norton Lake Eutrophication						
Priority Area 1 HUC 102500150205, 102500150206, 102500150207						
Cropland Treatment Needs: Management						
Total Acres of Cropland	Acres Cropland needing treatment	Acres needing Enhanced Nutrient Management	Acres needing Enhanced Pesticide Management	Acres with Nutrient Management Plan	Acres with Annual Soil Sampling	Acres in No-till
49636	13898	17273	2929	10473	596	17174
	28.00%	34.80%	5.90%	21.10%	1.20%	25.00%
Acres in Ridge Till	Acres in Conservation Tillage	Increased Crop Residue needed				
1688	24868	5907				
3.00%	50.10%	20.00%				
Cropland BMP Needs: Structural						
Acres Needing Structural Treatment	Acres Needing New Terraces	Acres Needing Terrace Restoration	Acres of New Waterways	Acres of Waterway Restoration	Acres Needing Diversions	Acres Needing Grade Stabilization
11863	14444	17174	50	0	943	0
23.90%	29.10%	34.60%	0.10%	0.00%	1.90%	0%
Acres Needing Sediment Control Basins	Acres Needing Conservation to Permanent Vegetation	Acres Needing Conservation to Wetland				
0	2383	50				
0%	4.80%	0.10%				
Livestock BMP Needs						
Total Acres of Rangeland/Grassland	Acres of Grassland Needing Treatment					
38188	23829					
	62.40%					

Appendix Table 24.2 Prairie Dog Creek Watershed Needs Inventory						
Upper Prairie Dog Creek TMDL Total Phosphorus/Norton Lake Eutrophication						
Priority Area 2 HUC 102500150203, 102500150204						
Cropland Treatment Needs: Management						
Total Acres of Cropland	Acres Cropland needing treatment	Acres needing Enhanced Nutrient Management	Acres needing Enhanced Pesticide Management	Acres with Nutrient Management Plan	Acres with Annual Soil Sampling	Acres in No-till
33392	9350	11620	1970	7046	401	11554
	28.00%	34.80%	5.90%	21.10%	1.20%	34.60%
Acres in Ridge Till	Acres in Conservation Tillage	Increased Crop Residue needed				
1135	16729	3974				
3.40%	50.10%	11.90%				
Cropland BMP Needs: Structural						
Acres Needing Structural Treatment	Acres Needing New Terraces	Acres Needing Terrace Restoration	Acres of New Waterways	Acres of Waterway Restoration	Acres Needing Diversions	Acres Needing Grade Stabilization
7981	9717	11554	33	0	634	0
23.90%	29.10%	34.60%	0.10%	0.00%	1.90%	0%
Acres Needing Sediment Control Basins	Acres Needing Conservation to Permanent Vegetation	Acres Needing Conservation to Wetland				
0	1603	33				
0%	4.80%	0.10%				
Livestock BMP Needs						
Total Acres of Grassland	Acres of Grassland Needing Treatment					
20153	12575					
	62.40%					

Appendix Table 24.3 Prairie Dog Creek Watershed Needs Inventory						
Upper Prairie Dog Creek TMDL Total Phosphorus/Norton Lake Eutrophication						
Priority Area 3 HUC 102500150107, 102500150201, 1025000150202						
Cropland Treatment Needs: Management						
Total Acres of Cropland	Acres Cropland needing treatment	Acres needing Enhanced Nutrient Management	Acres needing Enhanced Pesticide Management	Acres with Nutrient Management Plan	Acres with Annual Soil Sampling	Acres in No-till
65267	18275	22713	3851	13771	783	22582
	28.00%	34.80%	5.90%	21.10%	1.20%	34.60%
Acres in Ridge Till	Acres in Conservation Tillage	Increased Crop Residue needed				
2219	32699	7767				
3.40%	50.10%	11.90%				
Cropland BMP Needs: Structural						
Acres Needing Structural Treatment	Acres Needing New Terraces	Acres Needing Terrace Restoration	Acres of New Waterways	Acres of Waterway Restoration	Acres Needing Diversions	Acres Needing Grade Stabilization
15599	18993	22582	65	0	1240	0
23.90%	29.10%	34.60%	0.10%	0.00%	1.90%	0%
Acres Needing Sediment Control Basins	Acres Needing Conservation to Permanent Vegetation	Acres Needing Conservation to Wetland				
0	3133	65				
0%	4.80%	0.10%				
Livestock BMP Needs						
Total Acres of Rangeland/Grassland	Acres of Grassland Needing Treatment					
33477	20890					
	62.40%					

Appendix table 24.4 Prairie Dog Creek Watershed Needs Inventory						
Lower Prairie Dog Creek TMDL Total Phosphorus/Norton Lake Eutrophication						
Priority Area 1 HUC 102500150302, 102500150303						
Cropland Treatment Needs: Management						
Total Acres of Cropland	Acres Cropland needing Treatment	Acres needing Enhanced Nutrient Management	Acres needing Enhanced Pesticide Management	Acres with Nutrient Management Plan	Acres with Annual Soil Sampling	Acres in No-till
35287	12774	12280	2082	7446	432	8822
	36.20%	34.80%	5.90%	21.10%	1.20%	25.00%
Acres in Ridge Till	Acres in Conservation Tillage	Increased Crop Residue needed				
1059	17679	7057				
3.00%	50.10%	20.00%				
Cropland BMP Needs: Structural						
Acres Needing Structural Treatment	Acres Needing New Terraces	Acres Needing Terrace Restoration	Acres of New Waterways	Acres of Waterway Restoration	Acres Needing Diversions	Acres Needing Grade Stabilization
5293	5293	12209	35	4	670	0
15.00%	15.00%	34.60%	0.10%	0.00%	1.90%	0%
Acres Needing Sediment Control Basins	Acres Needing Conservation to Permanent Vegetation	Acres Needing Conservation to Wetland				
0	1694	35				
0%	4.80%	0.10%				
Livestock BMP Needs						
Total Acres of Rangeland/Grassland	Acres of Grassland Needing Treatment					
131919	82317					
	62.40%					

Appendix Table 24.5 Prairie Dog Creek Watershed Needs Inventory						
Lower Prairie Dog Creek TMDL Total Phosphorus						
Priority Area 2 HUC 102500150208, 102500150301						
Cropland Treatment Needs: Management						
Total Acres of Cropland	Acres Cropland needing treatment	Acres needing Enhanced Nutrient Management	Acres needing Enhanced Pesticide Management	Acres with Nutrient Management Plan	Acres with Annual Soil Sampling	Acres in No-till
32008	11587	11139	1888	6754	384	8002
	36.20%	34.80%	5.90%	21.10%	1.20%	25.00%
Acres in Ridge Till	Acres in Conservation Tillage	Increased Crop Residue needed				
960	16036	6402				
3.00%	50.10%	20.00%				
Cropland BMP Needs: Structural						
Acres Needing Structural Treatment	Acres Needing New Terraces	Acres Needing Terrace Restoration	Acres of New Waterways	Acres of Waterway Restoration	Acres Needing Diversions	Acres Needing Grade Stabilization
4801	4801	11075	32	3	608	0
15.00%	15.00%	34.60%	0.10%	0.00%	1.90%	0%
Acres Needing Sediment Control Basins	Acres Needing Conservation to Permanent Vegetation	Acres Needing Conservation to Wetland				
0	1536	32				
0%	4.80%	0.10%				
Livestock BMP Needs						
Total Acres of Rangeland/Grassland	Acres of Grassland Needing Treatment					
147709	92170					
	62.40%					

Appendix Table 24.6 Prairie Dog Creek Watershed Needs Inventory						
Lower Prairie Dog Creek TMDL Total Phosphorus						
Priority Area 3 HUC 102500150304, 102500150305, 102500150306, 102500150307						
Cropland Treatment Needs: Management						
Total Acres of Cropland	Acres Cropland needing Treatment	Acres needing Enhanced Nutrient Management	Acres needing Enhanced Pesticide Management	Acres with Nutrient Management Plan	Acres with Annual Soil Sampling	Acres in No-till
31669	11464	11021	1868	6682	380	7917
	36.20%	34.80%	5.90%	21.10%	1.20%	25.00%
Acres in Ridge Till	Acres in Conservation Tillage	Increased Crop Residue needed				
950	15866	6334				
3.00%	50.10%	20.00%				
Cropland BMP Needs: Structural						
Acres Needing Structural Treatment	Acres Needing New Terraces	Acres Needing Terrace Restoration	Acres of New Waterways	Acres of Waterway Restoration	Acres Needing Diversions	Acres Needing Grade Stabilization
4750	4750	10957	32	3	602	0
15.00%	15.00%	34.60%	0.10%	0.00%	1.90%	0%
Acres Needing Sediment Control Basins	Acres Needing Conservation to Permanent Vegetation	Acres Needing Conservation to Wetland				
0	1536	32				
0%	4.80%	0.10%				
Livestock BMP Needs						
Total Acres of Rangeland/Grassland	Acres of Grassland Needing Treatment					
114809	71641					
	62.40%					

Appendix Table 24.7 FY 2012 BMP County Cost Average				
FY 2012 Planned BMPs Upper Prairie Dog Creek/Keith Sebelius Lake				
BMP	**Units**	**Cost**	**Total**	
Grassland Management	2000 ac	$12.00 per acre	$24,000	
Terraces	1000 ac	.69 per ft	$138,000	1000 ac= 200,000 ft
Terrace Rebuilds	1000ac	.50 per ft	$87,500	
Nutrient Management	1500 ac	$6.63 per acre	$9,945	
Buffer /Filter Strips	50 ac	$112.00 per acre	$5,600	
Field Borders	30 ac	$114.00 per acre	$3,420	
Feeding Site Relocation	1 unit	$24.09 per ft	$25,000	
Septic Systems	2 units	$2,000 per unit	$4,000	
Abandon Wells	1 unit	$8.04 per ft	$338	Based on 60' average depth
FY 2012 Planned BMPs Lower Prairie Dog Creek				
BMP	**Units**	**Cost**	**Total**	
Grassland Management	2000 ac	$12.00 per acres	$24,000	
Terraces	1000 ac	.69 per ft	$138,000	1000 ac= 200,000 ft
Terrace Rebuilds	1000ac	.50 per ft	$87,500	
Nutrient Management	1500 ac	$6.63 per acre	$9,945	
Buffer /Filter Strips	50 ac	$112.00 per acre	$5,600	
Field Borders	30 ac	$114.00 per acre	$3,420	
Feeding Site Relocation	1 unit	$24.09 per ft	$25,000	
Septic Systems	2 units	$2,000 per unit	$4,000	
Abandon Wells	1 unit	$8.04 per ft	$338	Based on 60' average depth
Feeding Site Relocation includes but is not limited to; Fencing, Pipelines, Wells, Solar Pumps, Tanks, and Windbreaks.				

25.0 Glossary of BMPs (Best Management Practice)

Based on the finding in the needs inventory these BMPs were selected as practices that we feel need to be implemented to reach our load reduction goals.

Grassland Management

25.1 Rotational Grazing- A process of planned grazing that encourages pasture growth, provides maximum benefits to the animals, and prevents overgrazing.

5. Rotational Grazing in the Prairie Dog Creek Watershed

Range Planting-establishment of perennial vegetation.

CRP-Conservation Reserve Program-Reduces soil erosion, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources it encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter strips, or riparian buffers.

Windbreak- Line of trees or shrubs serving as a protection from the wind by breaking its force.

Fencing- Installation of fencing to control where livestock grazes.

Livestock Well- Excavation or structure created in the ground by digging, driving, boring or drilling to access groundwater in underground aquifers for livestock watering use.

Pipeline-Series of pipe, often underground, with pumps and valves for flow control, used to transport water, especially over great distances.

Tank installation- Alternative water source.

Solar Energy Pump-Water pump used for pumping ground water by use of sun energy.
Stream Crossing-Provides a hard, stable area where livestock or equipment can cross a stream without damaging the streambed or banks.

6.Channel Rock Crossing on the Prairie Dog Creek.

25.2 Terrace- Channel or ridge channel constructed across a slope to intercept runoff from a rain event.

25.3 Terrace Rebuilds- Any terrace that exceeds 20 years of age and does not meet the conservation needs.

25.4 Nutrient Management- Managing the amount, source, placement, form and timing of the application and soil.

Manure Spreading-The spreading of animal manure or organic byproducts for application of nutrient sources for crop production.

Soil Sample- Random sample of soil to determine the amount of minerals available for crop production.

Crop Rotation- Planned order of specific crops planted on the same land.

Cover Crops-Planted primarily to manage soil fertility, soil quality, water, weeds, pests, diseases, biodiversity and wildlife.

Contour Farming-The practice of tilling sloped land along lines of consistent elevation in order to conserve rainwater and to reduce soil losses from surface erosion.

No-Till-A way of growing crops from year to year without disturbing the soil through tillage.

25.5 Buffer/Filter Strips-Small areas or strips of land in permanent vegetation, designed to intercept pollutants and manage other environmental concerns.

25.6 Field Strips-Permanent vegetation established at the edge or around the perimeter of a field. Used to reduce soil erosion as well as protect soil and water quality.

25.7 Feeding Site Relocation-Moving the location that livestock are either encouraged to feed or naturally feed to a place that fewer pollutants can enter the rivers and streams from rainfall events**.**

25.8 Septic Upgrade/Replacement- Replacing a failing septic system to prevent safety hazards from people and animals and to eliminate contamination of surface and ground water.

25.9 Abandon Wells-Wells that are not in use that require plugging to prevent potential contamination of ground water as well as physical hazards to animals and people, particularly children.