Spring River WRAPS – 9 Element Watershed Plan Summary- SeeKan RC&D

Directly addressing:

Since there are no TMDL's for Grand Lake, the number one goal of the Spring River Watershed 9 Element Plan is a 30% load reduction of nutrients at state line as stated in the Kansas Nutrient Management Plan.

Positively Effecting 303 d-listed waters:

Shoal Creek near Galena (TP)

Cow Creek near Lawton (TP)

Short Creek near Galena (TP)

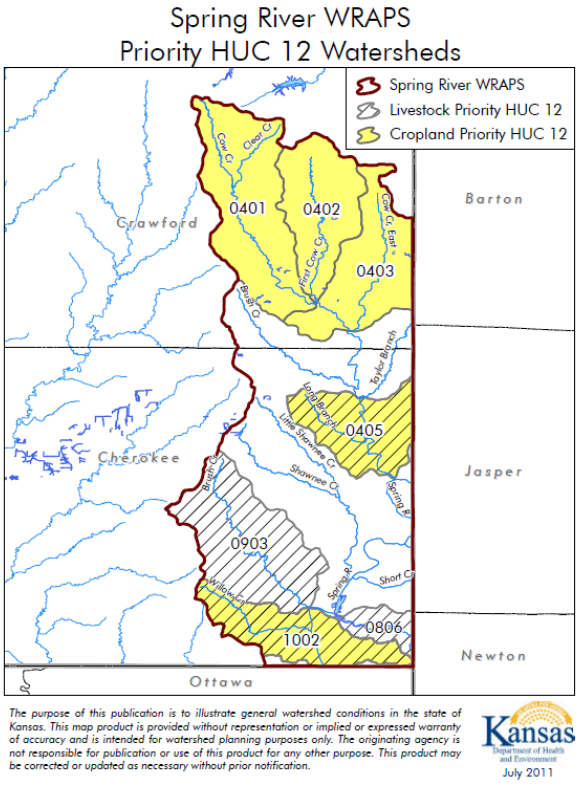
Mined Land Lake 01 (EU)

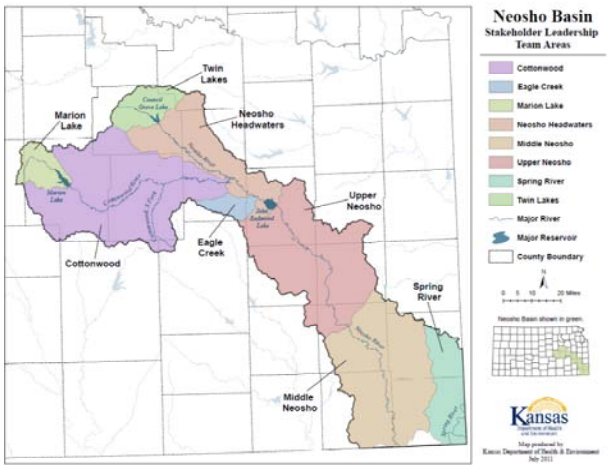
Mined Land Lake 06 (EU)

Playter's Lake (EU)

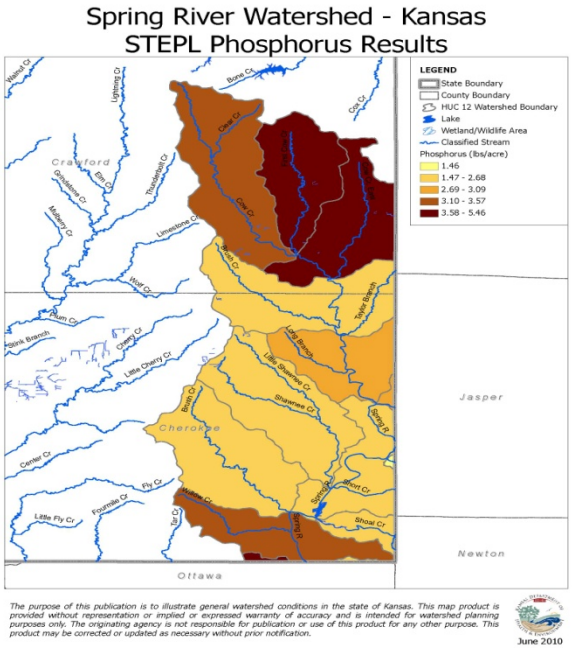
Pittsburg College Lake (EU)

Prioritized Critical Areas for Targeting BMPs





Targeting Considerations:



- Cropland Targeted areas were identified after reviewing the Spring River Watershed STEPL and gaining local knowledge, the Spring River SLT choose five priority areas for Cropland BMP Implementation
- Livestock Targeted areas were identified after reviewing KDHE monitoring data and the Spring River 303 d-listed waters. Then after reviewing a Spring River watershed CAFO map two other subwatersheds were identified.

Spring River WRAPS – 9 Element Watershed Plan Summary- SeeKan RC&D

Best Management Practices and Load Reduction Goals

Best Management Practices (BMPs) to address phosphorus and sediment in the watershed where chosen by the SLT based on local acceptance/adoptability and the amount of load reduction gained per dollar spent.

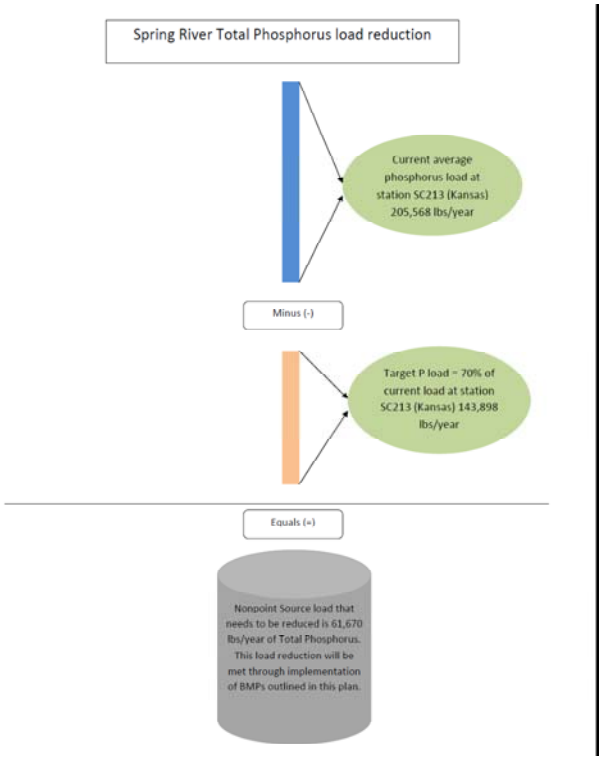
Phosphorus/Sediment Reducing Cropland BMPs

- Buffers
- Grassed Waterway
- No-Till
- Terraces
- Nutrient Management Plan

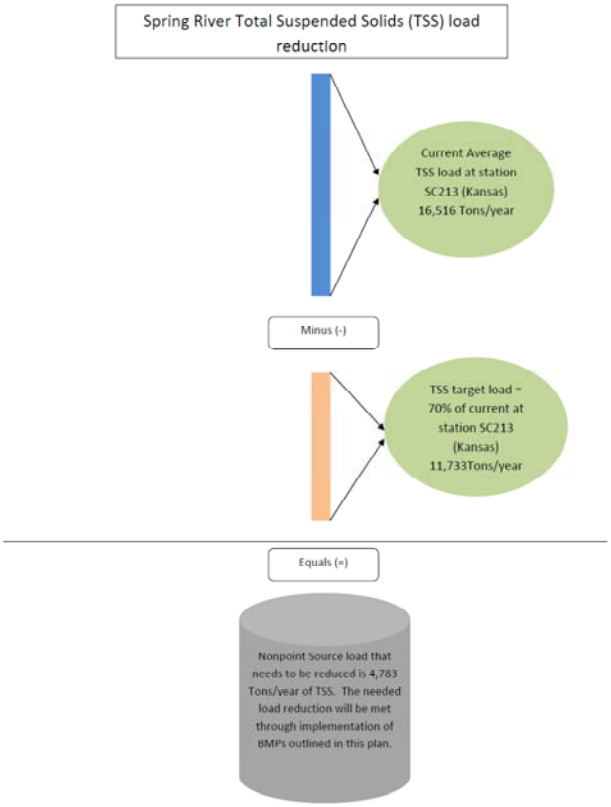
Phosphorus/Sediment Reducing Livestock BMPs

- Vegetative Filter Strip
- Relocate Feeding Pens
- Relocate Pasture Feeding Sites
- Alternative (Off-Stream) Watering System
- Nutrient Management Plan

Total Phosphorus load reduction needed to meet the 30% reduction is 61,670 lbs/year



Total Sediment load reduction needed to meet the 30% reduction is 4,783 Tons/year



SPRING RIVER

Watershed Restoration and Protection Strategy

By

Jessica Gordon

Final Draft Plan September 30, 2011

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

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PREFACE

The purpose of this Watershed Restoration and Protection Strategy (WRAPS) document for Spring River Watershed is to outline a plan of restoration and protection goals and actions for the surface waters of the watershed. Watershed goals are characterized as "restoration" or "protection". Watershed restoration is for surface waters that do not meet water quality standards (WQS), and for areas of the watershed that need improvement in habitat, land management, or other attributes. Watershed Protection is needed for surface waters that currently meet WQSs, but are in need of protection from future issues.

The WRAPS development process involves local communities and governmental agencies working together toward the common goal of a healthy environment. Local participants or stakeholders provide valuable grass roots leadership, responsibility and management of resources in the process. They have the most "at stake" in ensuring the water quality existing on their land is protected. Agencies bring science-based information, communication, and technical and financial assistance to the table. Together, several steps can be taken towards watershed restoration and protection. These steps involved building awareness and education, engaging local leadership, monitoring, and evaluation of watershed conditions, in addition to assessment, planning, and implementation of the WRAPS process at the local level. Final goals for the watershed at the end of the WRAPS process are to provide a sustainable water source for drinking and domestic use while preserving food, fiber, and timber production. Other crucial objectives are to maintain recreational opportunities and biodiversity while protection the environment from flooding, and from the negative effects of urbanization and industrial production. The ultimate goal is watershed restoration and protection that will be "locally led and driven" in conjunction with government agencies in order to better the environment for everyone.

This document is intended to serve as an overall strategy to guide watershed restoration and protection efforts by individuals, local, state, and federal agencies and organizations. At the end of the WRAPS process, the Stakeholder Leadership Team (SLT) will have the capability, capacity, and confidence to make decisions that will restore and protect the water quality in the Spring River Watershed.

GLOSSARY

Best Management Practices (BMP): Environmental protection practices used to control pollutants, such as sediment or nutrients, from common agricultural or urban land use activities.
Designated Uses: Recognized uses by KDHE that should be attained in a water body.
Dissolved Oxygen (DO): Amount of oxygen dissolved in water.
E. coli bacteria: Bacteria normally found in gastrointestinal tracts of animals. Some strains cause diarrheal diseases.
National Pollutant Discharge Elimination System (NPDES) Permit: Required by Federal law for all point source discharges into waters.
Nitrates: Final product of ammonia's biochemical oxidation. Primary source of nitrogen for plants. Contained in manure and fertilizers.
Nitrogen (N): Element that is essential for plants and animals. Total Nitrogen (TN) is a chemical measurement of all nitrogen forms in a water sample.
Nutrients: Nitrogen and Phosphorus in water source.
Phosphorus (P or TP): Element in water that, in excess, can lead to increased biological activity.
Riparian Zone: Margin of vegetation within approximately 100 feet of waterway.
Sedimentation: Deposition of slit, clay or sand in slow moving waters.
Stakeholder Leadership Team (SLT): Organization of watershed residents, landowners, farmers, agency personal, and all persons with an interest in water quality.
Total Maximum Daily Load (TMDL): Maximum amount of pollutant that a specific body of water can receive without violating the surface water-quality standards, resulting in failure to support their designated uses.
Total Suspended Solids(TSS): Measure of the suspended organic and inorganic solids in water. Used as an indicator of sediment or silt.

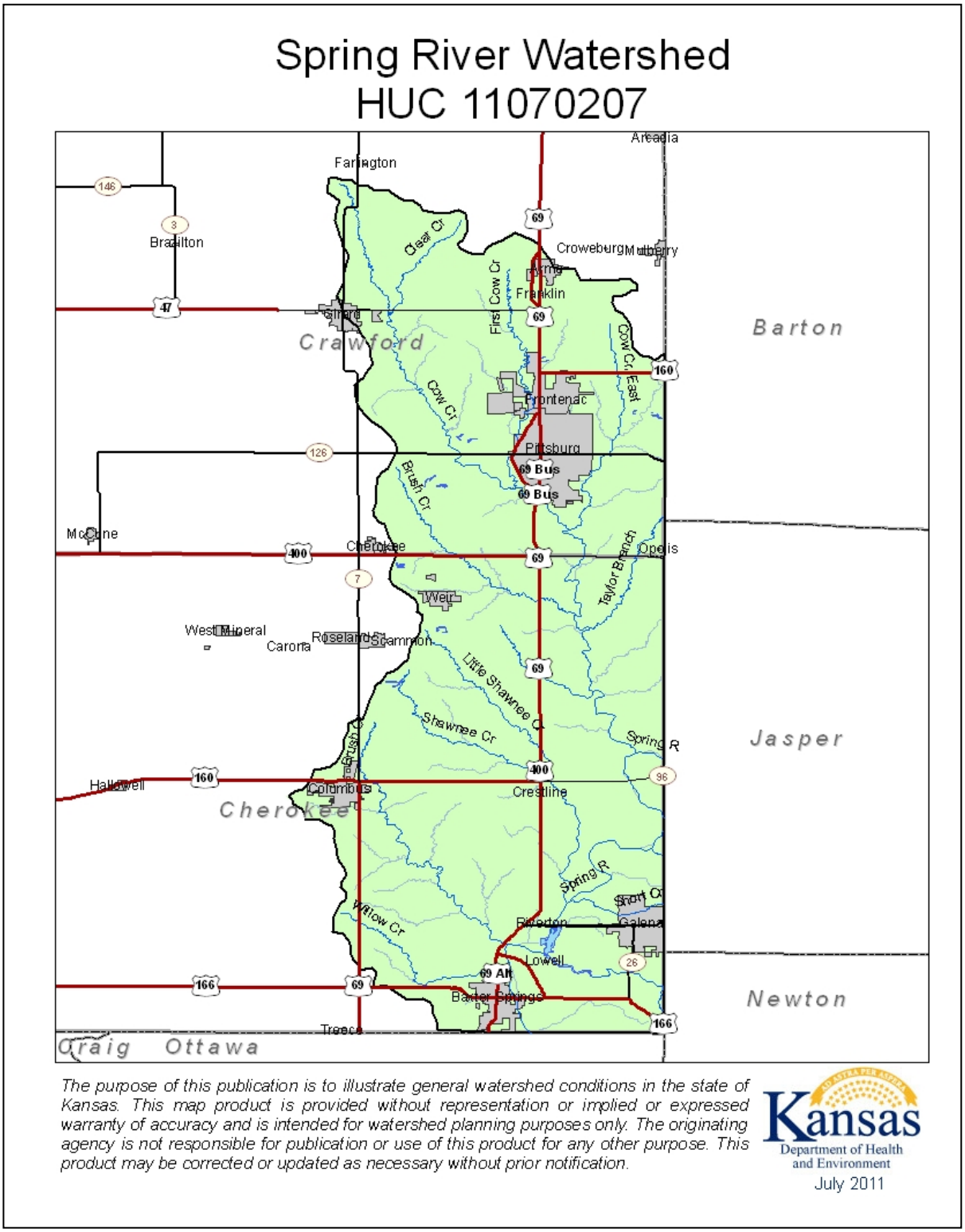


Figure 1

Description of the Watershed

A watershed is an area of land that catches the precipitation and funnels it to a particular creek, stream, and river, until the water drains into an ocean. A watershed has distinct elevation boundaries that do not follow political "lines" such as county, state, and international borders. Watersheds come in all shapes and sizes, and with some only cover an area of a few acres, others are thousands of square feet across.

Watershed Summary

A portion of the Spring River is located in Cherokee and Crawford County Kansas. The population of Cherokee County is approximately 21,000 people. Crawford County is slightly larger, with a population of 39,134 people. The primary townships that are influenced by the Spring River are Baxter Springs, Galena, Pittsburg and Riverton. Cherokee and Crawford Counties are rich with history, ranging from the Historic Route 66 to the Tri-State Mining District. This portion of Spring River is about 26 miles long. The Spring River watershed is a small, but important watershed located in the southeast corner of Kansas. A watershed is an area of land that drains water from the upper regions to a central area. The majority (78%) of the watershed is located in southwest Missouri. Only 18% of the watershed lies in Kansas while the remaining 4% is located in northeast Oklahoma. Kansas holds a unique role in the watershed because it is both an upstream and downstream state in the watershed. The Spring River watershed contains the only outcropping of the Ozark Plateau in Kansas. The physiographic feature creates unique habitats for plants and animals such as the Neosho Mucket mussel, that cannot be found anywhere else in the state.

Each drainage basin in the United States is identified by a Hydrologic Unit Code (HUC). These codes are used to better identify a certain area along the basin. The Hydrologic Unit Code 8 code for Spring River is 11070207. This code can be used nationwide in references to research and hydrologic mapping. The first two numbers in the code refer to the drainage region, the second set of two numbers refer to the drainage sub region, the last set numbers refer to the accounting unit and the fourth set of numbers is the cataloging unit. As the watershed becomes smaller, the HUC code becomes larger. HUC 8s are further divided into HUC 10 and HUC 12. The Spring River Watershed is divided into fourteen HUC 12.

Grand Lake Watershed

Spring River drains into the Grand Lake O' Cherokees located in northeast Oklahoma. Grand Lake is a major recreational reservoir and also a surface water supply to many communities. Because Grand Lake is a recreational reservoir it is a major economic resource for Oklahoma. The major rivers that drain into Grand Lake include Neosho River, Spring River and Elk River. This situation makes it important to create partnerships across state boundaries so a unified approach can be taken to protect and restore the watershed. Grand Lake Watershed covers a total of 10,298 square miles. While this watershed is located in four states and two EPA regions, most of this watershed is located in the state of Kansas.

Because Grand Lake watershed is made up of several different rivers; there are elevated levels of nutrients. These elevated nutrients cause algal blooms and low levels of dissolved oxygen. Because of the algal blooms and the low levels of oxygen it has a negative impact on the aquatic life. According to the Grand Lake Watershed Alliance Foundation (GLWAF), Spring River may contribute to the nutrient and bacteria levels, but also carries heavy metals from abandoned mining areas. It is important to decrease the amount of pollutants exiting in the Spring River Watershed and entering Grand Lake. A thirty percent reduction in pollutant loads has been assigned by KDHE as a target for the watersheds in Kansas that contribute a pollutant load to Grand Lake.

Grand Lake is expected to receive a TMDL list by 2012. Until then, the responsibility of reducing the pollutants into Grand Lake is distributed among to the incoming rivers. At the time when Grand

Lake's TMDL's are available, the SLT for the Spring River Watershed will reevaluate the BMPs and Load reductions and make corrections and alterations as needed.

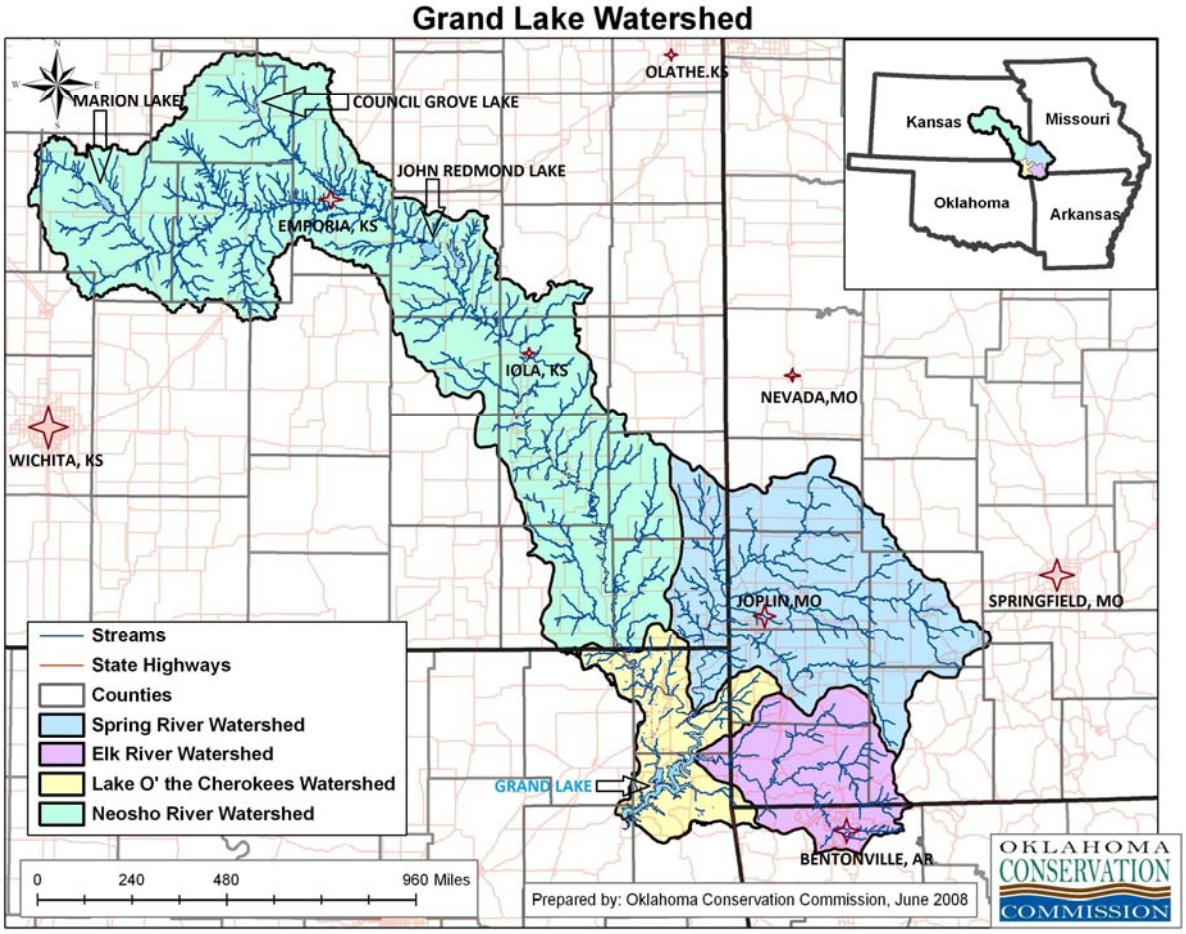


Figure 2

Watershed History

The local physiography and geology of the Spring River watershed has also provided metal ores that have brought historic wealth to the area. While the lead and zinc mining industry brought a great deal of economic activity to the area for more than 100 years, it has also created a legacy of environmental hardships. Because of the importance of the area and the problems that have surfaced, concern for water quality and human health have been long standing issues in the watershed. The result has been frequent studies and assessments to develop insights into specific concerns raised by stakeholders in the watershed. This has produced numerous, but scattered studies on issues from metal contamination in streams to silicosis from windblown particulates off of chat piles. In addition, there is a substantial amount of ongoing and planned work by federal, state and local agencies.

The region is scarred by sinkholes, acid mine drainage, and chat piles; all of which create an environment that is filled with contaminated soil, sediment and water. As a result of this contamination many of the streams in the area are classified as high priority Total Maximum Daily Load (TMDL) streams for heavy metals. The watershed has sustained substantial impact from coal mining in the north and lead and zinc mining in the south, one of the largest Superfund sites in the

nation. Remediation activity by the United States Environmental Protection Agency (US EPA) has been occurring through the Superfund program for more than 20 years.
National Resources Damages Assessment and Restoration Program (NRDAR) is a financial assistant that helps restore natural resources that have been damaged by the result of hazardous substances (mining and oil spills). Funds for this program come from legal settlements obtained by the responsible parties of the hazardous release or spill. Funds from these settlements are then used to restore the damaged resources.

Stakeholder Leadership Team

A group of concerned citizens in the watershed began meeting in 2007. They formed what is known as a Stakeholder Leadership Team (SLT). The SLT's goal has been to protect our downstream neighbors. During the time the SLT has been meeting with technical experts in the watershed and participating and leading discussions to review Spring River's issues and concerns.

Watershed Goals

Goals for Improving and Protecting the Spring River Watershed

1. **Goal:** Educate the public on poultry litter.
2. **Goal:** Reduce amount of pharmaceutical waste entering watershed.
3. **Goal:** Decrease sedimentation in the Spring River watershed.
4. **Goal:** Decrease nutrient enrichment in the Spring River Watershed.
5. **Goal:** Decrease storm water runoff entering water bodies.

The purpose of this plan is to isolate these issue and concerns of the Spring River SLT. The plan also serves the purpose of addressing the current TMDLs in the watershed and to establish proactive improvements to the impaired waters that are currently on the 303d.

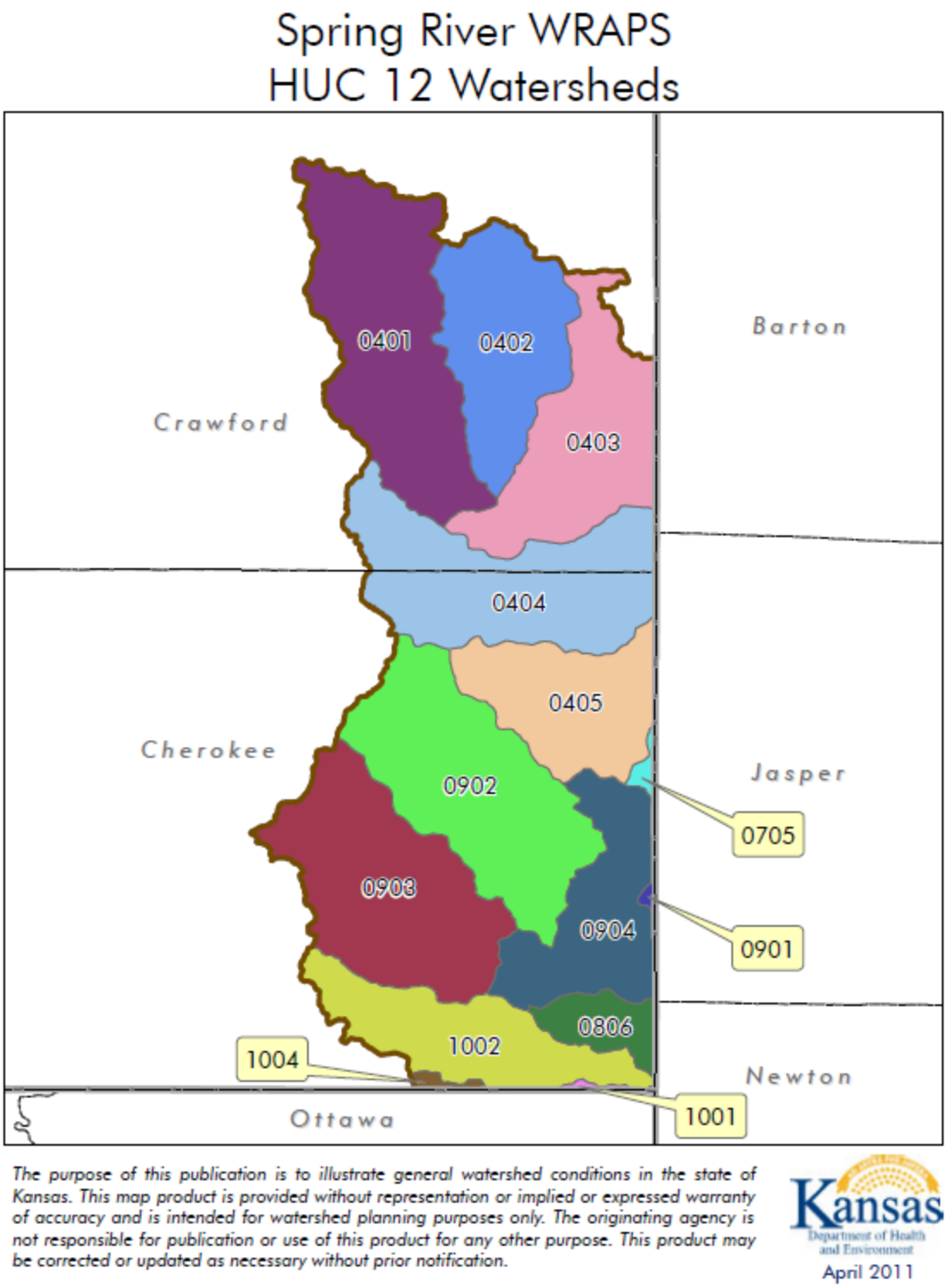


Figure 3

Land Use in the Watershed

The Spring River system represents the second largest unallocated surface water supply (the Missouri River is the largest) in the state of Kansas. Along with its high-sustained flow and its source in the Ozarks, it is a critical water supply to the region and has a unique and diverse fauna.

Grasslands represent the greatest usage of land in the watershed. This type of land is commonly used for grazing livestock. The grasslands represent 52% of the land area. Crop production utilizes 30% of the area. Since the Spring River Watershed is not heavily populated only 4% is considered urban area.

As stated above, crop producing land covers approximately 30% of the Spring River Watershed. This type of land usage can be a large nonpoint source pollutant. Four main pollutants that are common from crop land are nutrients, sediment, pesticides, and fecal matter. If proper best management practices are not applied, pollutant run off causes problems for the watershed. Best management practices for crop land include buffer strips, proper timing of fertilizer application, and contour plowing.

Urban area composes of about 4% of the land usage in the Spring River Watershed. Urban runoff can carry different pollutants, such as lawn fertilizers, heavy metals and other types of residential chemicals. This happens because paved surfaces divert the water into drainage ditches instead of allowing it to penetrate the ground.

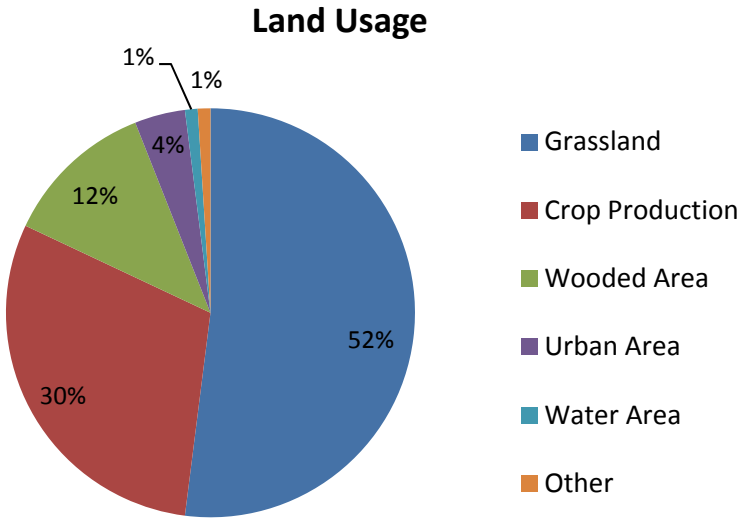
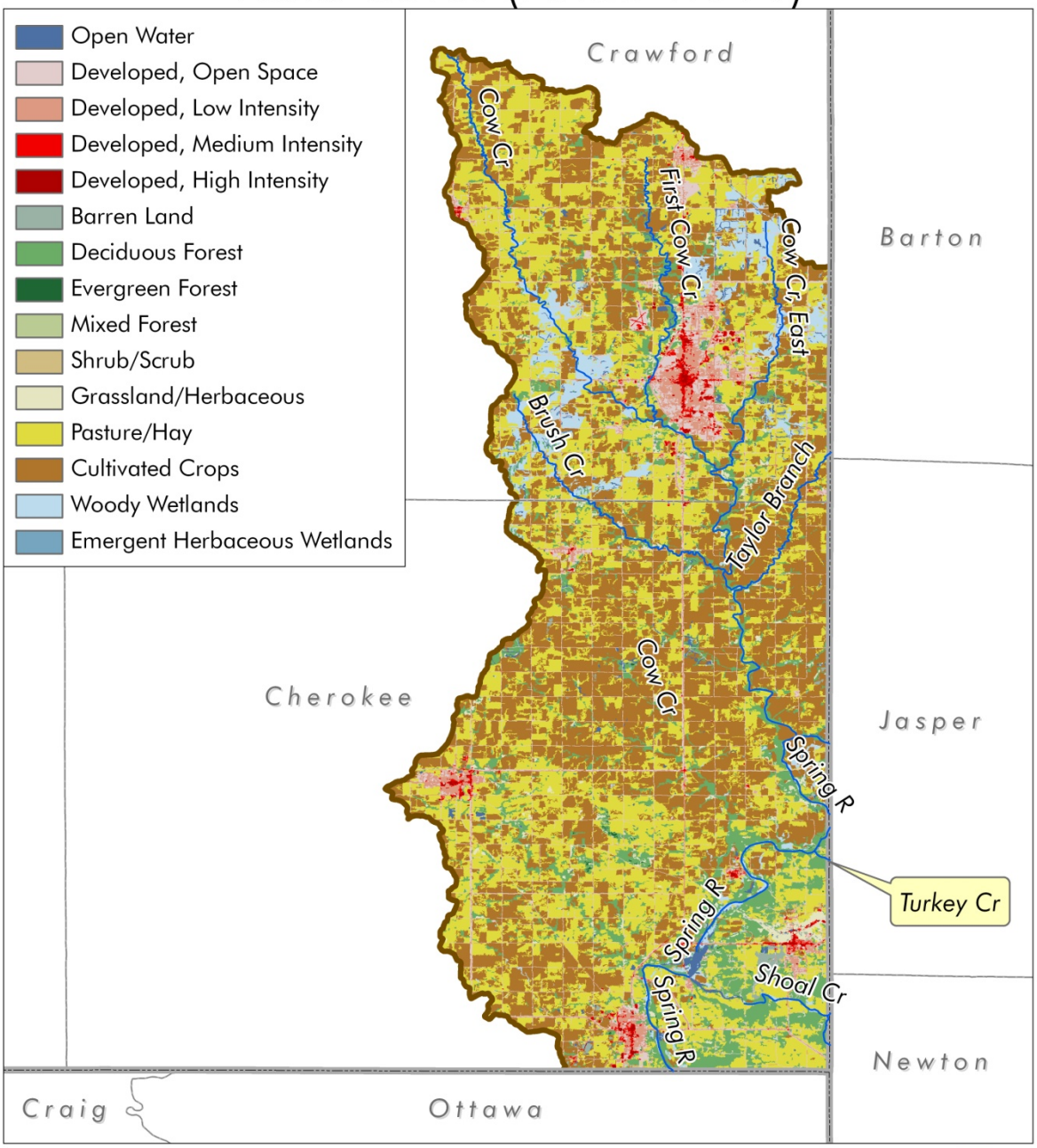


Figure 4

Spring River WRAPS
Land Cover (NLCD 2001)



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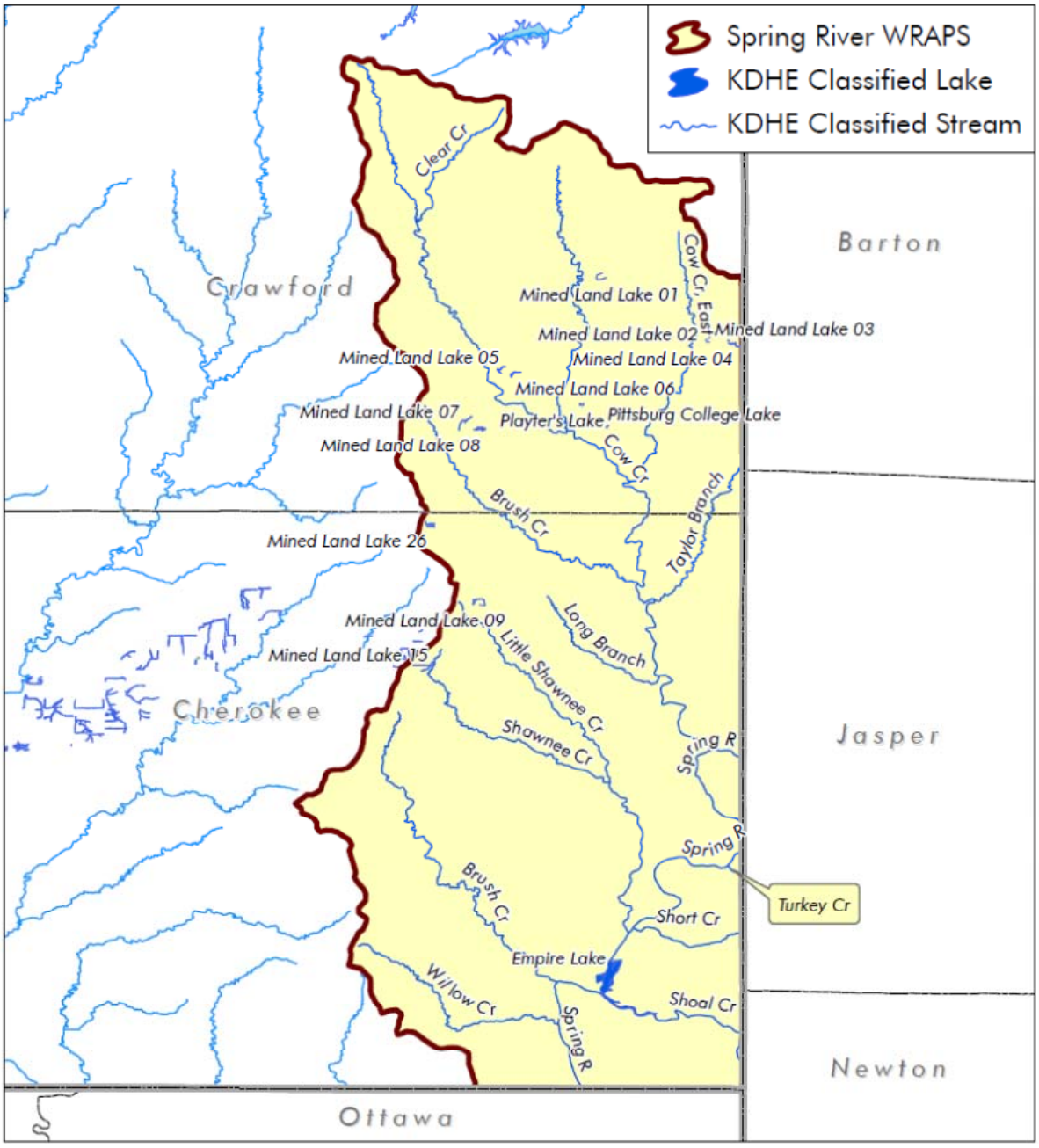
Kansas Department of Health and Environment

May 2011

Figure 5

Spring River WRAPS
KDHE Classified Waters



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Kansas Department of Health and Environment

July 2011

Figure 6

Designated Uses

The surface waters in the Spring River Watershed are generally used for aquatic life support, food procurement, domestic water supply, recreational use, groundwater recharge, industrial water supply, irrigation and livestock watering. Surface waters are given certain "designated uses" based on what the waters will be used for as stated in the Kansas Surface Water Register, 2009, issued by (Kansas Department of Health and Environment (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" water quality standard, that water is considered impaired.

Table 1: Designated Uses

Lake/Stream Name	CUSEGA	CLASS	AL	CR	FP	DS	GR	IW	IR	LW
Brush Creek	1107020723	GP	E	b	X					
Brush Creek	1107020726	GP	S	b	X					
Clear Creek	1107020728	GP	E	b						
Cow Creek	1107020716	GP	S	B	X	X	X	X	X	X
Cow Creek, East	1107020724	GP	S	b						
First Cow Creek	1107020727	GP	S	B						
Little Shawnee Creek	1107020722	GP	E		X					
Long Branch	1107020721	GP	E	b	X					
Shawnee Creek	1107020717	GP	E	C	X					
Shoal Creek	110702072	EX	S	B	X	X	X	X	X	X
Short Creek	11070207881	GP	E	b						
Spring River	110702071	EX	S	B	X	X	X	X	X	X
Spring River	110702073	EX	S	B	X	X	X	X	X	
Spring River	110702074	EX	S	B	X	X	X	X	X	X
Spring River	110702076	EX	S	B	X	X	X	X	X	X
Spring River	110702077	EX	S	B	X	X	X	X	X	X
Spring River	1107020719	EX	S	B	X	X	X	X	X	X
Taylor Branch	1107020725	GP	S	b	X					
Turkey Creek	1107020718	GP	S	b	X	X	X	X	X	X
Unnamed Stream	11070207886	EX	S	b	X	X	X	X	X	X
Willow Creek	1107020720	GP	E		X					
Empire Lake	N/A	GP	E	B	X	X	X	X	X	X
Mined Land Lake 01	N/A	GP	E	B	X	O	X	X	X	X
Mined Land Lake 02	N/A	GP	E	a	X	X	X	X	X	X
Mined Land Lake 03	N/A	GP	E	B	X	X	X	X	X	X
Mined Land Lake 04	N/A	GP	E	B	X	X	X	X	X	X
Mined Land Lake 05	N/A	GP	E	B	X	X	X	X	X	X
Mined Land Lake 06	N/A	GP	E	B	X	O	X	X	X	X
Mined Land Lake 07	N/A	GP	E	B	X	O	X	X	X	X
Mined Land Lake 08	N/A	GP	E	B	X	O	X	X	X	X

Mined Land Lake 09	N/A	GP	E	B	X	X	X	X	X	X
Mined Land Lake 15	N/A	GP	E	B	X	X	X	X	X	X
Mined Land Lake 26	N/A	GP	E	B	X	X	X	X	X	X
Pittsburg College Lake	N/A	GP	E	B	X	X	O	X	X	X
Playter's Lake	N/A	GP	E	B	X	X	O	X	X	X

Key

CUSEGA	=	channel unit segment
CLASS	=	antidegradation category
GP	=	general purpose waters
EX	=	exceptional state waters
AL	=	designated for aquatic life use
S	=	special aquatic life use water
E	=	expected aquatic life use water
CR	=	designated for contact recreational use
B	=	Primary contact recreation stream segment/lake that is by law or written permission of the landowner open to and accessible by the public
C	=	Primary contact recreation stream segment/lake that is not open to and accessible by the public under Kansas law
a	=	Secondary contact recreation stream segment/lake that is by law or written permission of the landowner open to and accessible by the public
b	=	Secondary contact recreation stream segment/lake that is not open to and accessible by the public under Kansas law
FP	=	designated for food procurement use
DS	=	designated for domestic water supply
GR	=	designated for ground water recharge
IW	=	designated for industrial water supply use
IR	=	designated for irrigation use
LW	=	designated for livestock watering use
X	=	referenced stream segment/lake is assigned the indicated designated use
O	=	referenced stream segment/lake does not support the indicated designated use
blank	=	capacity of the referenced stream segment/lake to support the indicated designated use has not been determined by use attainability analysis

The 303d List of Impaired Waters of the Spring River Basin (HUC 11070207)

The 303d list is composed of the bodies of water that have not met water quality standards as determined by KDHE monitoring program. Based on the Clean Water Act, a water body that does not meet water quality standards is considered "impaired". The Clean Water Act requires states to develop a plan for restoration and that plan is called a Total Maximum Daily Load (TMDL). A TMDL designation sets the maximum amount of pollutant that a specific body of water can receive without violating the surface water-quality standards, resulting in failure to support their designated uses.

Pollutants are assigned "categories" depending on their stage of TMDL development:

- Category 5 – Waters in need of TMDL(s)
- Category 4a – Waters that have a TMDL(s) developed for them and remain impaired

Table 2: 303d Listed Streams and Lakes in the Spring River Watershed (HUC 11070207)

State	Stream or Lake in the Spring River Watershed	Station	Impairment	Priority	Listings
MO	Turkey Creek near Joplin, MO	SC211	Dissolved Oxygen	Low	2004, 2008, 2010
MO	Turkey Creek near Joplin, MO	SC212	Total Phosphorus	Low	2008, 2010
KS	Shoal Creek near Galena	SC212	Total Phosphorus	Low	2008, 2010
KS	Cow Creek near Lawton	SC567	Total Phosphorus	Low	2008, 2010
KS	Short Creek near Galena	SC570	Total Phosphorus	Low	2008, 2010
KS	Short Creek near Galena	SC571	Selenium	Low	2010
KS	Short Creek near Galena	SC572	Fluoride	Low	2010
KS	Mined Land Lake 01	LM035101	Eutrophication	Low	2004, 2008, 2010
KS	Mined Land Lake 06	LM047601	Eutrophication	Low	2004, 2008, 2010

Mining activity identified as source of impairment

Majority of the watershed is located in MO

Will potentially benefit from planned BMP implementation
TMDL caused by low flow

Table 3: De-listed Streams and Lakes in the Spring River Watershed (HUC 11070207)

State	Stream or Lake in the Spring River Watershed	Station	Impairment	Priority	Listings
KS	Empire Lake	LM074101	Eutrophication & Siltation		2010
KS	Cow Creek	NPDES3894	Bacteria		2008
KS	Cow Creek Near Lawton	SC567	Dissolved Oxygen & Chlordane		2010
KS	Shawnee Creek Near Crestline	SC569	Bacteria		2008

TMDL List Spring (HUC 11070207)

Based on the Clean Water Act, a water body that does not meet water quality standards is considered "impaired". The Clean Water Act requires states to develop a plan for restoration and that plan is called a Total Maximum Daily Load (TMDL). A TMDL designation sets the maximum amount of pollutant that a specific body of water can receive without violating the surface water-quality standards, resulting in failure to support their designated uses.

Table 4: TMDLs in the Spring River Watershed (HUC 11070207)

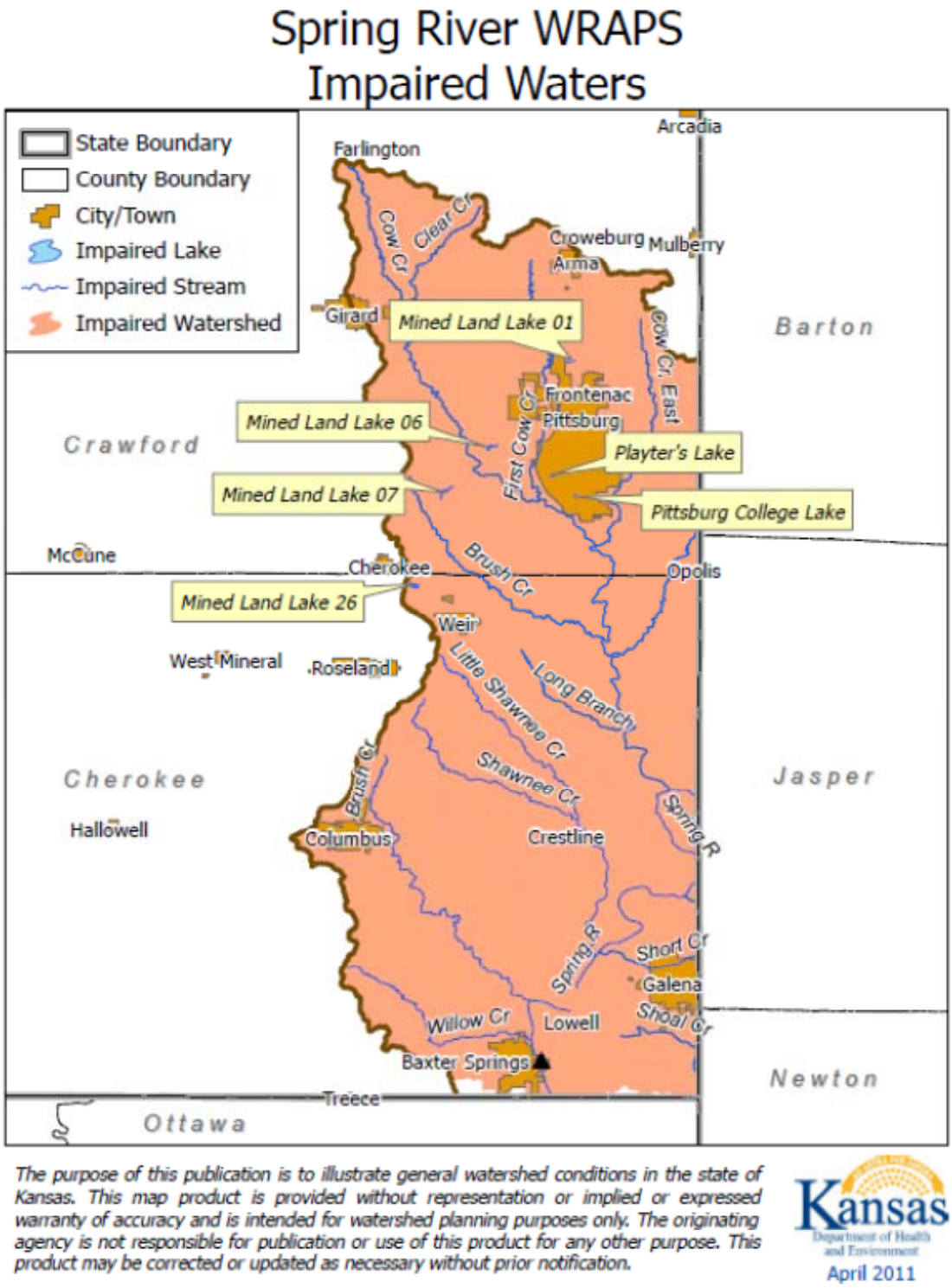
State	Stream or Lake in the Spring River Watershed	Station	Impairment	Priority	TMDL Approval Date
KS	Mined Land Lake 06	LM047601	Sulfate	Low	1/6/2005
KS	Mined Land Lake 07	LM047801	Sulfate	Low	1/6/2005
KS	Playter's Lake	LM069001	Eutrophication	Low	1/6/2005
KS	Pittsburg College Lake	LM073301	Eutrophication & pH	Low	9/30/2002
KS	Cow Creek near Lawton	SC567	Sulfate	Low	2/25/2005
MO	Turkey Creek near Joplin, MO	SC211	Cadmium, Copper, Lead, Zinc	High	6/24/2005

KS	Shoal Creek near Galena	SC212	Lead, Zinc	High	6/24/2005
KS	Spring River near Baxter Springs	SC213	Biology, Copper, Lead, Zinc	High	6/24/2005
KS	Spring River near Crestline	SC568	Biology, Copper, Lead, Zinc	High	6/24/2005
KS	Shawnee Creek near Crestline	SC569	Cadmium, Copper, Lead, Zinc	High	6/24/2005
KS	Short Creek near Galena	SC570	Cadmium, Copper, Lead, Zinc	HIgh	6/24/2005
KS	Shawnee Creek near Crestline	SC569	Dissolved Oxygen	High	9/30/2002

KDHE reviews TMDLs assigned in each of the twelve basins of Kansas every five years on a rotational schedule. The table below includes the review schedule for the Neosho Basin.

Table 5: TMDL Revision Schedule

Year Ending in September	Implementation	Possible TMDLs to Revise	TMDLs to Evaluate
2013	2014-2023	2002, 2004, 2005	2002, 2004, 2005
2018	2019-2028	2000, 2004, 2005, 2008	2000, 2004, 2005, 2008


Spring River WRAPS
Impaired Waters
State Boundary
County Boundary
City/Town
Impaired Lake
Impaired Stream
Impaired Watershed
Arcadia
Farlington
Cow Cr
Clear Cr
Croweburg
Mulberry
Arma
Girard
Mined Land Lake 01
Barton
Cow Cr, East
Frontenac
Pittsburg
First Cow Cr
Mined Land Lake 06
Playter's Lake
Crawford
Mined Land Lake 07
Pittsburg College Lake
McCune
Cherokee
Brush Cr
Opolis
Mined Land Lake 26
Weir
West Mineral
Roseland
Little Shawnee Cr
Long Branch
Shawnee Cr
Brush Cr
Cherokee
Jasper
Hallowell
Columbus
Crestline
Spring R
Spring R
Short Cr
Galena
Willow Cr
Lowell
Shoal Cr
Baxter Springs
Newton
Treece
Ottawa
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Kansas
Department of Health and Environment
April 2011

Figure 7

Special Aquatic Life Waters

Special aquatic life use waters are defined as "surface waters that contain combinations of habitat types and indigenous biota not found commonly in the state, or surface waters that contain representative populations of threatened or endangered species". These will be designated by the Kansas Department of Wildlife and Parks or the United States Fish and Wildlife Service. The Spring River Watershed contains seven different streams that are listed as the special aquatic life use waters. These steams are located among crop land and grazing land. The pollutants that might threaten the health of these streams would include sediment runoff or nutrient/fertilizer runoff. The BMPs placed along these steams will help assist with the reduction of these pollutants.

- Cow Creek
- Brush Creek
- Taylor Branch
- Turkey Creek
- Shoal Creek
- First Cow Creek
- Cow Creek East

Spring River WRAPS
Special Aquatic Life Use Waters

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Kansas Department of Health and Environment

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Figure 8

Public Water Supply

A public water supply (PWS) that derives its water from surface water supply can be affected by sediment, either in difficulty at the intake in accessing the water or in treatment of the water prior to consumption. Nutrients and fecal coliform bacteria will also affect surface water supplies causing excess cost in treatment prior to public consumption.

Public water supplies located in the Spring River Watershed:

- City of Girard, Crawford CO RWD 1c
- Crawford CO RWD 4,
- City of Arma, City of Pittsburg,
- Crawford CO RWD 1
- City of Frontenac
- Crawford CO RWD 5
- City of Weir,
- Cherokee CO RWD 1
- Cherokee CO RWD 3
- Cherokee CO RWD 4
- City of Columbus
- City of Galena
- Cherokee CO RWD 9
- Riverton School
- Cherokee CO RWD 2
- Cherokee CO RWD 8
- City of Baxter Springs
- HYZ Inc HAI Ying.

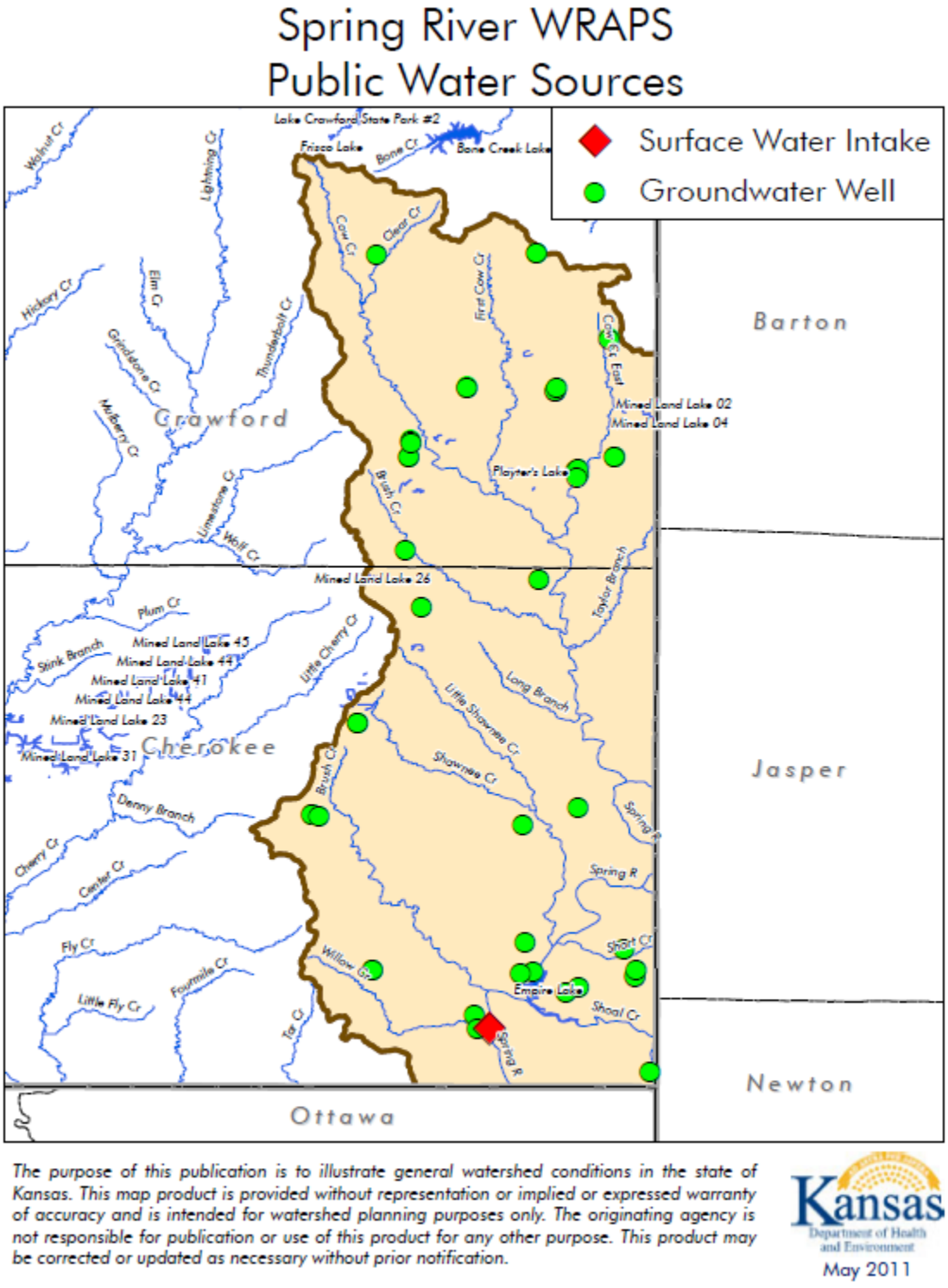

Figure 9

National Pollutant Discharge Elimination System (NPDES)

NPDES permits specify the maximum amount of pollutants allowed to be discharged to surface waters by a facility. These permitted facilities are regulated through KDHE. Having these point sources located on streams or rivers may impact water quality in the waterways. For example,

municipal waste water can contain suspended solids, biological pollutants that reduce oxygen in the water column, inorganic compounds or bacteria. Waste water will be treated to remove solids and organic materials, disinfected to kill bacteria and viruses, and discharged to surface water. Treatment of municipal waste water is similar across the country. Industrial point sources can contribute toxic chemicals or heavy metals. Any pollutant discharge from point sources that is allowed by the state is considered to be Wasteload Allocation.

Table 6: NPDES Permitted Facilities in the Spring River Watershed

Federal Permit #	Kansas Permit #	Facility Name	Facility City	County	Receiving Stream
C-NE57-NO04	KSJ000206	CHICKEN MARY'S RESTAURANT	PITTSBURG	CR	NEOSHO RIVER
C-NE57-NO05	KSJ000205	CHICKEN ANNIE'S RESTAURANT	PITTSBURG	CR	NEOSHO RIVER
C-NE57-OO01	KS0118354	WHISPERING PINES ESTATES	PITTSBURG	CR	COW CREEK VIA SECOND COW CREEK
C-NE57-OO02	KS0085782	OAK HILL MOBILE HOME PARK	PITTSBURG	CR	SPRING RIVER VIA COW CREEK
C-NE57-OO03	KS0091901	ABLE MANUFACTURING & ASSEMBLY, LLC	PITTSBURG	CR	NEOSHO RIVER
C-NE57-OO04	KS0094391	PITTSBURG TRUCK N TRAVEL	PITTSBURG	CK	COW CREEK VIA UNNAMED TRIBUTARY
C-NE67-NO06	KSJ000179	LABETTE COMMUNITY COLLEGE/PITTSBURG	WEIR	CK	NEOSHO RIVER
C-NE67-OO01	KS0082392	BRADFORD ACRES MHP	WEIR	CK	COW CREEK VIA UNNAMED TRIBUTARY
I-NE06-PO04	KS0098558	CHEROKEE COUNTY RWD NO. 3	BAXTER SPRINGS	CK	SPRING RIVER VIA BRUSH CREEK
I-NE06-PR01	KSG110102	O'BRIEN READY MIX - BAXTER SPRINGS	BAXTER SPRINGS	CK	MARMATON RIVER

I-NE27-PR01	KSG110098	O'BRIEN READY MIX - FRONTENAC PLANT	FRONTENAC	CR	FIRST COW CREEK
I-NE28-PO02	KS0117846	NITROUS OXIDE CORP - MILITARY PLANT	GALENA	CK	NEOSHO RIVER VIA SPRING RIVER
I-NE28-PO07	KS0092568	JAYHAWK FINE CHEMICAL CORP.	GALENA	CK	SPRING RIVER VIA LAKE OXBOW
I-NE28-PR02	KSG110201	O'BRIEN READY MIX - GALENA PLANT	GALENA	CK	SPRING RIVER VIA SHORT CREEK V UNN TRIB
I-NE31-PO01	KS0099988	CRAWFORD CO CONSOLIDATED RWD 1	GIRARD	CR	SECOND COW CREEK VIA CLEAR CREEK
I-NE57-PR02	KSG110142	AMERICAN CONCRETE CO., INC.	PITTSBURG	CR	EAST COW CREEK
I-NE73-BO01	KS0079812	EMPIRE DISTRICT ELECTRIC-RIVERTON PLT	RIVERTON	CK	NEOSHO RIVER VIA SPRING RIVER
M-NE03-OO01	KS0045926	ARMA, CITY OF	ARMA	CR	FIRST COW CREEK VIA UNNAMED TRIBUTARY
M-NE06-OO01	KS0045934	BAXTER SPRINGS, CITY OF	BAXTER SPRINGS	CK	SPRING RIVER
M-NE15-OO01	KS0031445	COLUMBUS, CITY OF	COLUMBUS	CK	SPRING RIVER VIA BRUSH CREEK
M-NE27-OO01	KS0026131	FRONTENAC, CITY OF	FRONTENAC	CR	COW CREEK VIA FIRST COW CREEK
M-NE28-OO01	KS0048135	GALENA, CITY OF	GALENA	CK	SPRING RIVER VIA UNNAMED TRIBUTARY

M-NE57-OO01	KS0038954	PITTSBURG, CITY OF	PITTSBURG	CR	NEOSHO R. VIA SPRING R. VIA COW CREEK
M-NE57-SN01	KSR044017	PITTSBURG, CITY OF	PITTSBURG	CR	Stormwater (MS4) Permit
M-NE67-OO01	KS0079146	WEIR, CITY OF	WEIR	CK	BRUSH CREEK VIA UNNAMED TRIBUTARY
M-NE73-OO02	KS0091057	CHEROKEE CO. S.D. #1	RIVERTON	CK	SPRING RIVER

Spring River WRAPS
NPDES Facilities

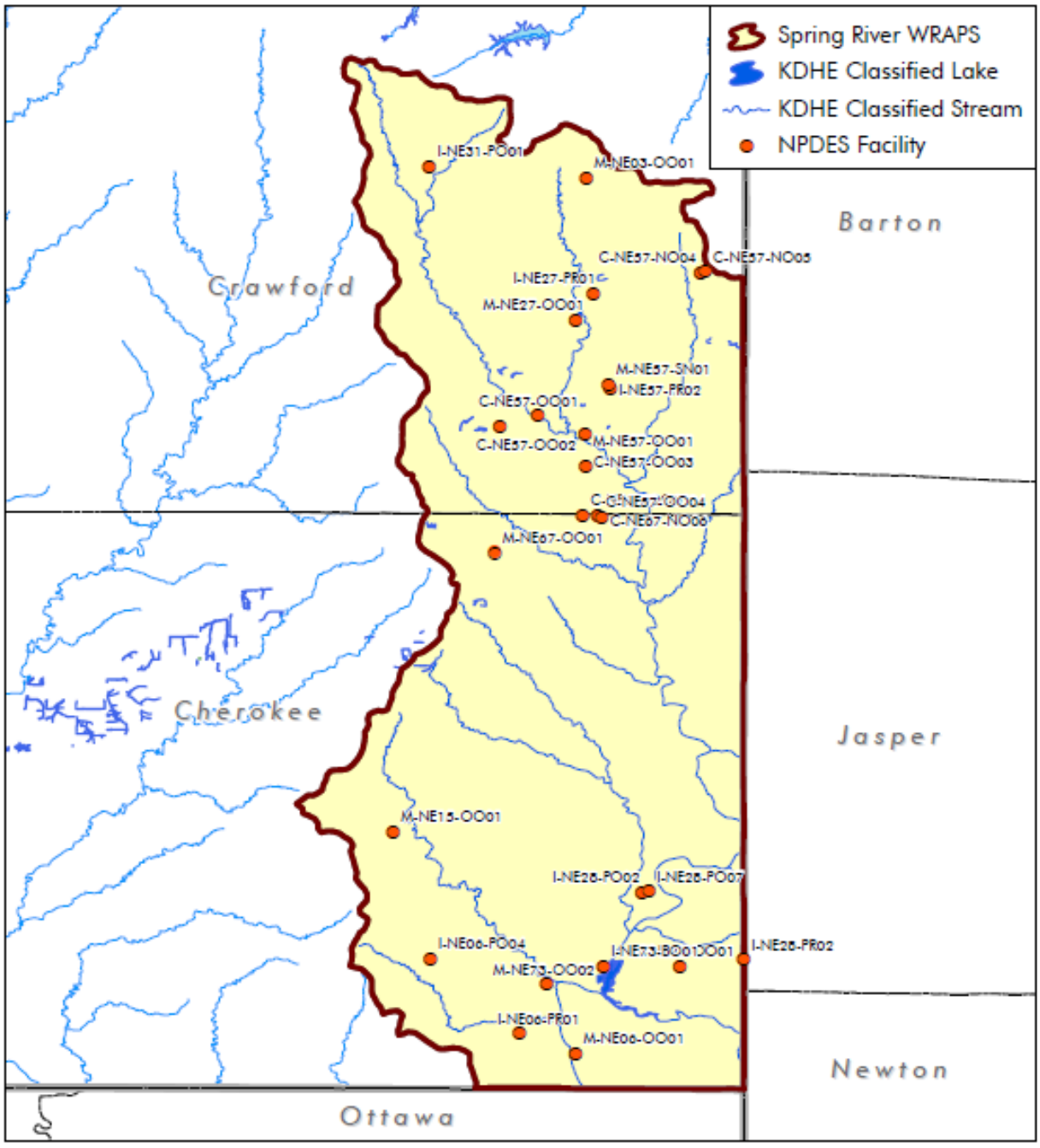

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Figure 10

Confined Livestock

A Confined Livestock Facility is any livestock facility with an animal unit capacity of three hundred or more. A Confined Livestock Facility or a facility with a daily discharge (regardless of size) must register with the Kansas Department of Health and Environment (KDHE). Any facility, no matter what animal capacity, is required to register if KDHE investigates them due to a complaint and the facility is found to pose a significant pollution potential. Facilities which register through KDHE will be site inspected for significant pollution potential, **if deemed not a significant pollution potential by KDHE, they can be certified if they follow BMPs as recommended by the technical service provider and approved by KDHE. These include but are not limited to: regular cleaning of stalls, managing manure storage areas, and so forth.** Facilities with 300 to 999 animal units are known as Confined Feeding Facilities (CFFs). CFFs identified to have a significant pollution potential must obtain a State of Kansas Livestock Waste Management Permit. Facilities of 1,000 or more must obtain an NPDES Livestock Waste Management Permit (Federal) known as Confined Animal Feeding Operations (CAFOs). Operations with a daily discharge, such as a dairy operation that generates an outflow from the milking barn on a daily basis, are required to have a permit (see www.kdheks.gov/feedlots) for more information.)

Unconfined Concentrated Animal Areas

Unconfined areas of animal concentration – e.g. watering areas, loafing areas or feeding areas can also pose a pollution potential if not managed properly. Unconfined animal areas are potential sources of nutrients, sediment, bacteria and aquatic impacts from manure and leftover feed. Best Management Practices for these areas can include proper manure application from a cleaning of these areas. This would be especially important when addressing cropland target areas. Practices such as alternative water supplies, rotational grazing are for grazing type of activities, alternative watering or loafing areas, mineral and feed location rotation etc. will not likely address any type of "regulated" livestock pollution control need.

Spring River Watershed - Kansas
Confined Animal Feeding Operations

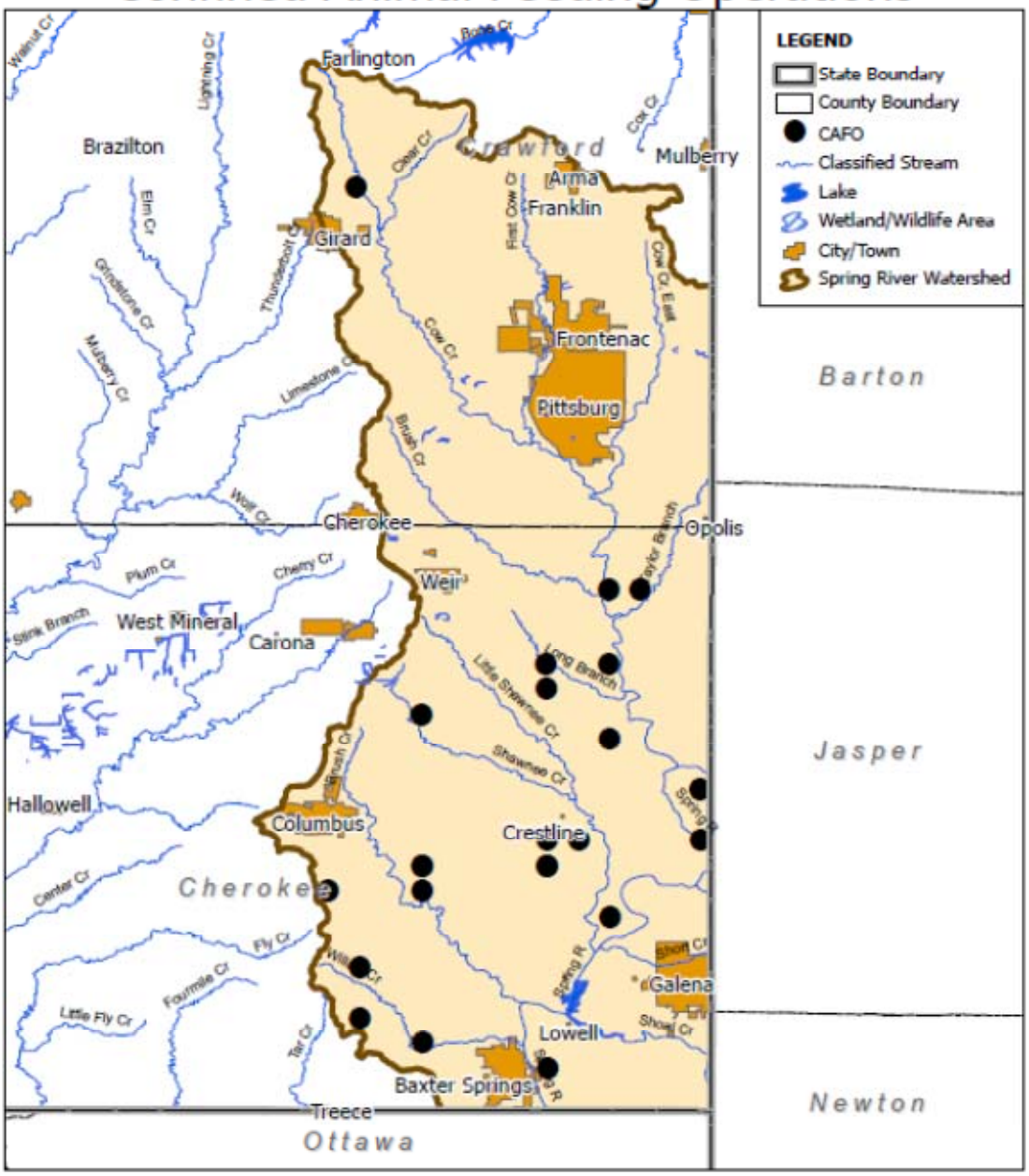

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Figure 11

STEPL Modeling—KDHE

The STEPL model employs simple algorithms to calculate nutrient and sediment loads from different land uses and the load reductions that would result from the implementation of various best management practices (BMPs), including Low Impact Development practices (LIDs) for urban areas. It computes surface runoff; nutrient loads, including nitrogen, phosphorus, and 5-day biological oxygen demand (BOD5); and sediment delivery based on various land uses and management practices. The land uses considered are urban land, cropland, pastureland, feedlot, forest, and a user-defined type. The pollutant sources include major nonpoint sources such as cropland, pastureland, farm animals, feedlots, urban runoff, and failing septic systems. The types of animals considered in the calculation are beef cattle, dairy cattle, swine, horses, sheep, chickens, turkeys, and ducks. For each watershed, the annual nutrient loading is calculated based on the runoff volume and the pollutant concentrations in the runoff water as influenced by factors such as the land use distribution and management practices. The annual sediment load (from sheet and rill erosion only) is calculated based on the Universal Soil Loss Equation (USLE) and the sediment delivery ratio.
(See maps below)

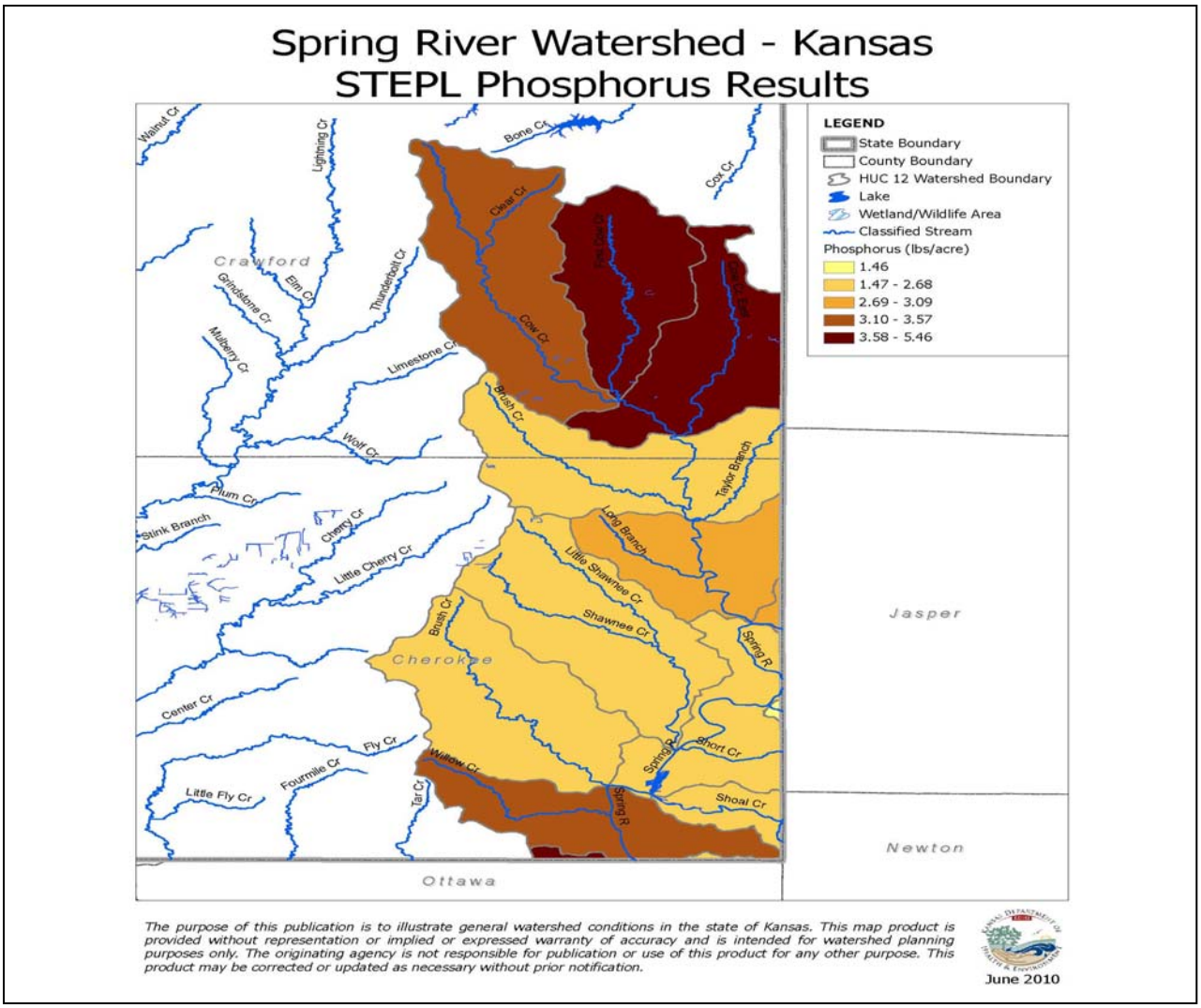

Figure 12

Spring River Watershed - Kansas
STEPL Nitrogen Results

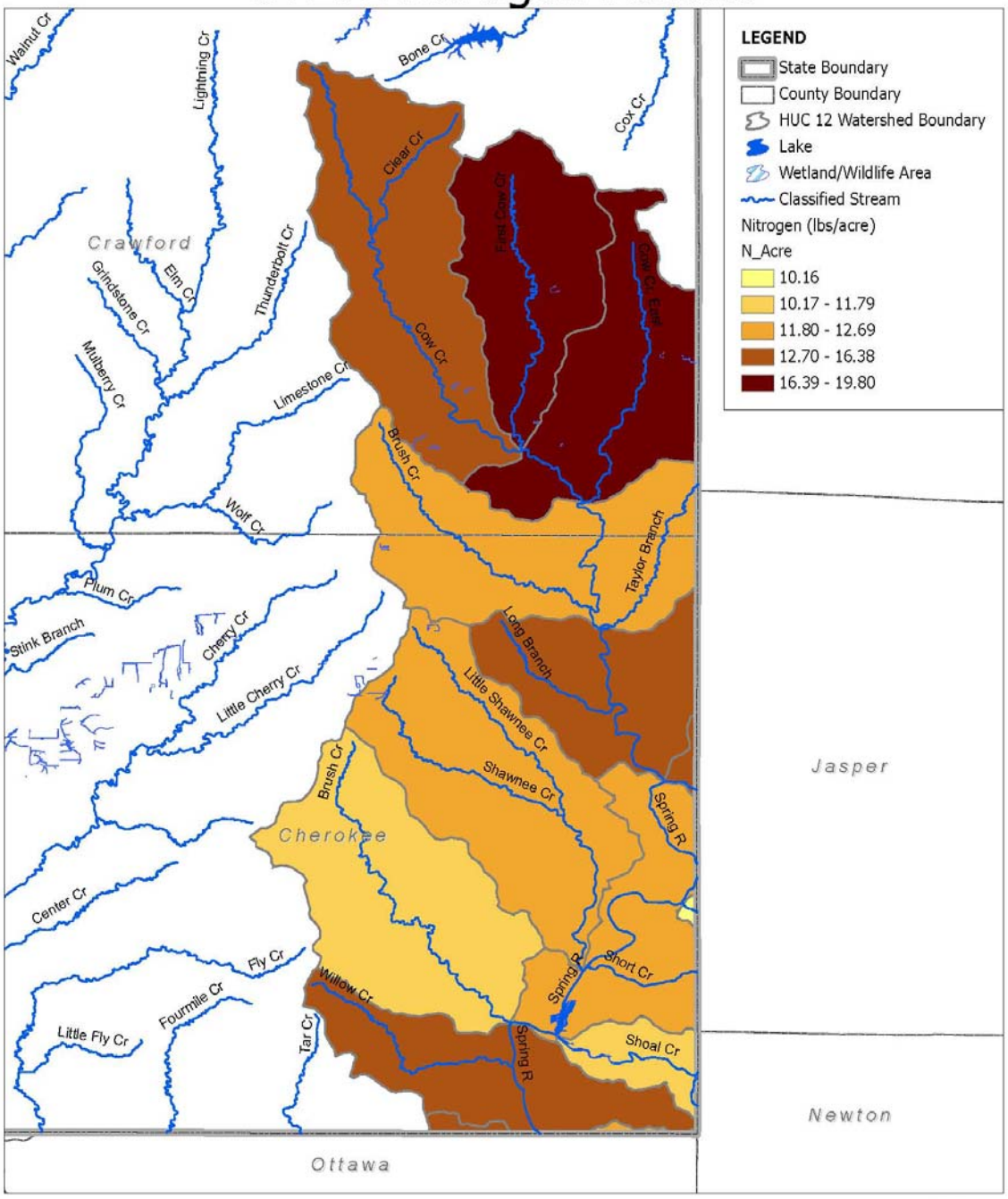

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Figure 13

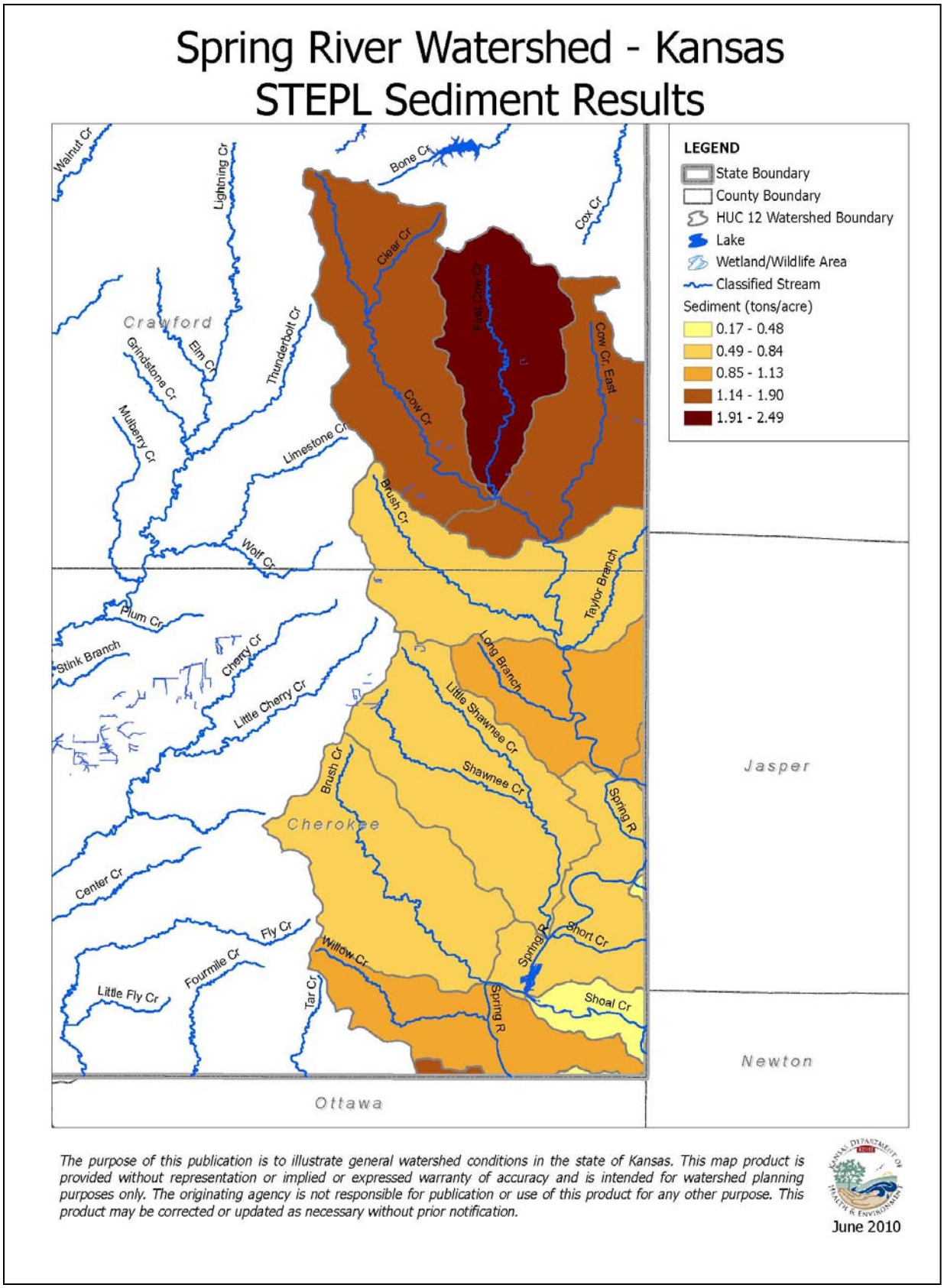

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Figure 14

Spring River priority HUC 12 Watersheds

Cropland Targeted Areas

After reviewing the Spring River Watershed STEPL and gaining local knowledge, the Spring River SLT chose five priority areas for cropland BMP implementation.

HUC 110702070401 – Cow Creek & Clear Creek
HUC 110702070402 – First Cow Creek
HUC 110702070403 – Cow Creek East
HUC 110702070405 – Long Branch Creek
HUC 110702071002 – Willow Creek

Livestock Targeted Area

After reviewing KDHE monitoring data and the Spring River 303 d listed waters, two watersheds out of a total of four livestock targeted watersheds were identified. Cow Creek near Lawton (HUC 0405) and Shoal Creek near Galena (HUC 0806) both have low priority 303 d listings for phosphorus. Then looking at the CAFO map and local landowner input Willow Creek (HUC 1002) and Brush Creek (0903) were also identified for livestock BMP implementation.

HUC 110702070405 – Long Branch Creek
HUC 110702070903 - Brush Creek
HUC 110702071002 - Willow Creek
HUC 110702070806 – Shoal Creek

Spring River WRAPS
Priority HUC 12 Watersheds

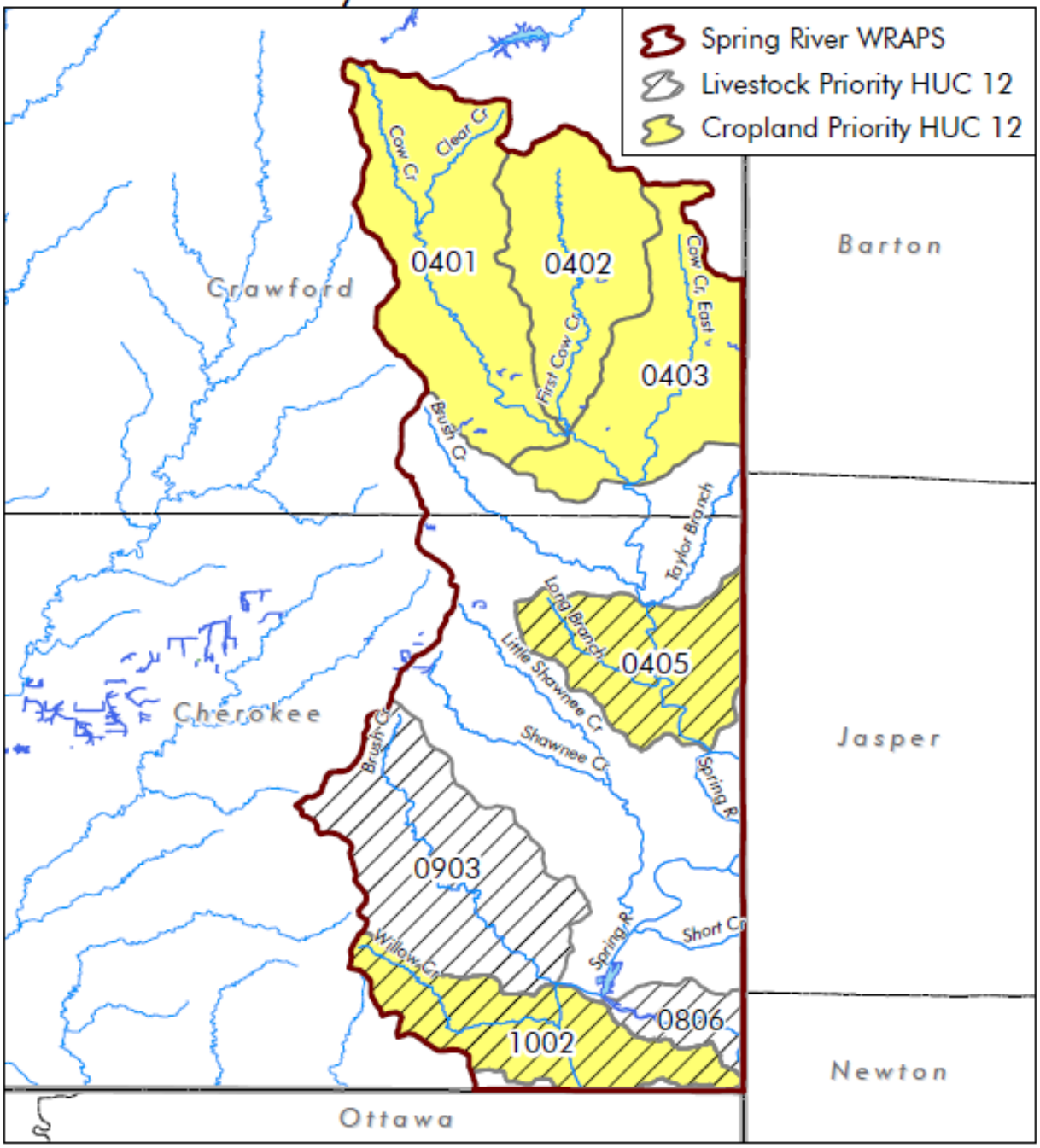

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Figure 15

Cropland and Livestock Best Management Practices

Listed below are the cropland and livestock BMPs that the Spring River SLT chose based on adoptability within the targeted areas.

Cropland

Vegetative Buffer

-Area of field maintained in permanent vegetation to help reduce nutrient and sediment loss from agricultural fields, improve runoff water quality, and provide habitat for wildlife.
-On average for Kansas fields, 1 acre buffer treats 15 acres of cropland.
-50% erosion reduction efficiency, 50% phosphorous reduction efficiency
-Approx. $1,000/acre, 90% cost-share available from NRCS.

Grassed Waterway

-Grassed strip used as an outlet to prevent silt and gully formation.
-Can also be used as outlets for water from terraces.
-On average for Kansas fields, 1 acre waterway will treat 10 acres of cropland.
-40% erosion reduction efficiency, 40% phosphorous reduction efficiency.
-$1,600 an acre, 50% cost-share available from NRCS.

No-Till

-A management system in which chemicals may be used for weed control and seedbed preparation.
-The soil surface is never disturbed except for planting or drilling operations in a 100% no-till system.
-75% erosion reduction efficiency, 40% phosphorous reduction efficiency.
-WRAPS groups and KSU Ag Economists have decided $10 an acre for 10 years is an adequate payment to entice producers to convert, 50% cost-share available from NRCS.

Terraces

-Earth embankment and/or channel constructed across the slope to intercept runoff water and trap soil.
-One of the oldest/most common BMPs
-30% Erosion Reduction Efficiency, 30% phosphorous reduction efficiency
-$1.02 per linear foot, 50% cost-share available from NRCS

Nutrient Management Plan

-Managing the amount, source, placement, form and timing of the application of nutrients and soil amendments.
-Intensive soil testing
-25% erosion and 25% P reduction efficiency.
-WRAPS groups and KSU Ag Economists have decided $7.30 an acre for 10 years (or a one-time payment of $57/acre) is an adequate payment to entice producers to convert, 50% cost-share is available from NRCS.

Livestock

Vegetative Filter Strip
-A vegetated area that receives runoff during rainfall from an animal feeding operation.
-Often require a land area equal to or greater than the drainage area (needs to be as large as the feedlot).
-10 year lifespan, requires periodic mowing or haying, average P reduction: 50%.
-$714 an acre

Relocate Feeding Pens
Pens- Move feedlot or pens away from a stream, waterway, or body of water to increase filtration and waste removal of manure. Highly variable in price, average of $6,600 per unit.

Relocate Pasture Feeding Site
Move feeding site that is in a pasture away from a stream, waterway, or body of water to increase the filtration and waste removal (eg. move bale feeders away from stream). Highly variable in price, average of $2,203 per unit.
-Average P reduction: 30-80%

Alternative (Off-Stream) Watering System
-Watering system so livestock do not enter stream or body of water.
-Studies show cattle will drink from tank over a stream or pond 80% of the time.
-10-25 year lifespan, average P reduction: 30-98% with greater efficiencies for limited stream access.
-$3,795 installed for solar system, including present value of maintenance costs.
Average Stocking Rates for Spring River Watershed
One pair on 6.75 acres of native grass.
Average grazing dates: April 20-October 15

Nutrient Management Plan
-Managing the amount, source, placement, form and timing of the application of nutrients and soil amendments.
-Intensive soil testing
-25% erosion and 25% P reduction efficiency.
-WRAPS groups and KSU Ag Economists have decided $7.30 an acre for 10 years (or a one-time payment of $57/acre) is an adequate payment to entice producers to convert, 50% cost-share is available from NRCS.

Cropland and Livestock "Needs"

Once the SLT decided on where to target cropland and livestock BMP implementation and which BMPs to implement, the next step was to make sure there was a "need" in the watershed for these types and quantities of BMPs within the targeted areas. KDHE surveyed the county conservation districts for land treatment "needs" in 2005. The districts completed a spreadsheet indicating the number of acres for each land use type that were in need of structural and/or nonstructural land treatment. Below are the cropland and grassland "needs" for the targeted watersheds:

Cropland "need"

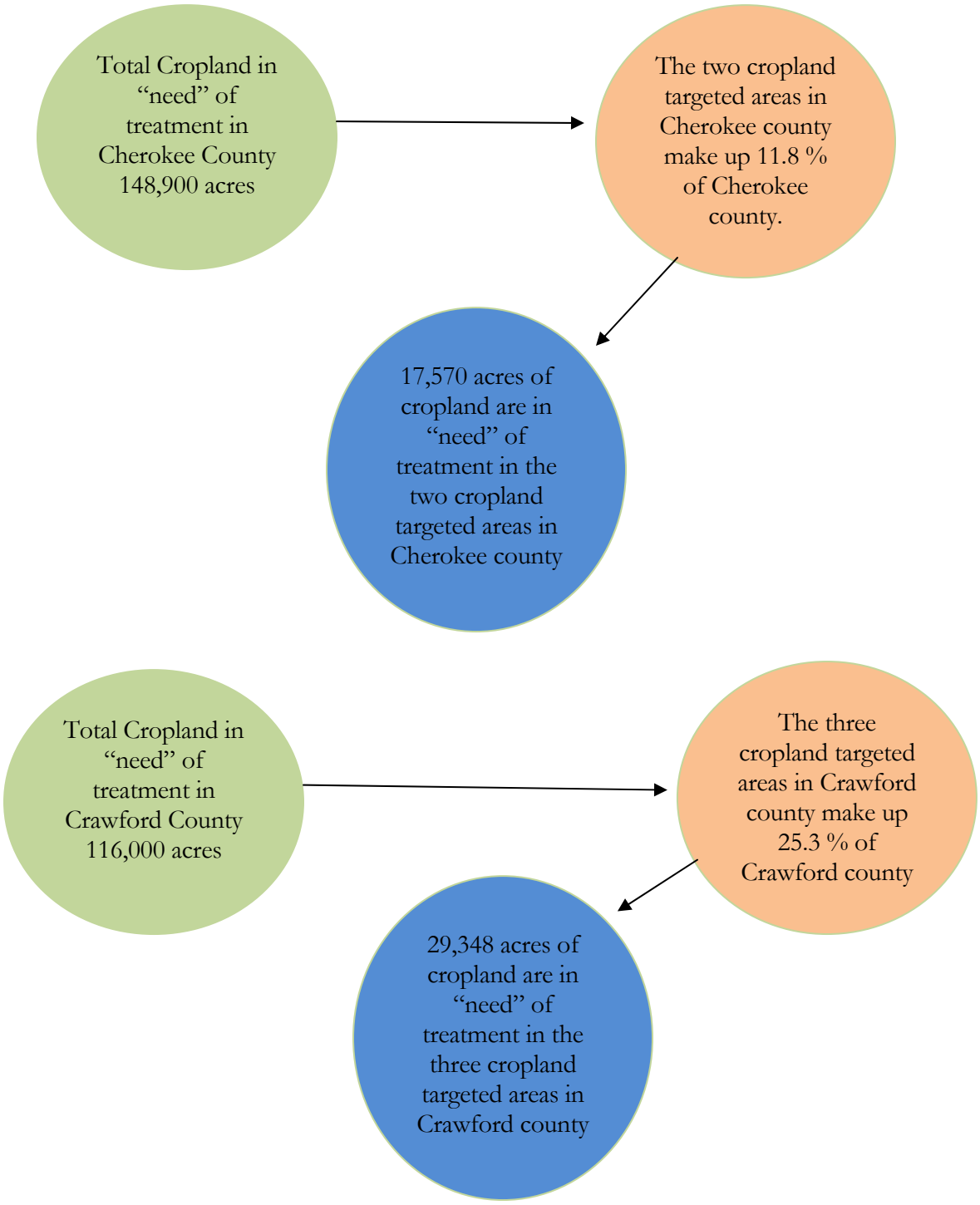

Figure 16

*Total cropland in "need" of treatment in the Cropland targeted areas equals 46,918 acres.

Livestock "Need"

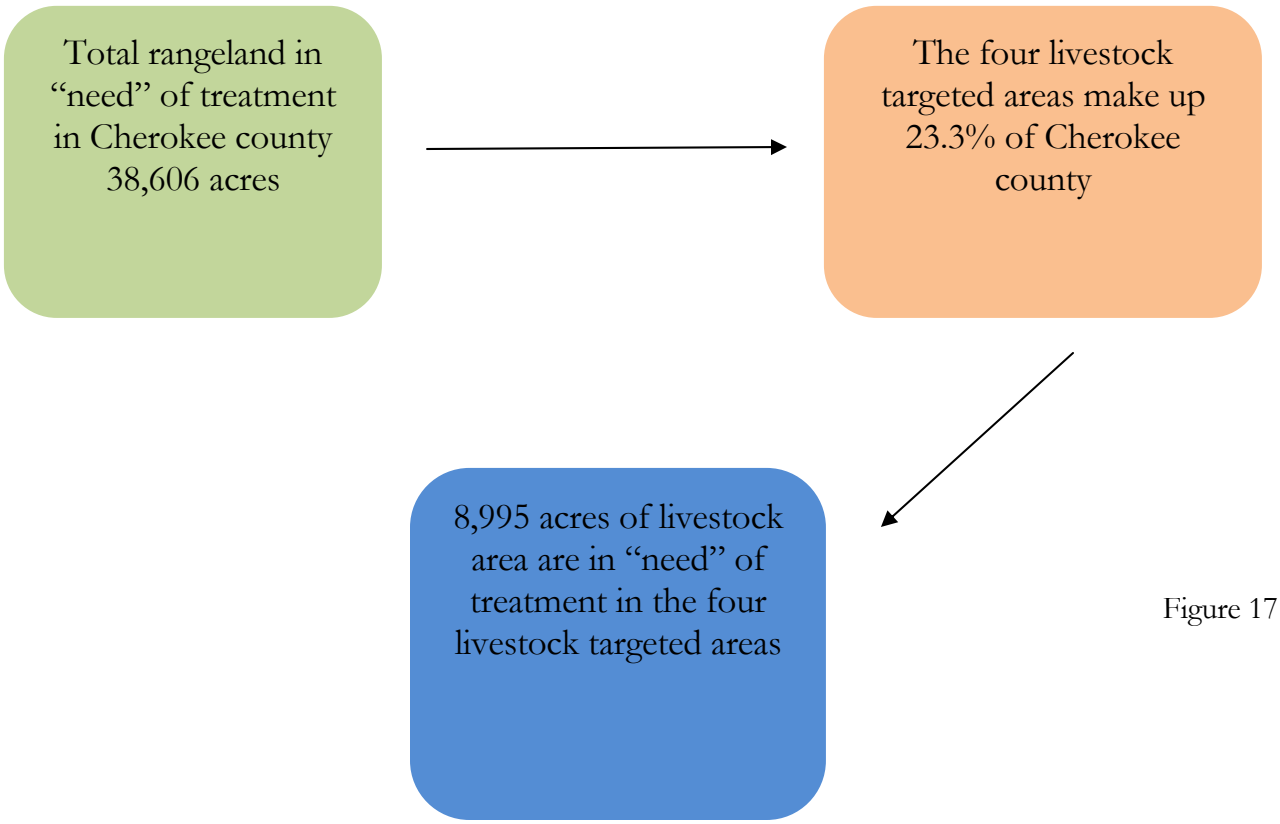

Figure 17

TMDL Load Allocations

Load allocation for phosphorus and sediment (expressed as Total Suspended Solids) for the Spring River Watershed has been determined by KDHE. Typically, Grand Lake would have TMDLs that would determine load allocations for the Spring River Watershed, however, no TMDLs have been drafted for Grand Lake at this time. Until a determination is made as to the need of TMDLs for Grand Lake, the Kansas Nutrient Management Plan has determined that a 30 percent load reduction in phosphorus and sediment is the reduction goal.

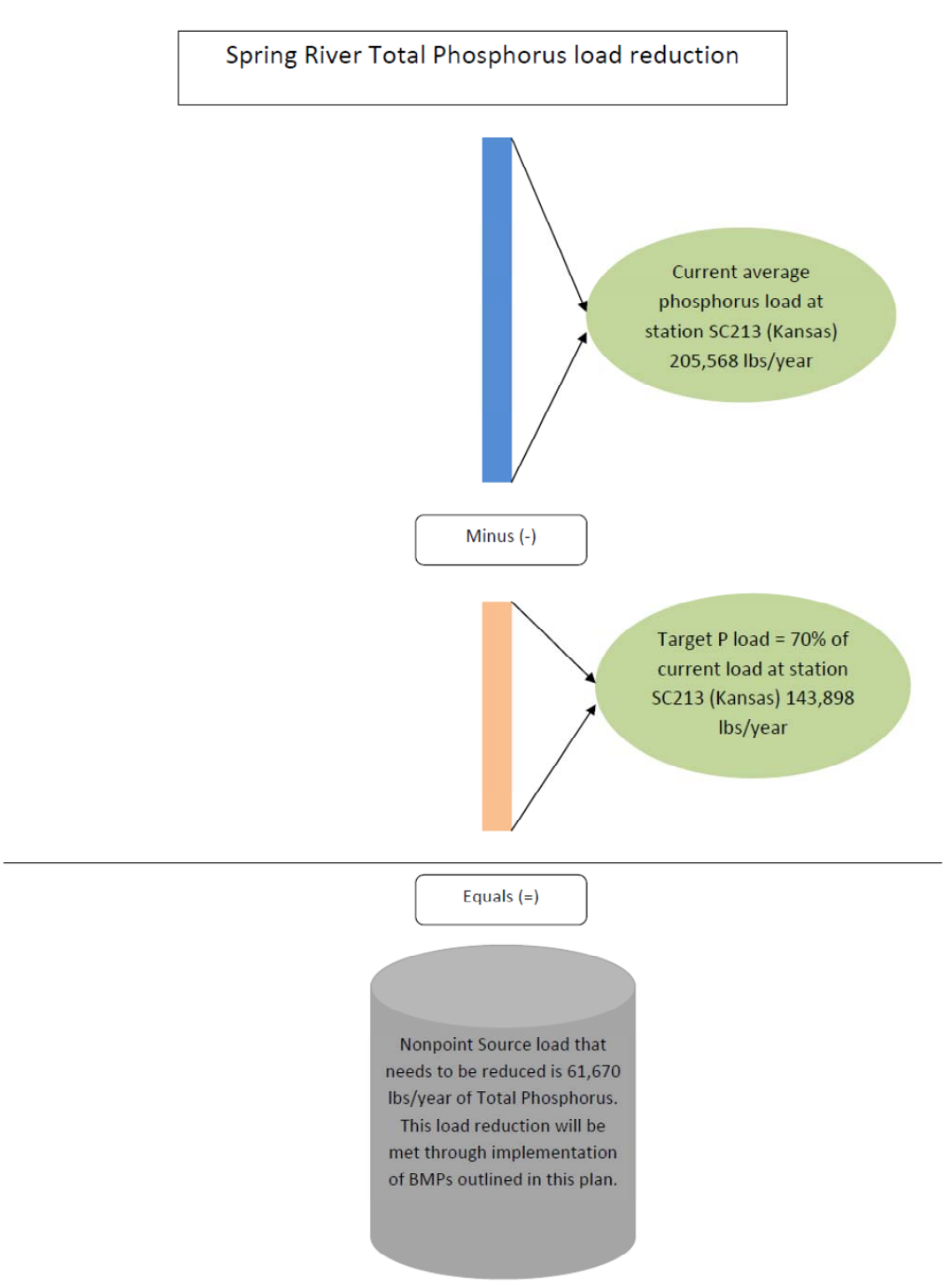
Spring River Total Phosphorus load reduction
Current average phosphorus load at station SC213 (Kansas) 205,568 lbs/year
Minus (-)
Target P load = 70% of current load at station SC213 (Kansas) 143,898 lbs/year
Equals (=)
Nonpoint Source load that needs to be reduced is 61,670 lbs/year of Total Phosphorus. This load reduction will be met through implementation of BMPs outlined in this plan.

Figure 18

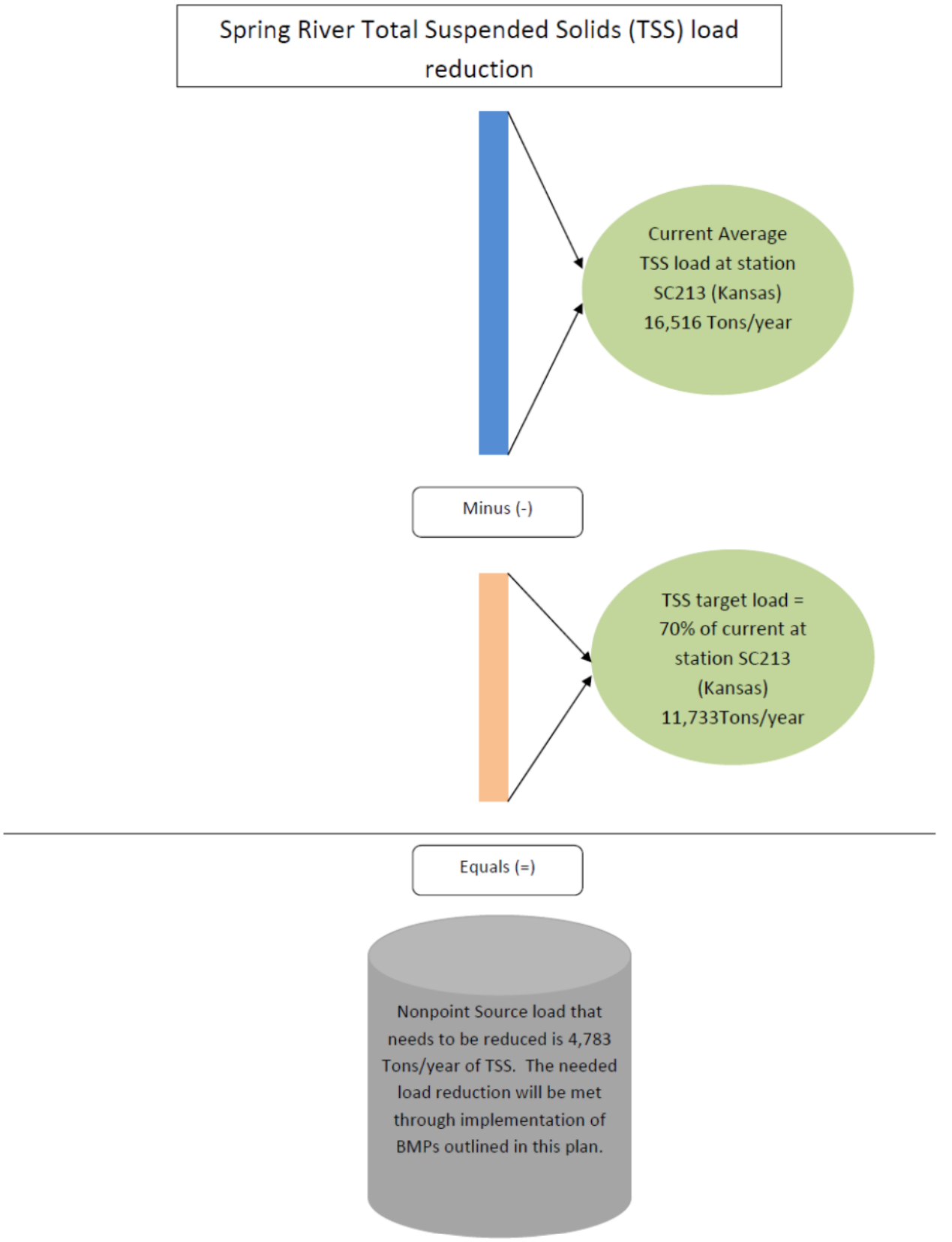
Spring River Total Suspended Solids (TSS) load reduction
Current Average TSS load at station SC213 (Kansas) 16,516 Tons/year
Minus (-)
TSS target load = 70% of current at station SC213 (Kansas) 11,733Tons/year
Equals (=)
Nonpoint Source load that needs to be reduced is 4,783 Tons/year of TSS. The needed load reduction will be met through implementation of BMPs outlined in this plan.

Figure 19

Table 7: Spring River WRAPS Cropland BMPs, Costs, and Reduction Efficiencies

Best Management Practice	Cost Per Treated Acre	Available Cost-Share	Erosion Reduction Efficiency	Phosphorous Reduction Efficiency	Nitrogen Reduction Efficiency
Permanent Vegetation	$150	50%	95%	95%	95%
Grassed Waterways	$170	50%	40%	40%	40%
No-Till	$78	39%	75%	40%	25%
Terraces	$102	50%	30%	30%	30%
Vegetative Buffer	$100	90%	50%	30%	25%
Nutrient Mgmt Plans	$57	50%	25%	25%	25%

**10 treated acres/acre of waterway*
***100 feet of terrace per acre*
****15 treated acres/acre of buffer*

Table 8: Annual Adoption (treated acres), Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Adoption
1	121	483	121	483	121	121	1,450
2	121	483	121	483	121	121	1,450
3	121	483	121	483	121	121	1,450
4	121	483	121	483	121	121	1,450
5	121	483	121	483	121	121	1,450
6	121	483	121	483	121	121	1,450
7	121	483	121	483	121	121	1,450
8	121	483	121	483	121	121	1,450
9	121	483	121	483	121	121	1,450
10	121	483	121	483	121	121	1,450
11	121	483	121	483	121	121	1,450
12	121	483	121	483	121	121	1,450
13	121	483	121	483	121	121	1,450
14	121	483	121	483	121	121	1,450
15	121	483	121	483	121	121	1,450
16	121	483	121	483	121	121	1,450
17	121	483	121	483	121	121	1,450
18	121	483	121	483	121	121	1,450
19	121	483	121	483	121	121	1,450
20	121	483	121	483	121	121	1,450

Table 9: Cropland Adoption Milestones (treated acres)

	Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Adoption
Short Term	1	121	483	121	483	121	121	1,450
	2	121	483	121	483	121	121	1,450
	3	121	483	121	483	121	121	1,450
	4	121	483	121	483	121	121	1,450
	5	121	483	121	483	121	121	1,450
Total		*604*	*2,417*	*604*	*2,417*	*604*	*604*	*7,251*
Medium Term	6	121	483	121	483	121	121	1,450
	7	121	483	121	483	121	121	1,450
	8	121	483	121	483	121	121	1,450
	9	121	483	121	483	121	121	1,450
	10	121	483	121	483	121	121	1,450
Total		*1,209*	*4,834*	*1,209*	*4,834*	*1,209*	*1,209*	*14,502*
Long Term	11	121	483	121	483	121	121	1,450
	12	121	483	121	483	121	121	1,450
	13	121	483	121	483	121	121	1,450
	14	121	483	121	483	121	121	1,450
	15	121	483	121	483	121	121	1,450
	16	121	483	121	483	121	121	1,450
	17	121	483	121	483	121	121	1,450
	18	121	483	121	483	121	121	1,450
	19	121	483	121	483	121	121	1,450
	20	121	483	121	483	121	121	1,450
Total		*2,417*	*9,668*	*2,417*	*9,668*	*2,417*	*2,417*	*29,005*

Table 10: Annual Soil Erosion Reduction, Cropland BMPs (tons)

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	180	303	142	227	95	47	994
2	360	606	284	455	189	95	1,989
3	540	909	426	682	284	142	2,983
4	720	1,212	568	909	379	189	3,978
5	900	1,515	710	1,137	474	237	4,972
6	1,080	1,818	852	1,364	568	284	5,967
7	1,260	2,122	994	1,591	663	331	6,961
8	1,440	2,425	1,137	1,818	758	379	7,956
9	1,620	2,728	1,279	2,046	852	426	8,950
10	1,799	3,031	1,421	2,273	947	474	9,945
11	1,979	3,334	1,563	2,500	1,042	521	10,939
12	2,159	3,637	1,705	2,728	1,137	568	11,933
13	2,339	3,940	1,847	2,955	1,231	616	12,928
14	2,519	4,243	1,989	3,182	1,326	663	13,922
15	2,699	4,546	2,131	3,410	1,421	710	14,917
16	2,879	4,849	2,273	3,637	1,515	758	15,911
17	3,059	5,152	2,415	3,864	1,610	805	16,906
18	3,239	5,455	2,557	4,091	1,705	852	17,900
19	3,419	5,758	2,699	4,319	1,799	900	18,895
20	3,599	6,061	2,841	4,546	1,894	947	19,889

Table 11: Annual Phosphorous Runoff Reduction, Cropland BMPs (pounds)

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	441	742	186	557	139	116	2,180
2	881	1,485	371	1,113	278	232	4,361
3	1,322	2,227	557	1,670	418	348	6,541
4	1,763	2,969	742	2,227	557	464	8,722
5	2,204	3,711	928	2,784	696	580	10,902
6	2,644	4,454	1,113	3,340	835	696	13,083
7	3,085	5,196	1,299	3,897	974	812	15,263
8	3,526	5,938	1,485	4,454	1,113	928	17,444
9	3,967	6,681	1,670	5,010	1,253	1,044	19,624
10	4,407	7,423	1,856	5,567	1,392	1,160	21,805
11	4,848	8,165	2,041	6,124	1,531	1,276	23,985
12	5,289	8,908	2,227	6,681	1,670	1,392	26,166
13	5,730	9,650	2,412	7,237	1,809	1,508	28,346
14	6,170	10,392	2,598	7,794	1,949	1,624	30,527

15	6,611	11,134	2,784	8,351	2,088	1,740	32,707
16	7,052	11,877	2,969	8,908	2,227	1,856	34,888
17	7,493	12,619	3,155	9,464	2,366	1,972	37,068
18	7,933	13,361	3,340	10,021	2,505	2,088	39,249
19	8,374	14,104	3,526	10,578	2,644	2,204	41,429
20	8,815	14,846	3,711	11,134	2,784	2,320	43,610

Table 12: Total Annual Cost Before Cost-Share*, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	18,128	82,180	9,389	49,308	12,085	6,854	$177,943
2	18,672	84,645	9,671	50,787	12,448	7,059	$183,282
3	19,232	87,184	9,961	52,311	12,821	7,271	$188,780
4	19,809	89,800	10,260	53,880	13,206	7,489	$194,443
5	20,403	92,494	10,567	55,496	13,602	7,714	$200,277
6	21,015	95,269	10,884	57,161	14,010	7,945	$206,285
7	21,646	98,127	11,211	58,876	14,430	8,183	$212,474
8	22,295	101,071	11,547	60,642	14,863	8,429	$218,848
9	22,964	104,103	11,894	62,462	15,309	8,682	$225,413
10	23,653	107,226	12,251	64,336	15,769	8,942	$232,176
11	24,362	110,443	12,618	66,266	16,242	9,211	$239,141
12	25,093	113,756	12,997	68,254	16,729	9,487	$246,315
13	25,846	117,169	13,387	70,301	17,231	9,772	$253,704
14	26,621	120,684	13,788	72,410	17,748	10,065	$261,316
15	27,420	124,304	14,202	74,583	18,280	10,367	$269,155
16	28,243	128,033	14,628	76,820	18,828	10,678	$277,230
17	29,090	131,874	15,067	79,125	19,393	10,998	$285,547
18	29,963	135,831	15,519	81,498	19,975	11,328	$294,113
19	30,861	139,905	15,984	83,943	20,574	11,668	$302,936
20	31,787	144,103	16,464	86,462	21,192	12,018	$312,025

**3% Annual Inflation*

Table 13: Total Annual Cost After Cost-Share*, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	9,064	41,090	5,727	24,654	1,209	3,427	$85,170
2	4,668	21,161	5,899	12,697	3,112	2,118	$49,655
3	4,808	21,796	6,076	13,078	3,205	2,181	$51,144
4	4,952	22,450	6,258	13,470	3,301	2,247	$52,679
5	5,101	23,123	6,446	13,874	3,401	2,314	$54,259
6	5,254	23,817	6,640	14,290	3,503	2,384	$55,887
7	5,411	24,532	6,839	14,719	3,608	2,455	$57,564

8	5,574	25,268	7,044	15,161	3,716	2,529	$59,290
9	5,741	26,026	7,255	15,615	3,827	2,605	$61,069
10	5,913	26,806	7,473	16,084	3,942	2,683	$62,901
11	6,091	27,611	7,697	16,566	4,060	2,763	$64,788
12	6,273	28,439	7,928	17,063	4,182	2,846	$66,732
13	6,462	29,292	8,166	17,575	4,308	2,931	$68,734
14	6,655	30,171	8,411	18,103	4,437	3,019	$70,796
15	6,855	31,076	8,663	18,646	4,570	3,110	$72,920
16	7,061	32,008	8,923	19,205	4,707	3,203	$75,107
17	7,272	32,969	9,191	19,781	4,848	3,299	$77,361
18	7,491	33,958	9,466	20,375	4,994	3,398	$79,681
19	7,715	34,976	9,750	20,986	5,144	3,500	$82,072
20	7,947	36,026	10,043	21,615	5,298	3,605	$84,534

**3% Annual Inflation*

Table 14: Sediment

Year	Cropland Reduction (tons)	% of Required Reduction
1	994	21%
2	1,989	42%
3	2,983	62%
4	3,978	83%
5	4,972	104%
6	5,967	125%
7	6,961	146%
8	7,956	166%
9	8,950	187%
10	9,945	208%
11	10,939	229%
12	11,933	249%
13	12,928	270%
14	13,922	291%
15	14,917	312%
16	15,911	333%
17	16,906	353%
18	17,900	374%
19	18,895	395%
20	19,889	416%
	Required Load Reduction (tons)	**4,783**

Table 15: Phosphorous

Year	Cropland Reduction (lbs)	Livestock Reduction (lbs)	Total Reduction (lbs)	% of Required Reduction
1	2,180	987	3,167	5%
2	4,361	1,973	6,334	10%
3	6,541	2,960	9,501	15%
4	8,722	3,946	12,668	21%
5	10,902	4,933	15,835	26%
6	13,083	5,919	19,002	31%
7	15,263	6,906	22,169	36%
8	17,444	7,892	25,336	41%
9	19,624	8,879	28,503	46%
10	21,805	9,866	31,670	51%
11	23,985	10,852	34,837	56%
12	26,166	11,839	38,004	62%
13	28,346	12,825	41,171	67%
14	30,527	13,812	44,338	72%
15	32,707	14,798	47,506	77%
16	34,888	15,785	50,673	82%
17	37,068	16,771	53,840	87%
18	39,249	17,758	57,007	92%
19	41,429	18,744	60,174	98%
20	43,610	19,731	63,341	103%
Required Load Reduction (pounds)		**61,670**		

Table 16: Total Annual WRAPS Cost after Cost-Share by BMP Category

Year	Cropland	Livestock	Total Annual Cost
1	$85,170	$5,254	$90,424
2	$49,655	$8,453	$58,108
3	$51,144	$5,573	$56,718
4	$52,679	$8,968	$61,647
5	$54,259	$5,913	$60,172
6	$55,887	$9,514	$65,401
7	$57,564	$6,273	$63,836
8	$59,290	$10,094	$69,384
9	$61,069	$6,655	$67,724
10	$62,901	$10,708	$73,609
11	$64,788	$7,060	$71,849
12	$66,732	$11,360	$78,092
13	$68,734	$7,490	$76,224
14	$70,796	$12,052	$82,848
15	$72,920	$7,946	$80,866
16	$75,107	$12,786	$87,894
17	$77,361	$8,430	$85,791
18	$79,681	$13,565	$93,246
19	$82,072	$8,944	$91,016
20	$84,534	$14,391	$98,925

Table 17: Sediment

Best Management Practice Category	Total Load Reduction (tons)	% of Required Load Reduction
Cropland	19,889	415.8%
Total	**19,889**	**415.8%**

Table 18: Phosphorous

Best Management Practice Category	Total Load Reduction (lbs)	% of Required Load Reduction
Livestock	19,731	32%
Cropland	43,610	71%
Total	**43,610**	**103%**

Table 19: Spring River WRAPS Livestock BMPs, Costs, and Estimated Phosphorous Reduction.

BMP	Approximate P Reduction Efficiency	Unit Cost	After Cost Share *	Estimated P Reduction (Pounds)	Additional Installations (Goal)	Total Estimated P Reduction
Vegetative Filter Strip	50%	$714	$357	638	10	6,379
Relocate Feedlot	95%	$6,621	$3,311	957	10	9,568
Relocated Pasture Feeding Site	50-90%	$2,203	$1,102	63	20	1,261
Off-Stream Watering System	85%	$3,795	$1,898	63	40	2,522

Table 20: Annual Livestock BMP Adoption

Year	Vegetative Filter Strip	Relocate Feeding Pens	Relocate Pasture Feeding Site	Off Stream Watering System
1	1	0	1	2
2	0	1	1	2
3	1	0	1	2
4	0	1	1	2
5	1	0	1	2
6	0	1	1	2
7	1	0	1	2
8	0	1	1	2
9	1	0	1	2
10	0	1	1	2
11	1	0	1	2
12	0	1	1	2
13	1	0	1	2
14	0	1	1	2
15	1	0	1	2
16	0	1	1	2
17	1	0	1	2
18	0	1	1	2
19	1	0	1	2
20	0	1	1	2
Total	*10*	*10*	*20*	*40*

Table 21: Livestock BMP Adoption Milestones

	Year	Vegetative Filter Strip	Relocate Feeding Pens	Relocate Pasture Feeding Site	Off Stream Watering System
Short Term	1	1	0	1	2
	2	0	1	1	2
	3	1	0	1	2
	4	0	1	1	2
	5	1	0	1	2
Total		*3*	*2*	*5*	*10*
Medium Term	6	0	1	1	2
	7	1	0	1	2
	8	0	1	1	2
	9	1	0	1	2
	10	0	1	1	2
Total		*5*	*5*	*10*	*20*
Long Term	11	1	0	1	2
	12	0	1	1	2
	13	1	0	1	2
	14	0	1	1	2
	15	1	0	1	2
	16	0	1	1	2
	17	1	0	1	2
	18	0	1	1	2
	19	1	0	1	2
	20	0	1	1	2
Total		*10*	*10*	*20*	*40*

Table 22: Annual Cost* Before Cost-Share of Implementing Livestock BMPs

Year	Vegetative Filter Strip	Relocate Feeding Pens	Relocate Pasture Feeding Site	Off Stream Watering System	Annual Cost
1	$714	$0	$2,203	$7,590	**$10,507**
2	$0	$6,820	$2,269	$7,818	**$16,906**
3	$757	$0	$2,337	$8,052	**$11,147**
4	$0	$7,235	$2,407	$8,294	**$17,936**
5	$804	$0	$2,479	$8,543	**$11,826**
6	$0	$7,676	$2,554	$8,799	**$19,028**
7	$853	$0	$2,630	$9,063	**$12,546**
8	$0	$8,143	$2,709	$9,335	**$20,187**
9	$904	$0	$2,791	$9,615	**$13,310**
10	$0	$8,639	$2,874	$9,903	**$21,417**

11	$960	$0	$2,961	$10,200	**$14,121**
12	$0	$9,165	$3,049	$10,506	**$22,721**
13	$1,018	$0	$3,141	$10,822	**$14,980**
14	$0	$9,723	$3,235	$11,146	**$24,105**
15	$1,080	$0	$3,332	$11,481	**$15,893**
16	$0	$10,315	$3,432	$11,825	**$25,572**
17	$1,146	$0	$3,535	$12,180	**$16,861**
18	$0	$10,944	$3,641	$12,545	**$27,130**
19	$1,216	$0	$3,750	$12,921	**$17,887**
20	$0	$11,610	$3,863	$13,309	**$28,782**

3% Annual Cost Inflation

Table 23: Annual Cost* After Cost-Share of Implementing Livestock BMPs

Year	Vegetative Filter Strip	Relocate Feeding Pens	Relocate Pasture Feeding Site	Off Stream Watering System	Annual Cost
1	$357	$0	$1,102	$3,795	**$5,254**
2	$0	$3,410	$1,135	$3,909	**$8,453**
3	$379	$0	$1,169	$4,026	**$5,573**
4	$0	$3,617	$1,204	$4,147	**$8,968**
5	$402	$0	$1,240	$4,271	**$5,913**
6	$0	$3,838	$1,277	$4,399	**$9,514**
7	$426	$0	$1,315	$4,531	**$6,273**
8	$0	$4,071	$1,355	$4,667	**$10,094**
9	$452	$0	$1,395	$4,807	**$6,655**
10	$0	$4,319	$1,437	$4,952	**$10,708**
11	$480	$0	$1,480	$5,100	**$7,060**
12	$0	$4,583	$1,525	$5,253	**$11,360**
13	$509	$0	$1,570	$5,411	**$7,490**
14	$0	$4,862	$1,618	$5,573	**$12,052**
15	$540	$0	$1,666	$5,740	**$7,946**
16	$0	$5,158	$1,716	$5,912	**$12,786**
17	$573	$0	$1,768	$6,090	**$8,430**
18	$0	$5,472	$1,821	$6,273	**$13,565**
19	$608	$0	$1,875	$6,461	**$8,944**
20	$0	$5,805	$1,931	$6,655	**$14,391**

3% Annual Cost Inflation

Table 24: Annual Phosphorus Load Reductions (lbs)

Year	Vegetative Filter Strip	Relocate Feeding Pens	Relocate Pasture Feeding Site	Off Stream Watering System	Annual Load Reduction

1	638	0	63	126	**827**
2	638	957	126	252	**1,973**
3	1,276	957	189	378	**2,800**
4	1,276	1,914	252	504	**3,946**
5	1,914	1,914	315	631	**4,773**
6	1,914	2,870	378	757	**5,919**
7	2,552	2,870	441	883	**6,746**
8	2,552	3,827	504	1,009	**7,892**
9	3,189	3,827	568	1,135	**8,719**
10	3,189	4,784	631	1,261	**9,865**
11	3,827	4,784	694	1,387	**10,692**
12	3,827	5,741	757	1,513	**11,838**
13	4,465	5,741	820	1,640	**12,665**
14	4,465	6,698	883	1,766	**13,811**
15	5,103	6,698	946	1,892	**14,638**
16	5,103	7,655	1,009	2,018	**15,784**
17	5,741	7,655	1,072	2,144	**16,611**
18	5,741	8,611	1,135	2,270	**17,757**
19	6,379	8,611	1,198	2,396	**18,585**
20	6,379	9,568	1,261	2,522	**19,731**

Table 25: Livestock BMP Adoption by Sub Watershed

Subwatershed	Vegetative Filter Strip	Relocate Feeding Site	Relocate Pasture Feeding Site	Off-Stream Watering System	Total Adoption
Long Branch	3	3	6	12	24
Brush Creek	3	3	6	12	24
Willow Creek	3	3	6	12	24
Shoal Creek	1	1	2	4	8
Total	10	10	20	40	80

Table 26: Livestock BMP Cost Before Cost-Share by Sub Watershed

Subwatershed	Vegetative Filter Strip	Relocate Feeding Site	Relocate Pasture Feeding Site	Off-Stream Watering System	Total Cost
Long Branch	$2,142	$19,863	$13,218	$45,540	$80,763
Brush Creek	$2,142	$19,863	$13,218	$45,540	$80,763
Willow Creek	$2,142	$19,863	$13,218	$45,540	$80,763
Shoal Creek	$714	$6,621	$4,406	$15,180	$26,921
Total	$7,140	$66,210	$44,060	$151,800	$269,210

Table 27: Livestock BMP Cost After Cost-Share by Sub Watershed

Subwatershed	Vegetative Filter Strip	Relocate Feeding Site	Relocate Pasture Feeding Site	Off-Stream Watering System	Total Cost
Long Branch	$1,071	$9,932	$6,609	$22,770	$40,382
Brush Creek	$1,071	$9,932	$6,609	$22,770	$40,382
Willow Creek	$1,071	$9,932	$6,609	$22,770	$40,382
Shoal Creek	$357	$3,311	$2,203	$7,590	$13,461
Total	$3,570	$33,105	$22,030	$75,900	$134,605

Table 28: Livestock BMP Phosphorus Load Reduction by Sub Watershed (pounds)

Subwatershed	Vegetative Filter Strip	Relocate Feeding Site	Relocate Pasture Feeding Site	Off-Stream Watering System	Total Load Reduction
Long Branch	1,914	2,870	378	757	5,919
Brush Creek	1,914	2,870	378	757	5,919
Willow Creek	1,914	2,870	378	757	5,919
Shoal Creek	638	957	126	252	1,973
Total	6,379	9,568	1,261	2,522	19,731

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 the residents of the watershed with a higher awareness of watershed issues. This will lead to an increase in adoption rates of BMPs. Listed below are the activities and events along with their costs and possible sponsoring agencies.

Table 29: Information and Education Activities and Events as Requested by the SLT to Address All TMDLs in the Watershed.

BMP	Target Audience	Information/Education Activity/Event	Time Frame	Estimated Costs	Sponsor/Responsible Agency
Cropland BMP Implementation					
Vegetative Buffers	Landowners and Farmers	Demonstration Project	Annual – Spring	$5,000 per demonstration project	Kansas Rural Center Buffer Coordinator
		Tour/Field Day to Highlight Grassed Buffer	Annual - Summer	$500 per tour or field day	Kansas Rural Center Buffer Coordinator
		Buffer/Riparian Area Tour/Field Day	Annual - Summer	$1,700 per tour or field	Kansas Forest Service

		highlighting forested buffers		day	
		Newspaper Articles	Annual – Fall	No Charge	Conservation Districts
		Extension Newsletter Article	Annual – Fall	No Charge	Conservation Districts and Kansas Research and Extension
		One on One Meetings with Producers	Annual - Ongoing	Cost included in Technical Assistance for Buffer Coordinator	Conservation Districts, Kansas Research and Extension and Buffer Coordinators

BMP	Target Audience	Information/Education Activity/Event	Time Frame	Estimated Costs	Sponsor/Responsible Agency
Cropland BMP Implementation, Cont.					
No-till	Farmers and Rental Operators	No-Till Informational Meeting	Annual - Spring	$2,000 per meeting	No-Till on the Plains and Conservation Districts
		Newsletter article	Annual – Spring	No Charge	Conservation District and Kansas State Research and Extension
		One on One Meetings with Producers	Annual - Ongoing	Cost included with Technical Assistance for No-Till Coordinator	Conservation District and Kansas State Research and Extension
		Seasonal Informational Meeting (planting)	Annual - Spring	$2,750 per meeting	No-till on the Plains
		Seasonal Informational Meeting (harvesting)	Annual - Summer	$2,750 per meeting	No-till on the Plains
		Scholarships for 25 producers to attend No-Till Winter Conference	Annual – Winter	$3,750 ($150 per person)	No-till on the Plains
Nutrient Management	Farmers	Cost Share for 600 Soil Tests	Annual - Ongoing	$3,000 ($5 per test)	Conservation District and Kansas State Research and Extension
		Extension Newsletter Article	Annual - Ongoing	No Charge	Conservation District and Kansas State Research and Extension
		One on One Meetings with Producers	Annual - Ongoing	Cost included with Technical Assistance for Watershed Specialist	Kansas State Research and Extension (KSRE)
Grassed Waterways/ Terraces	Farmers	Tour/Field Day	Annual/ Summer	$1,500 per tour	Conservation District and Kansas State Research and Extension

BMP	Target Audience	Information/Education Activity/Event	Time Frame	Estimated Costs	Sponsor/Responsible Agency
Livestock BMP Implementation					
Vegetative Filter Strips	Landowners and Ranchers	Demonstration Project	Annual – Spring	Combined with buffer demonstration	Kansas Rural Center Buffer Coordinator
		Tour/Field Day	Annual - Summer	Combined with buffer tour or field day	Kansas Rural Center Buffer Coordinator
		Workshop/Tour	Annual – Winter	$500 per workshop	Kansas Rural Center Buffer Coordinator
		Livestock Filter Strip and Feedlot Relocation Demonstration/Tour	Annual – Winter	$300 per demonstration or tour	Conservation Districts NCRS
Relocated Feedlot	Landowners and Small Feedlot Operators	Demonstration Project	Annual – Spring	$5,000 per demonstration project	Kansas Rural Center
		Tour/Field Day	Annual - Summer	$500 per tour or field day	Kansas Rural Center Conservation Districts
		EQIP Program Informational Meeting	Annual - Ongoing	No Charge	Conservation Districts NRCS

BMP	Target Audience	Information/Education Activity/Event	Time Frame	Estimated Costs	Sponsor/Responsible Agency
Livestock BMP Implementation, Cont.					
Relocate Pasture Feeding Site	Ranchers	Demonstration Project	Annual – Spring	$5,000 per demonstration project	Kansas Rural Center
		Tour/Field Day	Annual - Summer	$500 per tour or field day	Kansas Rural Center Conservation Districts
		Grazing Informational Meeting featuring Jim Gerrish	Annual - Fall	$250 per meeting	Conservation Districts Kansas Rural Center
Off-Stream Watering System	Ranchers	Demonstration Project	Annual – Spring	$5,000 per demonstration project	Kansas Rural Center
		Tour/Field Day	Annual - Summer	$500 per tour or field day	Kansas Rural Center Conservation Districts
		Grazing Informational Meeting featuring Jim Gerrish	Annual - Fall	Combined with relocating pasture feeding site meeting	Conservation Districts Kansas Rural Center
		Demonstration project for pond construction and spring developments	Annual - Fall	$10,000 per project	Conservation Districts NRCS
Watershed Wide Information and Education					
Education of Youth	Educators, K-12 Students	Day on the Farm	Annual – Spring	$500 per event	Conservation Districts, Kansas Farm Bureaus, Kansas FFA Organization, Kansas State Research and Extension
		Poster, essay and speech contests	Annual – Spring	$200	Conservation Districts
		Envirothon	Annual - Spring	$250	Conservation Districts
Education of Adults	Educators, Adult Education	Extension newsletter article	Annual – Ongoing	No charge	Conservation District
		Presentation at annual meeting	Annual – Winter	No charge	Conservation District
		River Friendly Farms	Annual -	$150 per	Conservation

		producer notebook Informational Meeting	Ongoing	meeting	Districts, Kansas Rural Center
		Media campaign to promote forestry practices (brochures, news releases, TV, radio, web-based)	Bi-annual – Ongoing	$500 per campaign	Kansas Forest Service
BMP	Target Audience	Information/Education Activity/Event	Time Frame	Estimated Costs	Sponsor/Responsible Agency
Watershed Wide Information and Education, Cont.					
Education of Watershed Residents	Watershed Residents	CoCoRaHS promotional event	Annual - Ongoing	$250 per event	Conservation Districts (CD)
		Meeting with Soil and Grassland Awards	Annual – Ongoing	No charge	Conservation Districts (CD)
		Media campaign to promote River Friendly Farms (news stories, features, farmer profiles)	Annual – Ongoing	$1,000 per campaign	Kansas Rural Center (KRC)
		Media campaign to address urban nutrient runoff (flyers or handouts addressing phosphate and nitrate pollution from urban areas)	Annual – Ongoing	$500 per campaign	Local Environmental Protection Program (LEPP)
		Watershed display for area garden shows	Annual – Ongoing	No charge	Conservation Districts, Kansas State Research and Extension
Total annual cost for Information and Education if all events are implemented				**$63,050**	

***Table 30: Potential Service Providers for BMP Implementation.* ***

BMP		**Services Needed to Implement BMP**		**Service Provider ****
		Technical Assistance	***Information and Education***	
Cropland	1.Vegetative Buffers	Design, cost share and maintenance	BMP workshops, tours, field days	NRCS FSA KRC SCC No-Till on the Plains
	2.Continuous No-till	Design, cost share and maintenance	BMP workshops, tours, field days	
	3.Nutrient Management	Development of management plan	BMP workshops	

	4.Grassed Waterways	Design, cost share and maintenance	BMP workshops, field days, tours	KFS KSRE CD RC&D KDWP
	5. Terraces	Design, cost share and maintenance	BMP workshops, field days, tours	
Livestock	1. Vegetative filter strips	Design, cost share and maintenance	BMP workshops, field days, tours	KSRE NRCS SCC KRC No-Till on the Plains KAWS CD RC&D KDWP
	2.Relocate feeding pens	Design, cost share and maintenance	BMP workshops, field days, tours	
	3.Relocate pasture feeding sites	Design, cost share and maintenance	BMP workshops, field days, tours	
	4. Establish off stream watering system.	Design, cost share and maintenance	BMP workshops, field days, tours	
***** See Appendix for service provider directory***				

Table 31: Technical Assistance Needed to Implement BMPs.

BMP		***Technical Assistance***	***Projected Annual Cost***
Cropland	1. Terraces	Terrace Coordinator No-Till Coordinator WRAPS Coordinator River Friendly Farms Technician	Buffer Coordinator $15,000 No-Till Coordinator $15,000 WRAPS Coordinator $35,000 Watershed Specialist $45,000 KRC River Friendly Farms Technician $20,000 Kansas Rural Water Association Technician $20,000
	2. Continuous No-till	No-Till Coordinator WRAPS Coordinator River Friendly Farms Technician	
	3. Nutrient Management	Watershed Specialist River Friendly Farms Technician	
	4. Waterways	Buffer Coordinator River Friendly Farms Technician	
	5. Vegetative Buffer	Buffer Coordinator River Friendly Farms Technician	
Livestock	1. Vegetative filter strips	Buffer Coordinator River Friendly Farms Technician	
	2. Relocate Feeding pens	Watershed Specialist River Friendly Farms Technician	
	3. Relocate pasture feeding sites	Watershed Specialist River Friendly Farms Technician	
	4. Establish off stream watering systems	Watershed Specialist River Friendly Farms Technician	
Total			**$150,000**

Water Quality Milestones to Determine Improvements

The goal of the Spring River WRAPS plan is to restore water quality for uses supportive of aquatic life, domestic water supply, and recreation for the Spring River Watershed. In order to address the impairments associated with the watershed, KDHE has set a goal of 30% reduction in phosphorus for the watershed. In order to reach the load reduction goals associated with the plan, a BMP implementation schedule spanning 20 years has been developed.

The selected BMPs included in the plan will be implemented throughout the targeted areas within the Spring River watershed. Water quality milestones have been developed for Spring River and its tributaries, along with additional indicators of water quality. The purpose of the milestones and indicators is to measure water quality improvements associated with the BMP implementation schedule contained in this plan.

Water Quality Milestones– Cow Creek and Spring River

As previously stated, in order to reach the load reduction goals for the Spring River watershed, a BMP implementation schedule spanning 20 years has been developed. KDHE has two monitoring stations that will be utilized to track water quality changes within the watershed associated with the BMP implementation schedule. One station (SC567) is on Cow Creek near Lawton and the other station (SC213) is at the downstream end of the watershed on Spring River near Baxter Springs.

Several water quality milestones and indicators have been developed for Spring River and Cow Creek, as included herein. The table below includes short term, mid-term, and long term water quality goals for various parameters monitored in the watershed.

Table 32

Water Quality Milestones for Spring River and Cow Creek							
		Short Term Goal		Mid Term Goal		Long Term Goal	
	Current Condition * Average TP	Improved Condition (2011 - 2015) 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), ppb**						
Cow Creek SC567	514	490	**24**	452	**62**	410	**20%**
Spring River Outlet SC213	243	230	**13**	200	**43**	170	**30%**

**The current conditions for total phosphorus were calculated utilizing sampling data from the KDHE stream monitoring stations from 1990 to 2011.

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 in public water supply from Spring River
- Trends of quantity and quality of fishing in Spring River
- No fish kills on Spring River

Monitoring Water Quality Progress

KDHE continues to monitor water quality in the Spring River watershed by maintaining the monitoring stations located within the watershed. The map below indicates the locations of the monitoring sites located within the Spring River watershed, as well as the BMP targeted areas that have been identified and discussed in previous sections of this plan.

The map shows both the permanent and rotational KDHE monitoring stations located within the Spring River watershed. The permanent monitoring sites are continuously sampled, while the rotational sites are typically sampled every four years. The sites are sampled for nutrients, *E. Coli* bacteria, chemicals, turbidity, alkalinity, dissolved oxygen, pH, ammonia and metals. The pollutant indicators tested for at each site may vary depending on the season at collection time and other factors.

The following is a list of the monitoring stations located with the Spring River watershed that will continue to be sampled and monitored by KDHE to evaluate the water quality of the watershed as associated with this plan:

SC213
Permanent
Spring River Outlet
SC567
Permanent
Cow Creek

In addition to the KDHE monitoring stations, there is a USGS gage located in Spring River near Baxter Springs, near the KDHE stream monitoring station SC213 shown on the map. The USGS utilizes this station to monitor flow data in Spring River.

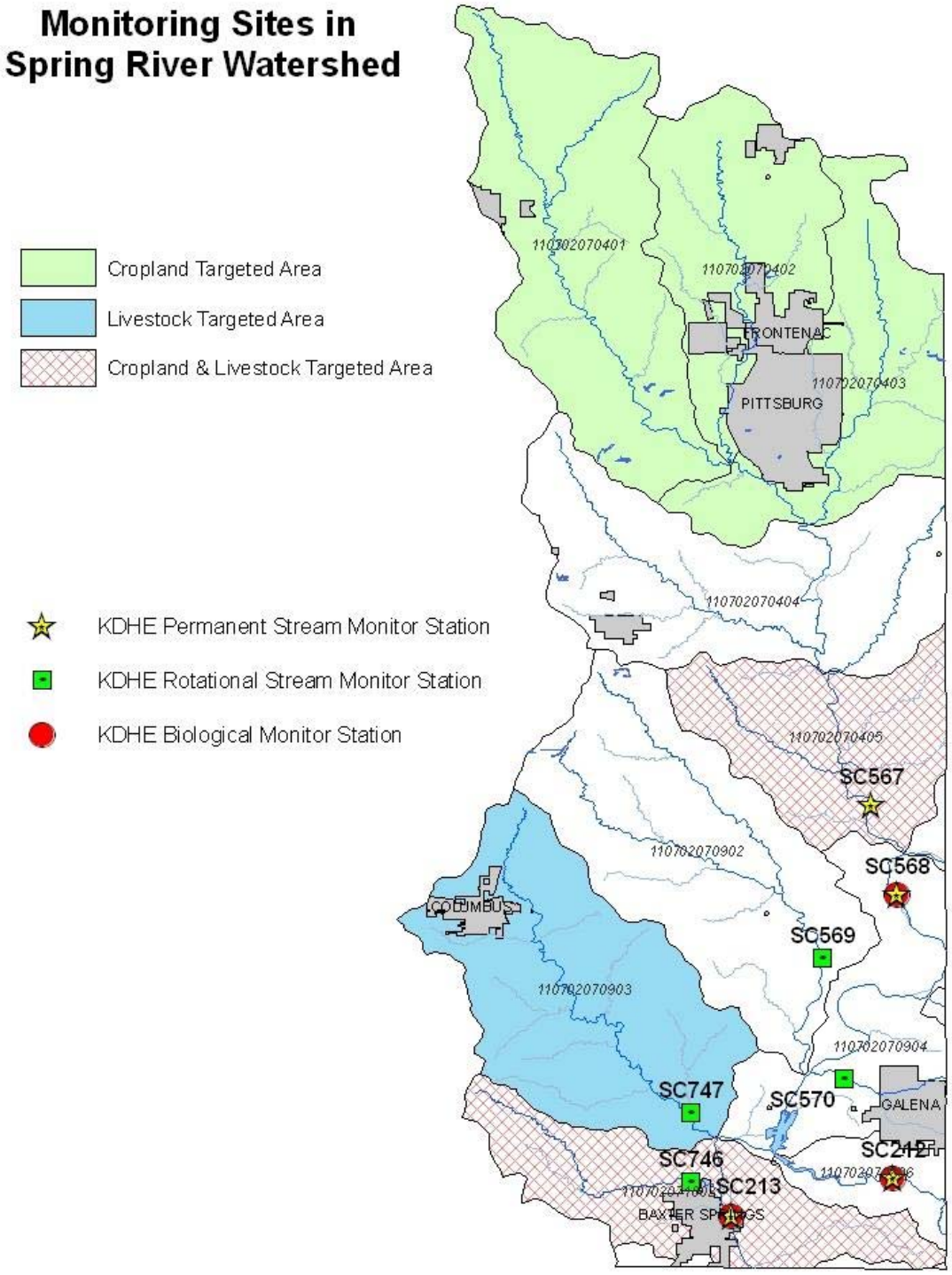
Monitoring Sites in
Spring River Watershed
Cropland Targeted Area
Livestock Targeted Area
Cropland & Livestock Targeted Area
KDHE Permanent Stream Monitor Station
KDHE Rotational Stream Monitor Station
KDHE Biological Monitor Station
110702070401
110702070402
FRONTENAC
110702070403
PITTSBURG
110702070404
110702070405
SC567
110702070902
SC568
COLUMBUS
SC569
110702070903
110702070904
SC747
SC570
GALENA
SC746
SC213
BAXTER SPRINGS

Table 20

Evaluation of Monitoring Data

Monitoring data in the Spring River watershed will be used to determine water quality progress, track water quality milestones, and to determine the effectiveness of the BMP implementation 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 BMP implementation schedule and water quality milestones for the Spring River watershed extend through a 20-year period from 2011 to 2030. Throughout that period, KDHE will continue to analyze and evaluate the monitoring data collected. After the first five years of monitoring and BMP implementation, KDHE will evaluate the available water quality data to determine whether the water quality milestones have been achieved. KDHE and the SLT can address any necessary modifications or revisions to the plan based on the data analysis. In 2030, at the end of the plan, a determination can be made as to whether the water quality standards have been attained.

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 KDHE and the SLT to evaluate newer available information, incorporate any revisions to applicable TMDLs, or address any potential water quality indicators that might trigger an immediate review.

APPENDIX

Table 33: Service Providers
Potential Service Provider Listing

Organization	Programs	Purpose	Technical or Financial Assistance	Phone	Website address
Environmental Protection Agency	Clean Water State Revolving Fund Program Watershed Protection	Provides low cost loans to communities for water pollution control activities. To conduct holistic strategies for restoring and protecting aquatic resources based on hydrology rather than political boundaries.	Financial	913-551-7003 913-551-7003	www.epa.gov
SEE-KAN RC&D	Natural resource development and protection	Plan and Implement projects and programs that improve environmental quality of life.	Technical	620-431-6180	www.seekanrcd.com
Kansas Alliance for Wetlands and Streams	Streambank Stabilization Wetland Restoration Cost share programs	The Kansas Alliance for Wetlands and Streams (KAWS) organized in 1996 to promote the protection, enhancement, restoration and establishment wetlands and streams in Kansas.	Technical	620-289-4663 SE/SC Chapter	www.kaws.org

Kansas Dept. of Agriculture Division of Water Resources	Watershed structures permitting.	Available for watershed districts and multipurpose small lakes development.	Technical and Financial	785-296-2933	www.accesskansas.org/kda

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
Kansas Dept. of Health and Environment	**Nonpoint Source Pollution Program** Livestock waste Point Source Pollution Municipal program State Revolving Loan Fund	Provide funds for projects that will reduce nonpoint source pollution. Compliance monitoring. Makes low interest loans for projects to improve and protect water quality.	Technical and Financial	785-296-5500	www.kdhe.state.ks.us

Kansas Department of Wildlife and Parks	Land and Water Conservation Funds Conservation Easements for Riparian and Wetland Areas Wildlife Habitat Improvement Program North American Waterfowl Conservation Act MARSH program in coordination with Ducks Unlimited Chickadee Checkoff Walk In Hunting Program F.I.S.H. Program	Provides funds to preserve develop and assure access to outdoor recreation. To provide easements to secure and enhance quality areas in the state. To provide limited assistance for development of wildlife habitat. To provide up to 50 percent cost share for the purchase and/or development of wetlands and wildlife habitat. May provide up to 100 percent of funding for small wetland projects.	Technical and Financial	620-672-5911 785-296-2780 620-672-5911 620-342-0658 620-672-5911	www.kdwp.state.ks.us/about/grants.html

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
Kansas Forest Service	Conservation Tree Planting Program Riparian and Wetland Protection Program	Provides low cost trees and shrubs for conservation plantings. Work closely with other agencies to promote and assist with establishment of riparian forestland and manage existing stands.	Technical	785-532-3312 785-532-3310	www.kansasforests.org
Kansas Rural Center	The Heartland Network Clean Water Farms-River Friendly Farms Sustainable Food Systems Project Cost share programs	The Center is committed to economically viable, environmentally sound and socially sustainable rural culture.	Technical and Financial	785-873-3431	http://www.kansasruralcenter.org
Kansas Rural Water Association	Technical assistance for Water Systems with Source Water Protection Planning.	Provide education, technical assistance and leadership to public water and wastewater utilities to enhance the public health and to sustain Kansas' communities	Technical	785-336-3760	http://www.krwa.net

Kansas State Research and Extension	Water Quality Programs, Waste Management Programs Kansas Center for Agricultural Resources and Environment (KCARE) Kansas Environmental Leadership Program (KELP) Kansas Local Government Water Quality Planning and Management Rangeland and Natural Area Services (RNAS) WaterLINK Kansas Pride: Healthy Ecosystems/ Healthy Communities Citizen Science	Provide programs, expertise and educational materials that relate to minimizing the impact of rural and urban activities on water quality. Educational program to develop leadership for improved water quality. Provide guidance to local governments on water protection programs. Reduce non-point source pollution emanating from Kansas grasslands. Service-learning projects available to college and university faculty and community watersheds in Kansas.	Technical	785-532-7108 785-532-5813 785-532-2643 785-532-0416 785-532-2732 785-532-3039 785-532-1443	www.kcare.ksu.edu www.ksre.ksu.edu/kelp www.ksre.ksu.edu/olg www.k-state.edu/waterlink/ www.kansasprideprogram.ksu.edu/healthyecosystems/ www.ksre.ksu.edu/kswater/

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
Kansas Water Office	Public Information and Education	Provide information and education to the public on Kansas Water Resources	Technical and Financial	785-296-3185	www.kwo.org
No-Till on the Plains	Field days, seasonal meetings, tours and technical consulting.	Provide information and assistance concerning continuous no-till farming practices.	Technical	888-330-5142	www.notill.org
Kansas Department of Health and Environment	Natural Resources Damage Assessment and Restoration Program (NRDAR)	Provide financial support for restoration.	Financial	303-236-4261	www.fws.gov/mountain-prairie/nrda/

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
State Conservation Commission and Conservation Districts	Water Resources Cost Share Nonpoint Source Pollution Control Fund Riparian and Wetland Protection Program Stream Rehabilitation Program Kansas Water Quality Buffer Initiative Watershed district and multipurpose lakes	Provide cost share assistance to landowners for establishment of water conservation practice Provides financial assistance for nonpoint pollution control projects which help restore water quality. Funds to assist with wetland and riparian development and enhancement. Assist with streams that have been adversely altered by channel modifications..	Technical and Financial	Cherokee County 620-429-3013 Crawford County 620-724-8231	www.accesskansas.org/kscc http://www.kacdnet.org/

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address

US Army Corps of Engineers	Planning Assistance to States Environmental Restoration	Assistance in development of plans for development, utilization and conservation of water and related land resources of drainage Funding assistance for aquatic ecosystem restoration.	Technical	816-983-3157 816-983-3157	www.usace.army.mil
US Fish and Wildlife Service	Fish and Wildlife Enhancement Program Private Lands Program	Supports field operations which include technical assistance on wetland design. Contracts to restore, enhance, or create wetlands.	Technical	785-539-3474 785-539-3474	www.fws.gov

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
USDA-Natural Resources Conservation Service and Farm Service Agency	Conservation Compliance Conservation Operations Watershed Planning and Operations Wetland Reserve Program Wildlife Habitat Incentives Program Grassland Reserve Program, EQIP, and Conservation Reserve Program	Primarily for the technical assistance to develop conservation plans on cropland. To provide technical assistance on private land for development and application of Resource Management Plans. Primarily focused on high priority areas where agricultural improvements will meet water quality objectives. Cost share and easements to restore wetlands. Cost share to establish wildlife habitat which includes wetlands and riparian areas. Improve and protect rangeland resources with cost-sharing practices, rental agreements, and easement purchases.	Technical and Financial	Cherokee County 620-429-3360 Crawford County 620-724-6227	www.ks.nrcs.usda.gov

Table 34: Pollutant Reductions by Subbasin

Sub Watershed #401 Annual Adoption (treated acres), Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Adoption
1	33	134	33	134	33	33	401
2	33	134	33	134	33	33	401
3	33	134	33	134	33	33	401
4	33	134	33	134	33	33	401
5	33	134	33	134	33	33	401
6	33	134	33	134	33	33	401
7	33	134	33	134	33	33	401
8	33	134	33	134	33	33	401
9	33	134	33	134	33	33	401
10	33	134	33	134	33	33	401
11	33	134	33	134	33	33	401
12	33	134	33	134	33	33	401
13	33	134	33	134	33	33	401
14	33	134	33	134	33	33	401
15	33	134	33	134	33	33	401
16	33	134	33	134	33	33	401
17	33	134	33	134	33	33	401
18	33	134	33	134	33	33	401
19	33	134	33	134	33	33	401
20	33	134	33	134	33	33	401

Sub Watershed #402 Annual Adoption (treated acres), Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Adoption
1	21	85	21	85	21	21	254
2	21	85	21	85	21	21	254
3	21	85	21	85	21	21	254
4	21	85	21	85	21	21	254
5	21	85	21	85	21	21	254
6	21	85	21	85	21	21	254
7	21	85	21	85	21	21	254
8	21	85	21	85	21	21	254
9	21	85	21	85	21	21	254
10	21	85	21	85	21	21	254
11	21	85	21	85	21	21	254

12	21	85	21	85	21	21	254
13	21	85	21	85	21	21	254
14	21	85	21	85	21	21	254
15	21	85	21	85	21	21	254
16	21	85	21	85	21	21	254
17	21	85	21	85	21	21	254
18	21	85	21	85	21	21	254
19	21	85	21	85	21	21	254
20	21	85	21	85	21	21	254

Sub Watershed #403 Annual Adoption (treated acres), Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Adoption
1	17	66	17	66	17	17	198
2	17	66	17	66	17	17	198
3	17	66	17	66	17	17	198
4	17	66	17	66	17	17	198
5	17	66	17	66	17	17	198
6	17	66	17	66	17	17	198
7	17	66	17	66	17	17	198
8	17	66	17	66	17	17	198
9	17	66	17	66	17	17	198
10	17	66	17	66	17	17	198
11	17	66	17	66	17	17	198
12	17	66	17	66	17	17	198
13	17	66	17	66	17	17	198
14	17	66	17	66	17	17	198
15	17	66	17	66	17	17	198
16	17	66	17	66	17	17	198
17	17	66	17	66	17	17	198
18	17	66	17	66	17	17	198
19	17	66	17	66	17	17	198
20	17	66	17	66	17	17	198

Sub Watershed #405 Annual Adoption (treated acres), Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Adoption
1	34	137	34	137	34	34	410
2	34	137	34	137	34	34	410
3	34	137	34	137	34	34	410
4	34	137	34	137	34	34	410

5	34	137	34	137	34	34	410
6	34	137	34	137	34	34	410
7	34	137	34	137	34	34	410
8	34	137	34	137	34	34	410
9	34	137	34	137	34	34	410
10	34	137	34	137	34	34	410
11	34	137	34	137	34	34	410
12	34	137	34	137	34	34	410
13	34	137	34	137	34	34	410
14	34	137	34	137	34	34	410
15	34	137	34	137	34	34	410
16	34	137	34	137	34	34	410
17	34	137	34	137	34	34	410
18	34	137	34	137	34	34	410
19	34	137	34	137	34	34	410
20	34	137	34	137	34	34	410

Sub Watershed #1002 Annual Adoption (treated acres), Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Adoption
1	16	62	16	62	16	16	186
2	16	62	16	62	16	16	186
3	16	62	16	62	16	16	186
4	16	62	16	62	16	16	186
5	16	62	16	62	16	16	186
6	16	62	16	62	16	16	186
7	16	62	16	62	16	16	186
8	16	62	16	62	16	16	186
9	16	62	16	62	16	16	186
10	16	62	16	62	16	16	186
11	16	62	16	62	16	16	186
12	16	62	16	62	16	16	186
13	16	62	16	62	16	16	186
14	16	62	16	62	16	16	186
15	16	62	16	62	16	16	186
16	16	62	16	62	16	16	186
17	16	62	16	62	16	16	186
18	16	62	16	62	16	16	186
19	16	62	16	62	16	16	186
20	16	62	16	62	16	16	186

Sub Watershed #401 Annual Soil Erosion Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	60	102	48	76	32	16	333
2	121	203	95	152	63	32	666
3	181	305	143	229	95	48	1,000
4	241	406	190	305	127	63	1,333
5	302	508	238	381	159	79	1,666
6	362	609	286	457	190	95	1,999
7	422	711	333	533	222	111	2,333
8	482	812	381	609	254	127	2,666
9	543	914	428	686	286	143	2,999
10	603	1,016	476	762	317	159	3,332
11	663	1,117	524	838	349	175	3,666
12	724	1,219	571	914	381	190	3,999
13	784	1,320	619	990	413	206	4,332
14	844	1,422	666	1,066	444	222	4,665
15	905	1,523	714	1,143	476	238	4,999
16	965	1,625	762	1,219	508	254	5,332
17	1,025	1,726	809	1,295	540	270	5,665
18	1,085	1,828	857	1,371	571	286	5,998
19	1,146	1,930	905	1,447	603	302	6,332
20	1,206	2,031	952	1,523	635	317	6,665

Sub Watershed #402 Annual Soil Erosion Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	50	84	40	63	26	13	277
2	100	169	79	127	53	26	554
3	150	253	119	190	79	40	831
4	200	338	158	253	106	53	1,108
5	251	422	198	317	132	66	1,385
6	301	506	237	380	158	79	1,662
7	351	591	277	443	185	92	1,939
8	401	675	317	506	211	106	2,216
9	451	760	356	570	237	119	2,493
10	501	844	396	633	264	132	2,770
11	551	929	435	696	290	145	3,047
12	601	1,013	475	760	317	158	3,324
13	652	1,097	514	823	343	171	3,601
14	702	1,182	554	886	369	185	3,878
15	752	1,266	594	950	396	198	4,155

16	802	1,351	633	1,013	422	211	4,432
17	852	1,435	673	1,076	448	224	4,709
18	902	1,519	712	1,140	475	237	4,986
19	952	1,604	752	1,203	501	251	5,262
20	1,002	1,688	791	1,266	528	264	5,539

Sub Watershed #403 Annual Soil Erosion Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	30	50	24	38	16	8	165
2	60	101	47	75	31	16	330
3	90	151	71	113	47	24	495
4	119	201	94	151	63	31	660
5	149	251	118	189	79	39	825
6	179	302	141	226	94	47	990
7	209	352	165	264	110	55	1,155
8	239	402	189	302	126	63	1,320
9	269	453	212	339	141	71	1,485
10	299	503	236	377	157	79	1,650
11	328	553	259	415	173	86	1,815
12	358	603	283	453	189	94	1,980
13	388	654	306	490	204	102	2,145
14	418	704	330	528	220	110	2,310
15	448	754	354	566	236	118	2,475
16	478	805	377	603	251	126	2,640
17	508	855	401	641	267	134	2,805
18	537	905	424	679	283	141	2,970
19	567	955	448	717	299	149	3,135
20	597	1,006	471	754	314	157	3,300

Sub Watershed #405 Annual Soil Erosion Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	27	46	22	34	14	7	151
2	55	92	43	69	29	14	302
3	82	138	65	103	43	22	452
4	109	184	86	138	57	29	603
5	136	230	108	172	72	36	754
6	164	276	129	207	86	43	905
7	191	322	151	241	101	50	1,055
8	218	368	172	276	115	57	1,206
9	246	414	194	310	129	65	1,357
10	273	459	215	345	144	72	1,508

11	300	505	237	379	158	79	1,658
12	327	551	258	414	172	86	1,809
13	355	597	280	448	187	93	1,960
14	382	643	302	482	201	101	2,111
15	409	689	323	517	215	108	2,261
16	436	735	345	551	230	115	2,412
17	464	781	366	586	244	122	2,563
18	491	827	388	620	258	129	2,714
19	518	873	409	655	273	136	2,864
20	546	919	431	689	287	144	3,015

Sub Watershed #1002 Annual Soil Erosion Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	12	21	10	16	7	3	68
2	25	42	20	31	13	7	137
3	37	63	29	47	20	10	205
4	50	84	39	63	26	13	274
5	62	104	49	78	33	16	342
6	74	125	59	94	39	20	411
7	87	146	68	110	46	23	479
8	99	167	78	125	52	26	548
9	112	188	88	141	59	29	616
10	124	209	98	157	65	33	685
11	136	230	108	172	72	36	753
12	149	251	117	188	78	39	822
13	161	271	127	204	85	42	890
14	174	292	137	219	91	46	959
15	186	313	147	235	98	49	1,027
16	198	334	157	251	104	52	1,096
17	211	355	166	266	111	55	1,164
18	223	376	176	282	117	59	1,233
19	236	397	186	297	124	62	1,301
20	248	418	196	313	130	65	1,370

Sub Watershed #401 Annual Phosphorous Runoff Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	113	191	48	143	36	30	561
2	227	382	95	286	72	60	1,121
3	340	572	143	429	107	89	1,682
4	453	763	191	572	143	119	2,242

5	567	954	239	716	179	149	2,803
6	680	1,145	286	859	215	179	3,363
7	793	1,336	334	1,002	250	209	3,924
8	906	1,527	382	1,145	286	239	4,484
9	1,020	1,717	429	1,288	322	268	5,045
10	1,133	1,908	477	1,431	358	298	5,605
11	1,246	2,099	525	1,574	394	328	6,166
12	1,360	2,290	572	1,717	429	358	6,727
13	1,473	2,481	620	1,861	465	388	7,287
14	1,586	2,672	668	2,004	501	417	7,848
15	1,700	2,862	716	2,147	537	447	8,408
16	1,813	3,053	763	2,290	572	477	8,969
17	1,926	3,244	811	2,433	608	507	9,529
18	2,039	3,435	859	2,576	644	537	10,090
19	2,153	3,626	906	2,719	680	567	10,650
20	2,266	3,816	954	2,862	716	596	11,211

Sub Watershed #402 Annual Phosphorous Runoff Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	110	185	46	139	35	29	544
2	220	370	93	278	69	58	1,087
3	330	555	139	416	104	87	1,631
4	440	740	185	555	139	116	2,175
5	549	925	231	694	174	145	2,719
6	659	1,111	278	833	208	174	3,262
7	769	1,296	324	972	243	202	3,806
8	879	1,481	370	1,111	278	231	4,350
9	989	1,666	416	1,249	312	260	4,893
10	1,099	1,851	463	1,388	347	289	5,437
11	1,209	2,036	509	1,527	382	318	5,981
12	1,319	2,221	555	1,666	416	347	6,525
13	1,429	2,406	602	1,805	451	376	7,068
14	1,539	2,591	648	1,943	486	405	7,612
15	1,648	2,776	694	2,082	521	434	8,156
16	1,758	2,962	740	2,221	555	463	8,699
17	1,868	3,147	787	2,360	590	492	9,243
18	1,978	3,332	833	2,499	625	521	9,787
19	2,088	3,517	879	2,638	659	549	10,331
20	2,198	3,702	925	2,776	694	578	10,874

Sub Watershed #403 Annual Phosphorous Runoff Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	67	113	28	85	21	18	333
2	135	227	57	170	42	35	665
3	202	340	85	255	64	53	998
4	269	453	113	340	85	71	1,331
5	336	566	142	425	106	88	1,664
6	404	680	170	510	127	106	1,996
7	471	793	198	595	149	124	2,329
8	538	906	227	680	170	142	2,662
9	605	1,019	255	765	191	159	2,994
10	673	1,133	283	849	212	177	3,327
11	740	1,246	311	934	234	195	3,660
12	807	1,359	340	1,019	255	212	3,993
13	874	1,472	368	1,104	276	230	4,325
14	942	1,586	396	1,189	297	248	4,658
15	1,009	1,699	425	1,274	319	265	4,991
16	1,076	1,812	453	1,359	340	283	5,323
17	1,143	1,926	481	1,444	361	301	5,656
18	1,211	2,039	510	1,529	382	319	5,989
19	1,278	2,152	538	1,614	404	336	6,322
20	1,345	2,265	566	1,699	425	354	6,654

Sub Watershed #405 Annual Phosphorous Runoff Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	99	167	42	126	31	26	492
2	199	335	84	251	63	52	983
3	298	502	126	377	94	78	1,475
4	398	669	167	502	126	105	1,967
5	497	837	209	628	157	131	2,458
6	596	1,004	251	753	188	157	2,950
7	696	1,172	293	879	220	183	3,442
8	795	1,339	335	1,004	251	209	3,933
9	894	1,506	377	1,130	282	235	4,425
10	994	1,674	418	1,255	314	262	4,916
11	1,093	1,841	460	1,381	345	288	5,408
12	1,193	2,008	502	1,506	377	314	5,900
13	1,292	2,176	544	1,632	408	340	6,391
14	1,391	2,343	586	1,757	439	366	6,883
15	1,491	2,511	628	1,883	471	392	7,375
16	1,590	2,678	669	2,008	502	418	7,866
17	1,689	2,845	711	2,134	533	445	8,358

18	1,789	3,013	753	2,259	565	471	8,850
19	1,888	3,180	795	2,385	596	497	9,341
20	1,988	3,347	837	2,511	628	523	9,833

Sub Watershed #1002 Annual Phosphorous Runoff Reduction

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total
1	51	86	21	64	16	13	252
2	102	171	43	129	32	27	504
3	153	257	64	193	48	40	756
4	204	343	86	257	64	54	1,007
5	255	429	107	322	80	67	1,259
6	305	514	129	386	96	80	1,511
7	356	600	150	450	113	94	1,763
8	407	686	171	514	129	107	2,015
9	458	772	193	579	145	121	2,267
10	509	857	214	643	161	134	2,519
11	560	943	236	707	177	147	2,770
12	611	1,029	257	772	193	161	3,022
13	662	1,115	279	836	209	174	3,274
14	713	1,200	300	900	225	188	3,526
15	764	1,286	322	965	241	201	3,778
16	815	1,372	343	1,029	257	214	4,030
17	865	1,458	364	1,093	273	228	4,282
18	916	1,543	386	1,157	289	241	4,533
19	967	1,629	407	1,222	305	255	4,785
20	1,018	1,715	429	1,286	322	268	5,037

Sub Watershed #401 Total Annual Cost Before Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$5,011	$22,717	$2,595	$13,630	$3,341	$1,895	$49,189
2	$5,161	$23,399	$2,673	$14,039	$3,441	$1,951	$50,665
3	$5,316	$24,101	$2,753	$14,460	$3,544	$2,010	$52,185
4	$5,476	$24,824	$2,836	$14,894	$3,651	$2,070	$53,750
5	$5,640	$25,568	$2,921	$15,341	$3,760	$2,132	$55,363
6	$5,809	$26,335	$3,009	$15,801	$3,873	$2,196	$57,024
7	$5,984	$27,125	$3,099	$16,275	$3,989	$2,262	$58,734
8	$6,163	$27,939	$3,192	$16,764	$4,109	$2,330	$60,497
9	$6,348	$28,777	$3,288	$17,266	$4,232	$2,400	$62,311
10	$6,538	$29,641	$3,386	$17,784	$4,359	$2,472	$64,181
11	$6,735	$30,530	$3,488	$18,318	$4,490	$2,546	$66,106

12	$6,937	$31,446	$3,593	$18,867	$4,624	$2,622	$68,089
13	$7,145	$32,389	$3,700	$19,433	$4,763	$2,701	$70,132
14	$7,359	$33,361	$3,811	$20,016	$4,906	$2,782	$72,236
15	$7,580	$34,362	$3,926	$20,617	$5,053	$2,866	$74,403
16	$7,807	$35,393	$4,044	$21,236	$5,205	$2,952	$76,635
17	$8,041	$36,454	$4,165	$21,873	$5,361	$3,040	$78,934
18	$8,283	$37,548	$4,290	$22,529	$5,522	$3,131	$81,302
19	$8,531	$38,674	$4,419	$23,205	$5,687	$3,225	$83,741
20	$8,787	$39,835	$4,551	$23,901	$5,858	$3,322	$86,254

**3% Annual Inflation*

Sub Watershed #402 Total Annual Cost Before Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$3,178	$14,408	$1,646	$8,645	$2,119	$1,202	$31,196
2	$3,273	$14,840	$1,695	$8,904	$2,182	$1,238	$32,132
3	$3,372	$15,285	$1,746	$9,171	$2,248	$1,275	$33,096
4	$3,473	$15,743	$1,799	$9,446	$2,315	$1,313	$34,089
5	$3,577	$16,216	$1,853	$9,729	$2,385	$1,352	$35,112
6	$3,684	$16,702	$1,908	$10,021	$2,456	$1,393	$36,165
7	$3,795	$17,203	$1,965	$10,322	$2,530	$1,435	$37,250
8	$3,909	$17,719	$2,024	$10,632	$2,606	$1,478	$38,368
9	$4,026	$18,251	$2,085	$10,951	$2,684	$1,522	$39,519
10	$4,147	$18,799	$2,148	$11,279	$2,764	$1,568	$40,704
11	$4,271	$19,362	$2,212	$11,617	$2,847	$1,615	$41,925
12	$4,399	$19,943	$2,279	$11,966	$2,933	$1,663	$43,183
13	$4,531	$20,542	$2,347	$12,325	$3,021	$1,713	$44,479
14	$4,667	$21,158	$2,417	$12,695	$3,111	$1,765	$45,813
15	$4,807	$21,793	$2,490	$13,076	$3,205	$1,817	$47,187
16	$4,951	$22,446	$2,565	$13,468	$3,301	$1,872	$48,603
17	$5,100	$23,120	$2,641	$13,872	$3,400	$1,928	$50,061
18	$5,253	$23,813	$2,721	$14,288	$3,502	$1,986	$51,563
19	$5,411	$24,528	$2,802	$14,717	$3,607	$2,046	$53,110
20	$5,573	$25,264	$2,886	$15,158	$3,715	$2,107	$54,703

**3% Annual Inflation*

Sub Watershed #403 Total Annual Cost Before Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$2,481	$11,247	$1,285	$6,748	$1,654	$938	$24,353
2	$2,555	$11,585	$1,324	$6,951	$1,704	$966	$25,084
3	$2,632	$11,932	$1,363	$7,159	$1,755	$995	$25,837
4	$2,711	$12,290	$1,404	$7,374	$1,807	$1,025	$26,612
5	$2,792	$12,659	$1,446	$7,595	$1,862	$1,056	$27,410

6	$2,876	$13,039	$1,490	$7,823	$1,917	$1,087	$28,232
7	$2,962	$13,430	$1,534	$8,058	$1,975	$1,120	$29,079
8	$3,051	$13,833	$1,580	$8,300	$2,034	$1,154	$29,952
9	$3,143	$14,248	$1,628	$8,549	$2,095	$1,188	$30,850
10	$3,237	$14,675	$1,677	$8,805	$2,158	$1,224	$31,776
11	$3,334	$15,115	$1,727	$9,069	$2,223	$1,261	$32,729
12	$3,434	$15,569	$1,779	$9,341	$2,290	$1,298	$33,711
13	$3,537	$16,036	$1,832	$9,621	$2,358	$1,337	$34,722
14	$3,643	$16,517	$1,887	$9,910	$2,429	$1,377	$35,764
15	$3,753	$17,012	$1,944	$10,207	$2,502	$1,419	$36,837
16	$3,865	$17,523	$2,002	$10,514	$2,577	$1,461	$37,942
17	$3,981	$18,048	$2,062	$10,829	$2,654	$1,505	$39,080
18	$4,101	$18,590	$2,124	$11,154	$2,734	$1,550	$40,253
19	$4,224	$19,148	$2,188	$11,489	$2,816	$1,597	$41,460
20	$4,350	$19,722	$2,253	$11,833	$2,900	$1,645	$42,704

**3% Annual Inflation*

Sub Watershed #405 Total Annual Cost Before Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$5,128	$23,246	$2,656	$13,947	$3,419	$1,939	$50,334
2	$5,282	$23,943	$2,736	$14,366	$3,521	$1,997	$51,844
3	$5,440	$24,661	$2,818	$14,797	$3,627	$2,057	$53,399
4	$5,603	$25,401	$2,902	$15,241	$3,735	$2,118	$55,001
5	$5,771	$26,163	$2,989	$15,698	$3,848	$2,182	$56,651
6	$5,944	$26,948	$3,079	$16,169	$3,963	$2,247	$58,351
7	$6,123	$27,757	$3,171	$16,654	$4,082	$2,315	$60,101
8	$6,306	$28,589	$3,266	$17,154	$4,204	$2,384	$61,904
9	$6,496	$29,447	$3,364	$17,668	$4,330	$2,456	$63,762
10	$6,691	$30,330	$3,465	$18,198	$4,460	$2,529	$65,674
11	$6,891	$31,240	$3,569	$18,744	$4,594	$2,605	$67,645
12	$7,098	$32,178	$3,676	$19,307	$4,732	$2,684	$69,674
13	$7,311	$33,143	$3,787	$19,886	$4,874	$2,764	$71,764
14	$7,530	$34,137	$3,900	$20,482	$5,020	$2,847	$73,917
15	$7,756	$35,161	$4,017	$21,097	$5,171	$2,932	$76,135
16	$7,989	$36,216	$4,138	$21,730	$5,326	$3,020	$78,419
17	$8,229	$37,303	$4,262	$22,382	$5,486	$3,111	$80,771
18	$8,475	$38,422	$4,390	$23,053	$5,650	$3,204	$83,194
19	$8,730	$39,574	$4,521	$23,745	$5,820	$3,300	$85,690
20	$8,992	$40,762	$4,657	$24,457	$5,994	$3,399	$88,261

**3% Annual Inflation*

Sub Watershed #1002 Total Annual Cost Before Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$2,330	$10,562	$1,207	$6,337	$1,553	$881	$22,870
2	$2,400	$10,879	$1,243	$6,527	$1,600	$907	$23,556
3	$2,472	$11,205	$1,280	$6,723	$1,648	$934	$24,263
4	$2,546	$11,541	$1,319	$6,925	$1,697	$963	$24,991
5	$2,622	$11,888	$1,358	$7,133	$1,748	$991	$25,740
6	$2,701	$12,244	$1,399	$7,347	$1,801	$1,021	$26,513
7	$2,782	$12,612	$1,441	$7,567	$1,855	$1,052	$27,308
8	$2,865	$12,990	$1,484	$7,794	$1,910	$1,083	$28,127
9	$2,951	$13,380	$1,529	$8,028	$1,968	$1,116	$28,971
10	$3,040	$13,781	$1,574	$8,269	$2,027	$1,149	$29,840
11	$3,131	$14,195	$1,622	$8,517	$2,087	$1,184	$30,735
12	$3,225	$14,620	$1,670	$8,772	$2,150	$1,219	$31,658
13	$3,322	$15,059	$1,720	$9,035	$2,215	$1,256	$32,607
14	$3,421	$15,511	$1,772	$9,306	$2,281	$1,294	$33,585
15	$3,524	$15,976	$1,825	$9,586	$2,349	$1,332	$34,593
16	$3,630	$16,455	$1,880	$9,873	$2,420	$1,372	$35,631
17	$3,739	$16,949	$1,936	$10,169	$2,493	$1,414	$36,700
18	$3,851	$17,458	$1,995	$10,475	$2,567	$1,456	$37,801
19	$3,966	$17,981	$2,054	$10,789	$2,644	$1,500	$38,935
20	$4,085	$18,521	$2,116	$11,112	$2,724	$1,545	$40,103

**3% Annual Inflation*

Sub Watershed #401 Total Annual Cost After Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$2,506	$11,359	$1,583	$6,815	$334	$947	$23,544
2	$1,290	$5,850	$1,631	$3,510	$860	$585	$13,726
3	$1,329	$6,025	$1,680	$3,615	$886	$603	$14,138
4	$1,369	$6,206	$1,730	$3,724	$913	$621	$14,562
5	$1,410	$6,392	$1,782	$3,835	$940	$640	$14,999
6	$1,452	$6,584	$1,835	$3,950	$968	$659	$15,449
7	$1,496	$6,781	$1,890	$4,069	$997	$679	$15,912
8	$1,541	$6,985	$1,947	$4,191	$1,027	$699	$16,390
9	$1,587	$7,194	$2,006	$4,317	$1,058	$720	$16,881
10	$1,635	$7,410	$2,066	$4,446	$1,090	$742	$17,388
11	$1,684	$7,632	$2,128	$4,579	$1,122	$764	$17,910
12	$1,734	$7,861	$2,192	$4,717	$1,156	$787	$18,447
13	$1,786	$8,097	$2,257	$4,858	$1,191	$810	$19,000
14	$1,840	$8,340	$2,325	$5,004	$1,227	$835	$19,570
15	$1,895	$8,590	$2,395	$5,154	$1,263	$860	$20,157

16	$1,952	$8,848	$2,467	$5,309	$1,301	$885	$20,762
17	$2,010	$9,114	$2,541	$5,468	$1,340	$912	$21,385
18	$2,071	$9,387	$2,617	$5,632	$1,380	$939	$22,026
19	$2,133	$9,669	$2,695	$5,801	$1,422	$968	$22,687
20	$2,197	$9,959	$2,776	$5,975	$1,465	$997	$23,368

**3% Annual Inflation*

Sub Watershed #402 Total Annual Cost After Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$1,589	$7,204	$1,004	$4,322	$212	$601	$14,932
2	$818	$3,710	$1,034	$2,226	$546	$371	$8,705
3	$843	$3,821	$1,065	$2,293	$562	$382	$8,966
4	$868	$3,936	$1,097	$2,362	$579	$394	$9,235
5	$894	$4,054	$1,130	$2,432	$596	$406	$9,513
6	$921	$4,176	$1,164	$2,505	$614	$418	$9,798
7	$949	$4,301	$1,199	$2,580	$632	$430	$10,092
8	$977	$4,430	$1,235	$2,658	$651	$443	$10,395
9	$1,006	$4,563	$1,272	$2,738	$671	$457	$10,706
10	$1,037	$4,700	$1,310	$2,820	$691	$470	$11,028
11	$1,068	$4,841	$1,349	$2,904	$712	$484	$11,358
12	$1,100	$4,986	$1,390	$2,992	$733	$499	$11,699
13	$1,133	$5,135	$1,432	$3,081	$755	$514	$12,050
14	$1,167	$5,289	$1,475	$3,174	$778	$529	$12,412
15	$1,202	$5,448	$1,519	$3,269	$801	$545	$12,784
16	$1,238	$5,612	$1,564	$3,367	$825	$562	$13,168
17	$1,275	$5,780	$1,611	$3,468	$850	$578	$13,563
18	$1,313	$5,953	$1,660	$3,572	$875	$596	$13,969
19	$1,353	$6,132	$1,709	$3,679	$902	$614	$14,389
20	$1,393	$6,316	$1,761	$3,790	$929	$632	$14,820

**3% Annual Inflation*

Sub Watershed #403 Total Annual Cost After Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$1,241	$5,624	$784	$3,374	$165	$469	$11,656
2	$639	$2,896	$807	$1,738	$426	$290	$6,796
3	$658	$2,983	$832	$1,790	$439	$299	$7,000
4	$678	$3,073	$857	$1,844	$452	$307	$7,210
5	$698	$3,165	$882	$1,899	$465	$317	$7,426
6	$719	$3,260	$909	$1,956	$479	$326	$7,649
7	$741	$3,357	$936	$2,014	$494	$336	$7,878
8	$763	$3,458	$964	$2,075	$509	$346	$8,115
9	$786	$3,562	$993	$2,137	$524	$356	$8,358

10	$809	$3,669	$1,023	$2,201	$540	$367	$8,609
11	$834	$3,779	$1,053	$2,267	$556	$378	$8,867
12	$859	$3,892	$1,085	$2,335	$572	$390	$9,133
13	$884	$4,009	$1,118	$2,405	$590	$401	$9,407
14	$911	$4,129	$1,151	$2,478	$607	$413	$9,689
15	$938	$4,253	$1,186	$2,552	$625	$426	$9,980
16	$966	$4,381	$1,221	$2,628	$644	$438	$10,279
17	$995	$4,512	$1,258	$2,707	$664	$452	$10,588
18	$1,025	$4,647	$1,296	$2,788	$683	$465	$10,905
19	$1,056	$4,787	$1,334	$2,872	$704	$479	$11,232
20	$1,088	$4,931	$1,374	$2,958	$725	$493	$11,569

**3% Annual Inflation*

Sub Watershed #405 Total Annual Cost After Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$2,564	$11,623	$1,620	$6,974	$342	$969	$24,092
2	$1,320	$5,986	$1,669	$3,591	$880	$599	$14,046
3	$1,360	$6,165	$1,719	$3,699	$907	$617	$14,467
4	$1,401	$6,350	$1,770	$3,810	$934	$636	$14,901
5	$1,443	$6,541	$1,823	$3,925	$962	$655	$15,348
6	$1,486	$6,737	$1,878	$4,042	$991	$674	$15,808
7	$1,531	$6,939	$1,934	$4,164	$1,020	$694	$16,283
8	$1,577	$7,147	$1,992	$4,288	$1,051	$715	$16,771
9	$1,624	$7,362	$2,052	$4,417	$1,083	$737	$17,274
10	$1,673	$7,583	$2,114	$4,550	$1,115	$759	$17,793
11	$1,723	$7,810	$2,177	$4,686	$1,149	$782	$18,326
12	$1,775	$8,044	$2,243	$4,827	$1,183	$805	$18,876
13	$1,828	$8,286	$2,310	$4,971	$1,218	$829	$19,442
14	$1,883	$8,534	$2,379	$5,121	$1,255	$854	$20,026
15	$1,939	$8,790	$2,450	$5,274	$1,293	$880	$20,626
16	$1,997	$9,054	$2,524	$5,432	$1,331	$906	$21,245
17	$2,057	$9,326	$2,600	$5,595	$1,371	$933	$21,883
18	$2,119	$9,605	$2,678	$5,763	$1,413	$961	$22,539
19	$2,182	$9,894	$2,758	$5,936	$1,455	$990	$23,215
20	$2,248	$10,190	$2,841	$6,114	$1,499	$1,020	$23,912

**3% Annual Inflation*

Sub Watershed #1002 Total Annual Cost After Cost-Share, Cropland BMPs

Year	Permanent Vegetation	Grassed Waterways	No-Till	Terraces	Buffers	Nutrient Management	Total Cost
1	$1,165	$5,281	$736	$3,169	$155	$440	$10,946
2	$600	$2,720	$758	$1,632	$400	$272	$6,382
3	$618	$2,801	$781	$1,681	$412	$280	$6,573

4	$636	$2,885	$804	$1,731	$424	$289	$6,771
5	$656	$2,972	$828	$1,783	$437	$297	$6,974
6	$675	$3,061	$853	$1,837	$450	$306	$7,183
7	$695	$3,153	$879	$1,892	$464	$316	$7,398
8	$716	$3,248	$905	$1,949	$478	$325	$7,620
9	$738	$3,345	$932	$2,007	$492	$335	$7,849
10	$760	$3,445	$960	$2,067	$507	$345	$8,084
11	$783	$3,549	$989	$2,129	$522	$355	$8,327
12	$806	$3,655	$1,019	$2,193	$538	$366	$8,577
13	$830	$3,765	$1,050	$2,259	$554	$377	$8,834
14	$855	$3,878	$1,081	$2,327	$570	$388	$9,099
15	$881	$3,994	$1,113	$2,396	$587	$400	$9,372
16	$907	$4,114	$1,147	$2,468	$605	$412	$9,653
17	$935	$4,237	$1,181	$2,542	$623	$424	$9,943
18	$963	$4,364	$1,217	$2,619	$642	$437	$10,241
19	$992	$4,495	$1,253	$2,697	$661	$450	$10,548
20	$1,021	$4,630	$1,291	$2,778	$681	$463	$10,865

**3% Annual Inflation*

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