

Middle Neosho – 9 Element Watershed Plan Summary

Impairments to be addressed:

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

Cherry Creek (DO)

Labette Creek (DO)

Bachelor Creek (DO)

Parsons Lake (EU)

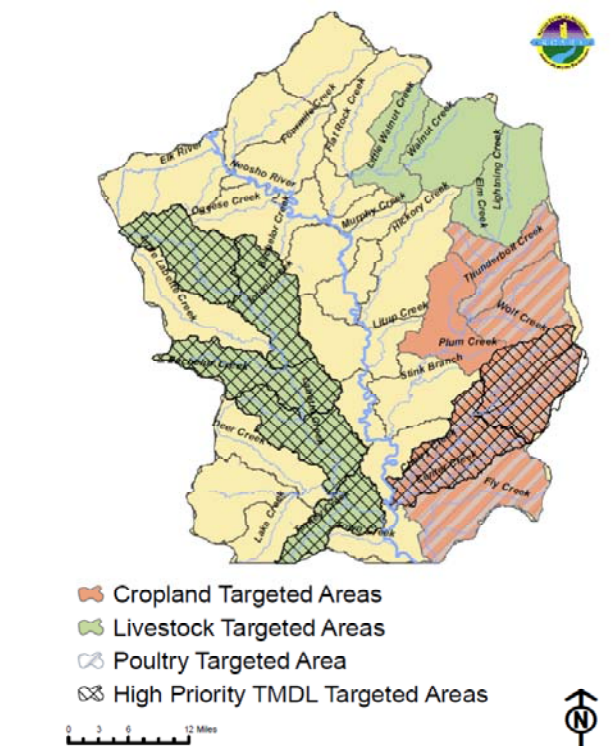
Mined Land WA Unit #42 (DO, Silt)

Labette Creek near Labette (TP)

Mined Land Lake

19,24,25,26,31,34,35,36,40,41 (EU)

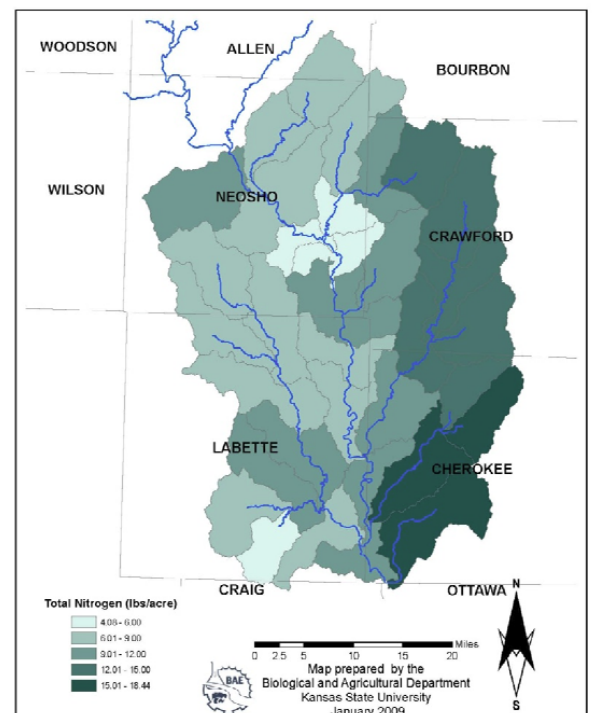
Prioritized Critical Areas for Targeting BMPs



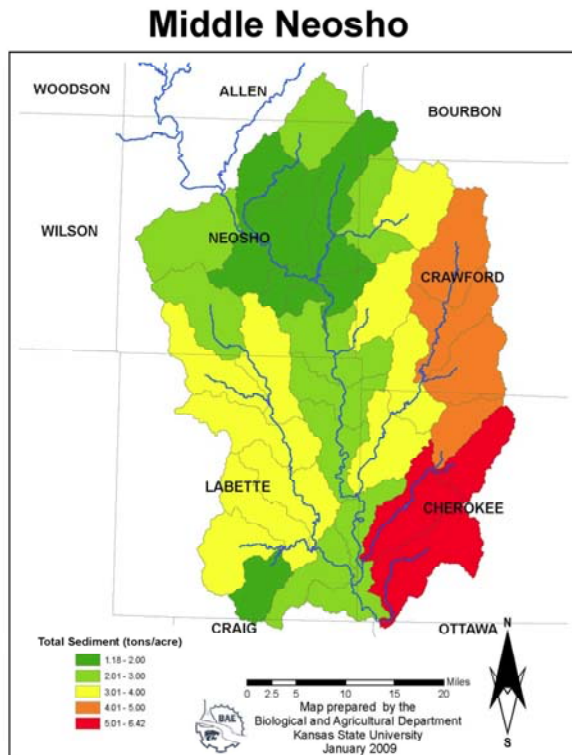
Targeting considerations:

- Livestock targeted areas were determined primarily by stream monitoring data conducted by KDHE that demonstrated repeatable high levels of nutrients and FCB. Some additional areas were added through the watershed knowledge of the SLT.
- Cropland BMP Targeted areas were identified through SWAT (Soil and Water Assessment Tool) modeling to determine where high levels of phosphorous and sediment were coming from within the Middle Neosho watershed.

Middle Neosho



Middle Neosho – 9 Element Watershed Plan Summary



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

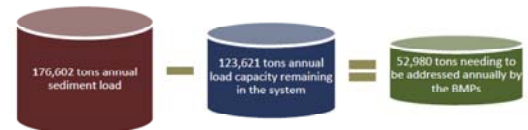
- No-Till practices
- Buffers
- Terraces
- Permanent vegetation
- Grassed waterways
- Minimum tillage conservation practices

Phosphorus/Sediment Reducing Livestock BMPs

- Grazing Management plans
- Relocate pasture feeding sites
- Alternative watering sites
- Rotational grazing

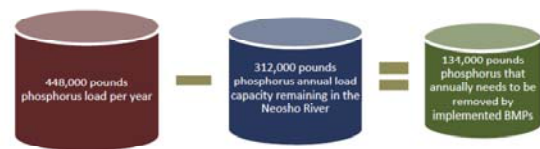
Sediment Reduction:

Required load reduction for Middle Neosho from Nonpoint Sources (30% load reduction of nutrients at watershed line as stated in the Kansas Nutrient Management)



Phosphorus Reduction:

Required load reduction for Middle Neosho from nonpoint sources (30% load reduction of nutrients at watershed line as stated in the Kansas Nutrient Management)





MIDDLE NEOSHO WATERSHED

Watershed Restoration and Protection Strategy

Final Draft Plan April 5, 2011

Funding for the development of this plan was provided through an EPA 319 grant 2007-0044 from the Kansas Department of Health and Environment.



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Glossary of Terms

Best Management Practices (BMP): Environmental protection practices used to control pollutants, such as sediment or nutrients, from common agricultural or urban land use activities.

Biological Oxygen Demand (BOD): Measure of the amount of oxygen removed from aquatic environments by aerobic microorganisms for their metabolic requirements.

Biota: Plant and animal life of a particular region.

Chlorophyll a: Common pigment found in algae and other aquatic plants that is used in photosynthesis

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 (ECB): Bacteria normally found in gastrointestinal tracts of animals. Some strains cause diarrheal diseases.

Environmental Protection Agency (EPA): Federal agency charged to protect human health and the environment.

Eutrophication (E): Excess of mineral and organic nutrients that promote a proliferation of plant life in lakes and ponds.

Fecal coliform bacteria (FCB): Bacteria that originate in the intestines of all warm-blooded animals.

Municipal Water System: Water system that serves at least 25 people or has more than 15 service connections.

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. Originates from manure and fertilizers.

Nitrogen(N or TN): Element that is essential for plants and animals. TN or total nitrogen 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 in water.

Riparian Zone: Margin of vegetation within approximately 100 feet of waterway.

Sedimentation: Deposition of silt, clay or sand in slow moving waters.

Secchi Disk: Circular plate 10-12" in diameter with alternating black and white quarters used to measure water clarity by measuring the depth at which it can be seen.

Stakeholder Leadership Team (SLT): Organization of watershed residents, landowners, farmers, ranchers, agency personnel and all persons with an interest in water quality.

Total Maximum Daily Loads (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.

Water Quality Standard (WQS): Mandated in the Clean Water Act. Defines goals for a waterbody by designating its uses, setting criteria to protect those uses and establishing provisions to protect waterbodies from pollutants.

1.0 Preface

The purpose of this Watershed Restoration and Protection Strategy (WRAPS) report for the Middle Neosho 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 degradation.

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 involve 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 protecting the environment from flooding, and 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 report 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 and watershed conditions of the Middle Neosho Watershed.



Middle Neosho River Watershed HUC 11070205

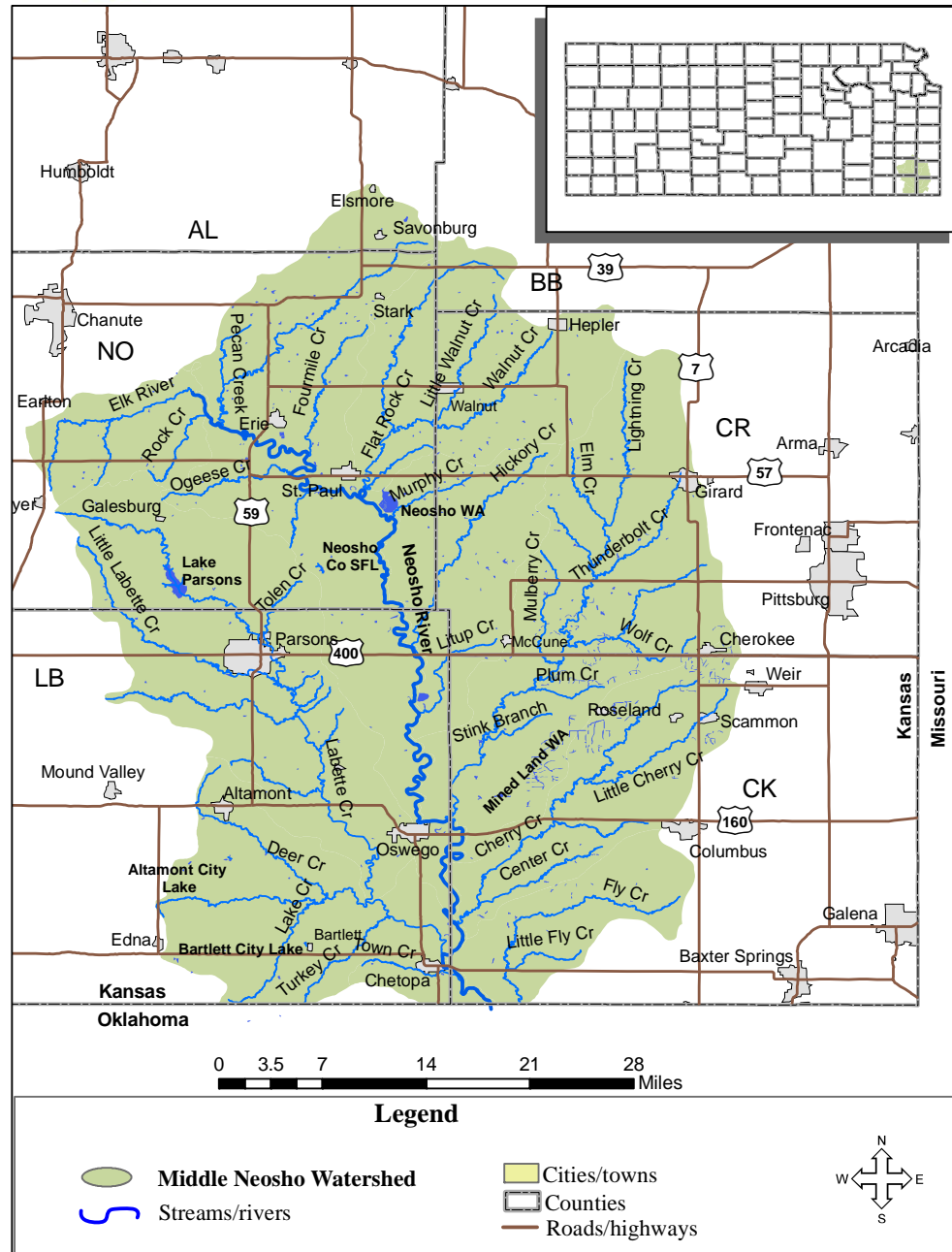


Figure 1. Map of the Middle Neosho Watershed

2.0 Description of the Watershed

2.1 What is a Watershed?

A watershed is an area of land that catches precipitation and funnels it to a particular creek, stream, and river and so on, 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, with some only covering an area of a few acres while others are thousands of square miles across.

Elevation determines the watershed boundaries. The upper boundary of the Middle Neosho Watershed has an elevation of 677 meters (2,221 feet) and the lowest point of the watershed, which is the outlet at the Kansas Oklahoma state line, has an elevation of 200 meters (656 feet) above sea level.

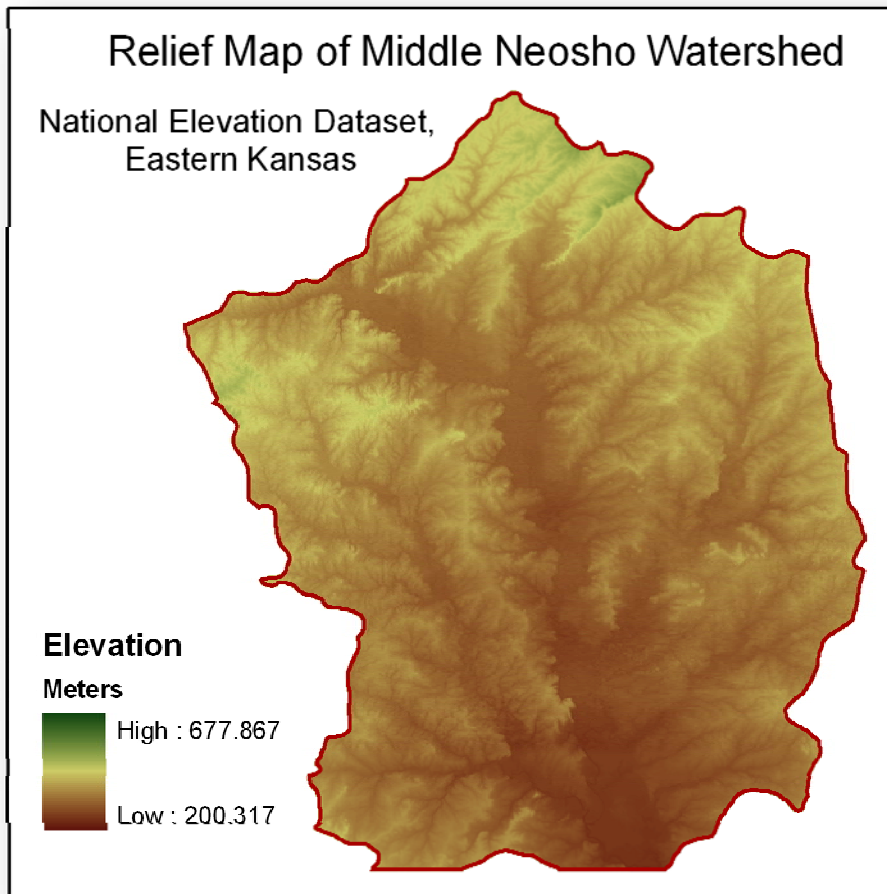
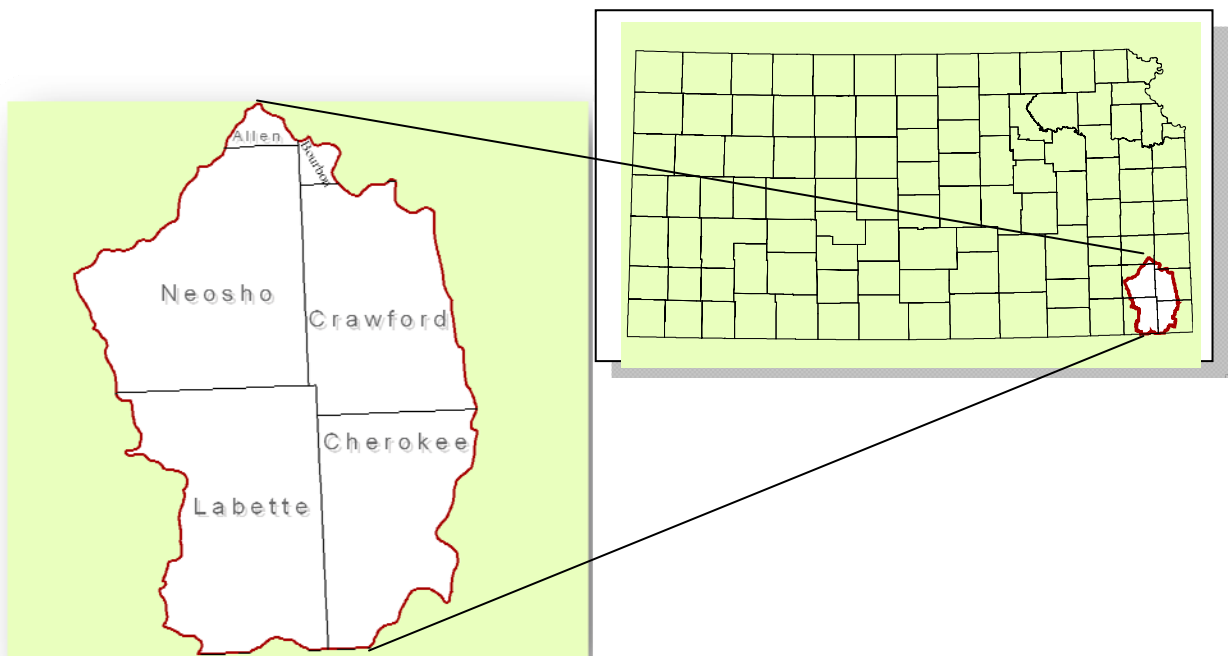


Figure 2 Elevation of the Watershed

2.2 Where is the Middle Neosho Watershed?

The scope of this Watershed Restoration and Protection Strategy (WRAPS) is the Middle Neosho Watershed (HUC 11070205). This watershed begins in Neosho County in southeast Kansas and ends at the point at which the Neosho River crosses the Kansas – Oklahoma state line. The watershed is primarily a drainage area for the Neosho River and its numerous tributaries. It contains numerous small lakes. A few are Parsons Lake, Neosho State Fishing Lake, Altamont and Bartlett State Fishing Lakes. Also scattered across the watershed are the Mined Land Wildlife Area and Lakes. This land was once stripped mined for coal which formed many small depressions and lakes. Not only are the lakes stocked with game fish, but the wildlife area surrounding the lakes is under the jurisdiction of the Kansas Department of Wildlife and Parks and is managed for wildlife and songbird habitat. The Neosho River drains into Grand Lake in Oklahoma.



2.3 Why is the Middle Neosho Watershed Important to Grand Lake?

Grand Lake was impounded in 1940. It is located in northeast Oklahoma. It contains 46,500 surface acres and is a major recreational reservoir. Three major rivers flow into Grand Lake:

- the Neosho River from Kansas,
- the Spring River from Missouri, and

- the Elk River from Missouri.

Grand Lake is a surface water supply to many communities in the area. It is also a major economic resource for Oklahoma. The Neosho Basin comprises 57 percent of the total Grand Lake Watershed; therefore, it is of key importance to the overall environmental health of Grand Lake.

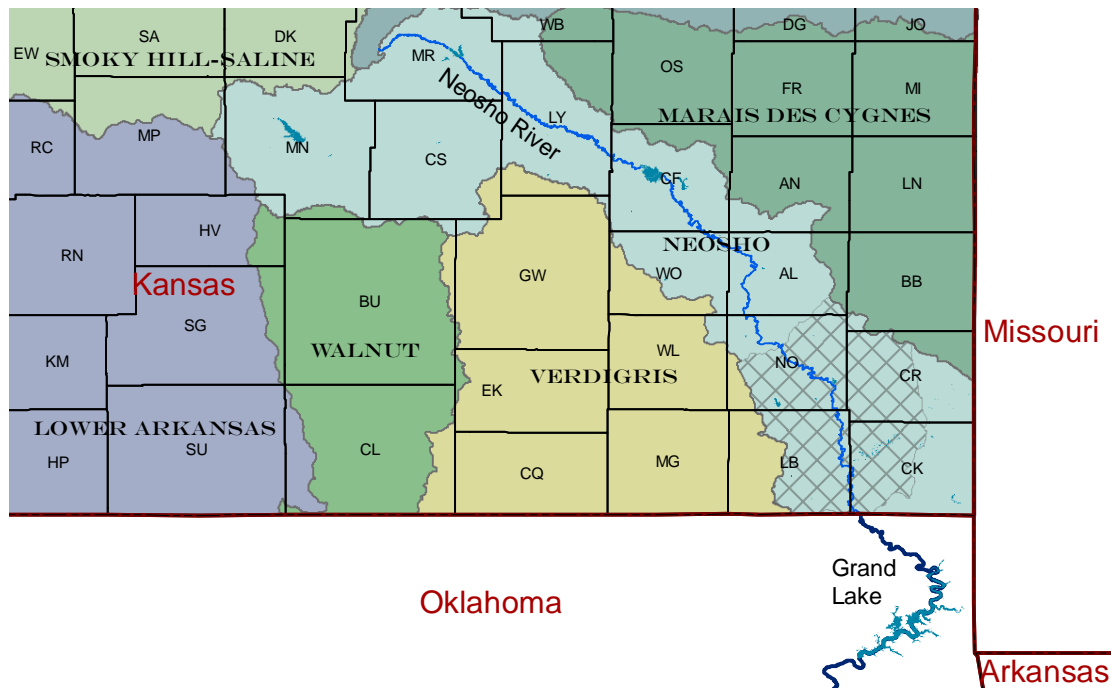


Figure 3 Neosho Basin and its Geographic Relationship to Grand Lake

Grand Lake has elevated levels of nutrients. This can cause algal blooms in the lake and low levels of dissolved oxygen which will be discussed later in this report. Both of these incidents will negatively impact aquatic life. According to the Grand Lake Watershed Alliance Foundation (GLWAF), the Neosho River basin can contribute nutrients, sediment and bacteria into Grand Lake. Spring River may contribute to the nutrient and bacteria levels, but also carries heavy metals from abandoned mining areas. Elk River is similar to the Neosho River in that it can contribute nutrients, bacteria and sediment. Therefore, the water quality of Grand Lake depends on the water quality of the rivers entering it. Since the bulk of the watershed of Grand Lake lies in Kansas, it is important for Middle Neosho and the other Neosho Basin watersheds to reduce pollutants exiting their watersheds. A thirty percent reduction target has been assigned by KDHE to the outflow of each watershed in Kansas.

Mining has historically been a major contributor to the economies of the southeastern part of Kansas. Coal, lead and zinc were heavily mined in Cherokee County. Active mining lasted from the late 1800's to the 1970's. The Mined Land Wildlife Area, which is located in the Middle Neosho Watershed, is coal strip mining land that has been healed by revegetating and installing water

control structures. This has provided excellent wildlife recreation areas. However, the abandoned lead and zinc mines of Cherokee County continue to contribute heavy metals to the Spring River Watershed and the area is riddled with sinkholes, acid mine drainage and chat piles. Seven Environmental Protection Agency (EPA) Superfund Sites were initiated to remediate the mine related pollutants. None of these superfund sites are located in the Middle Neosho Watershed.

Grand Lake is expected to receive TMDLs in 2012. At this time, responsibilities for pollutants in the lake will be distributed to the incoming rivers. Therefore, the Neosho River could receive a significant portion of the pollutant load. At that time, the SLT for the Middle Neosho Watershed will need to reevaluate the BMPs and load reductions that are outlined later in this plan for needed corrections and alterations.

2.4 What is a HUC?

HUC is an acronym for **Hydrologic Unit Codes**. HUCs are an identification system for watersheds. Each watershed has a unique HUC number in addition to a common name. The Middle Neosho Watershed is classified as a HUC 8, meaning it has an 8 digit identifying code. Its HUC number is 11070205. The first 2 numbers in the code refer to the drainage region, the second 2 digits refer to the drainage sub region, the third 2 digits refer to the accounting unit and the fourth set of digits is the cataloging unit. For example, the Middle Neosho watershed categories are as follows:

11070205 = Drainage of the Arkansas, White and Red River basins

11070205 = Drainage of the Neosho and Verdigris River basins

11070205 = Drainage of the Neosho River basin

11070205 = Drainage of the section of the Neosho River named the Middle Neosho

As watersheds become smaller, the HUC number will become larger. HUC 8s are further divided into smaller watersheds with HUC 10 and HUC 12 delineations. The Middle Neosho Watershed is divided into thirty three HUC 12 delineations.



Figure 4 HUC 12 Delineations of the Middle Neosho Watershed

3.0 Watershed History

3.1 Stakeholder Leadership Team (SLT) History

A group of concerned citizens in the watershed began meeting in 2006. They formed a Stakeholder Leadership Team (SLT) under the guidance of Kansas State Research and Extension personnel. Their charge has been to create a plan of restoration and protection measures for the watershed. During the time period that they have been meeting, technical experts in the watershed have participated and led discussions to review and study the watershed issues and concerns.

3.2 Watershed Overview

The Middle Neosho Watershed is designated as a Category I watershed indicating that it is in need of restoration as defined by the Kansas Unified Watershed Assessment 1999 submitted by the Kansas Department of Health and Environment (KDHE) and the United States Department of Agriculture (USDA).¹ A Category I watershed does not meet state WQSs or fails to achieve aquatic system goals related to habitat and ecosystem health. Category I watersheds are also assigned a priority for restoration. The Middle Neosho is ranked 24th in priority out of 92 watersheds in the state.

The Middle Neosho Watershed covers 912,698 acres. There are numerous towns and cities in this watershed with Parsons and Chanute having the largest population. There are small ponds, lakes and reservoirs; however, none dam the Neosho River.

3.3 Issues and Goals of the Watershed

The SLT has set **priority watershed issues and goals** that arose out of the discussions and informational meetings that occurred during the WRAPS process.

The priority issues that the SLT felt were most important to the health of the watershed are (in no particular order):

1. Sedimentation,
2. Streambank stabilization,
3. Fertilizer and nutrient runoff (livestock and poultry manure),
4. Fecal coliform bacteria (FCB),
5. Storm water,
6. Water supply development, and

7. Erosion of grassland and rangelands.

In order to address the watershed issues, the SLT has set certain **watershed restoration and protection goals**. They are:

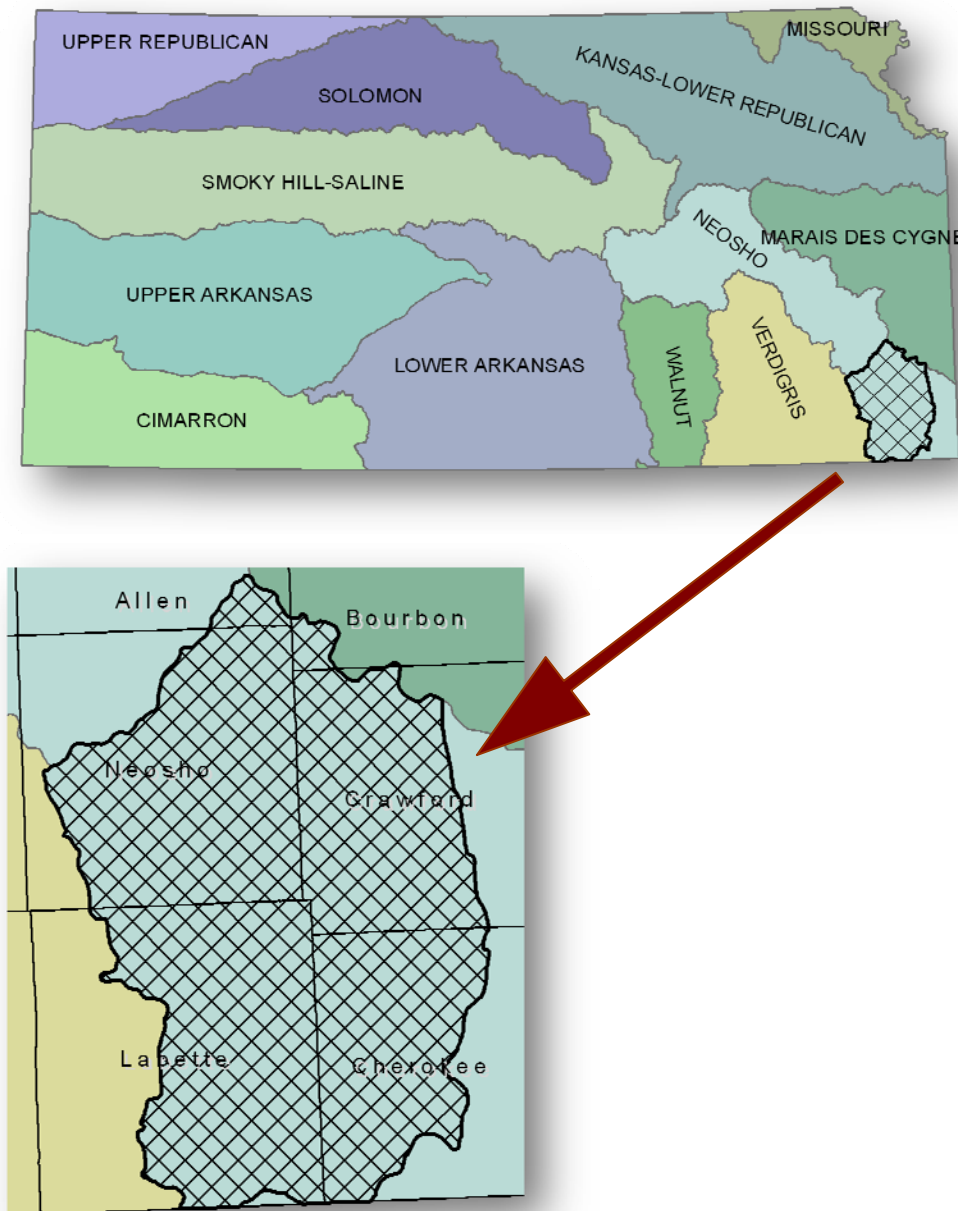
1. To protect and restore water quality in the Neosho River and its tributaries,
2. To protect public water supply sources,
3. To protect productivity of agricultural lands, and
4. To protect the water quality and storage capacity of the Grand Lakes.

The purpose of this WRAPS plan is to address these issues and concerns of the SLT, to address and mitigate current TMDLs in the watershed and to proactively improve conditions so that the impairments on the current 303d list will not reach the stage of TMDL development.

Note: In this report, the term BMP (Best Management Practice) will be used frequently. A BMP is defined as an environmental protection practice used to control pollutants, such as sediment or nutrients, from common agricultural or urban land use activities. Common agricultural BMPs are buffer strips, terraces, grassed waterways, utilizing no-till or minimum tillage, conservation crop rotation and nutrient management plans. Definitions of each of these BMPs are found in the appendix of this report.

4.0 Watershed Review

There are twelve river basins located in Kansas. The scope of this WRAPS project is a portion of the Neosho River Basin in southeast Kansas. The entire basin drains the Neosho River and its tributaries into Oklahoma and eventually fills the Grand Lake O' The Cherokees in Oklahoma. The geographical endpoint of the watershed is the state line of Kansas and Oklahoma.



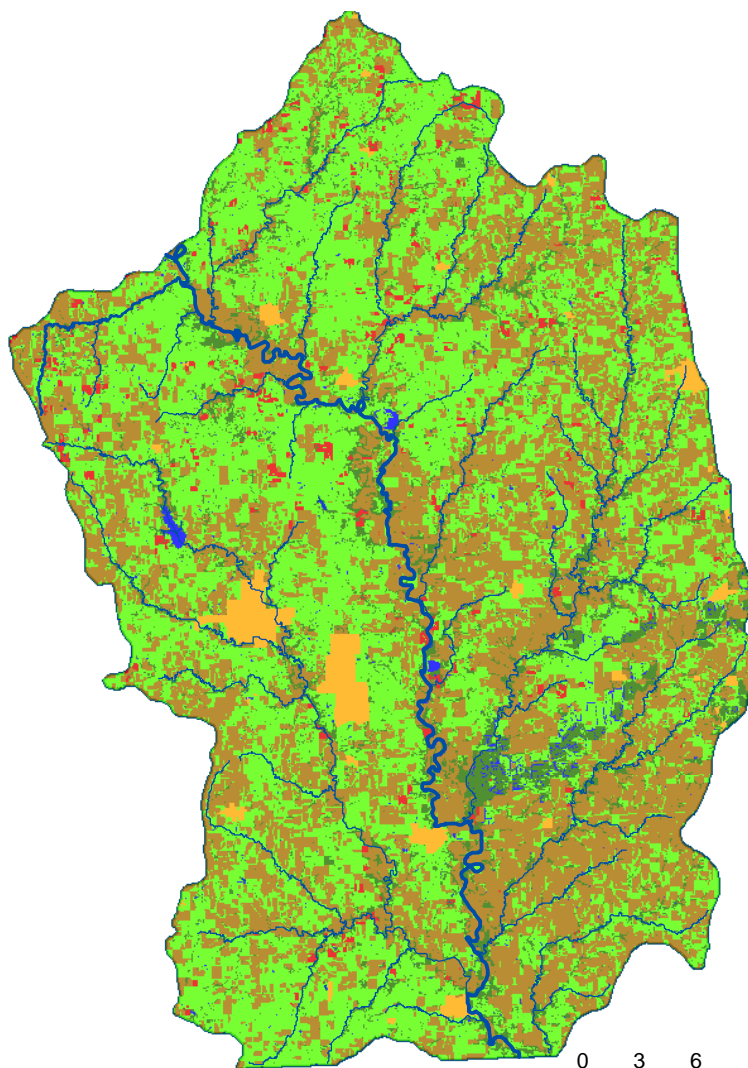
4.1 Land Cover/Land Uses

Land use activities have a significant impact on the types and quantity of pollutants in the watershed. The two major land uses in the watershed are grassland (48 percent which includes CRP) and cropland (39 percent). Approximately ninety nine percent of the cropland in the watershed does not have buffers and only one percent is in continuous no-till. This much conventional farming coupled with the relatively high rainfall for eastern Kansas leads to an increased potential for erosion and increased nutrient runoff originating from cropland. Cropland can be the source of sediment from overland flow, and nutrients from fertilizer overuse or application prior to a rainfall event. Also, E. coli bacteria (ECB) from manure applied to cropland before a rainfall event can wash off the land and enter the rivers and streams. Grassland can contribute ECB from grazing livestock that have access to streams and ponds, in addition to sediment from cattle trails and gullies in pastures. The rest of the land uses in the watershed are woodlands (10 percent), urban (2 percent) and water (1 percent).



Landuse

-  Urban
-  Cropland
-  Grassland
-  CRP
-  Woodland
-  Water



0 3 6 12 Miles

Figure 5. Land Cover and Land Use of the Middle Neosho River Watershed. ²

Table 1 Land Use in the Watershed, 2005.³

Land Use	Acres	Percentage
Grassland	427,178	46.8
Cropland	355,752	39.0
Woodland	87,283	9.6
CRP	14,281	1.6
Urban Open Land	9,362	1.0
Water	9,032	1.0
Urban Residential	6,454	0.7
Urban Industrial/Commercial	2,026	0.2
Urban Woodland	807	0.1
Other	462	0.1
Urban Water	63	0.0
Total	912,698	100.0

4.2 Designated Uses

Surface waters in this watershed are generally used for aquatic life support (fish), food procurement, domestic water supply, recreation (fishing, boating, and swimming), groundwater recharge, industrial water supply, irrigation and livestock watering. These are commonly referred to as “designated uses” as stated in the Kansas Surface Water Register, 2004, issued by KDHE. Creeks and rivers in the watershed have been assigned designated uses. The table below indicates specific designated uses by waterway.

Table 2 Designated Water Uses for the Middle Neosho Watershed.⁴

Designated Uses Table								
Stream Name	AL	CR	DS	FP	GR	IW	IR	LW
Bachelor Creek (seg 396), Center Creek, Denny Branch, Downey Creek, Fourmile Creek, Grindstone Creek, Hackberry Creek, Limestone Creek, Little Cherry Creek, Little Elk Creek, Little Fly Creek, Little Walnut Creek, Litup Creek, Mulberry Creek, Murphy Creek, Ogeese Creek, Pecan Creek, Plum Creek, Rock Creek, Stink Branch, Thunderbolt Creek, Tolen Creek, Town Creek,	E							
Bachelor Creek (seg 40), Canville Creek, Cherry Creek, Deer Creek, Elk Creek, Elm Creek, Flat Rock Creek (seg 14), Hickory Creek, Lake Creek, Lightning Creek, Little Labette Creek, Spring Creek, Walnut Creek,	E			X				

Fly Creek	E	C		X				
Flat Rock Creek	S			X				
Labette Creek (seg 21 and 22)	E	C	X	X	X	X	X	X
Labette Creek (seg 20), Neosho River	S	C	X	X	X	X	X	X
Turkey Creek	E			X				X
Unnamed Stream (seg 298, 303, 304, 305), Wolf Creek	E	B	X	X	X	X	X	X
Altamont City Main Lake, Altamont City West Lake, Mined Land Lake #10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, Mined Lake #42 Wetland	E	B		X				
Bartlett City Lake, Timber Lake	E	B	X	X		X		
Harmon Wildlife Area	E	A		X				
Neosho County SFL	E	B		X				
Neosho Wildlife Area	S			X				
Parsons Lake	E	A	X	X		X		

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

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

A=Primary contact stream segment or lake that has a posted public swimming area

B=Primary contact stream segment or lake is by law or written permission of the landowner open to and accessible by the public

b=Secondary contact stream segment or lake is not open to and accessible by the public under Kansas law

C=Primary contact stream segment or lake that is not open to and accessible by the public under Kansas law

S=Special aquatic life use water

E = Expected aquatic life use water

X = Referenced stream segment or lake is assigned the indicated designated use

O = Referenced stream segment or lake does not support the indicated beneficial use

Blank=Capacity of the referenced stream segment or lake to support the indicated designated use has not been determined by use attainability analysis

SFL = State Fishing Lake

WMA = Wildlife Management Area

4.3 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 Middle Neosho Watershed has one creek that is listed as special aquatic life use waters: the lower section of Labette Creek. This section of Labette Creek is included in Livestock and High Priority Targeted Areas (discussed in Sections 5.2.2 and 5.2.4) for BMP placement.



Figure 6. Special Aquatic Life Use Waters in the Watershed. ⁵

The special aquatic life use waters are located in an area that is primarily cropland, as can be seen by the figure below. Pollutants that might threaten the health of these waters would be sediment runoff or nutrient/fertilizer runoff. BMPs along the streams with buffer strips and adequate riparian areas will assist in reducing these pollutants.

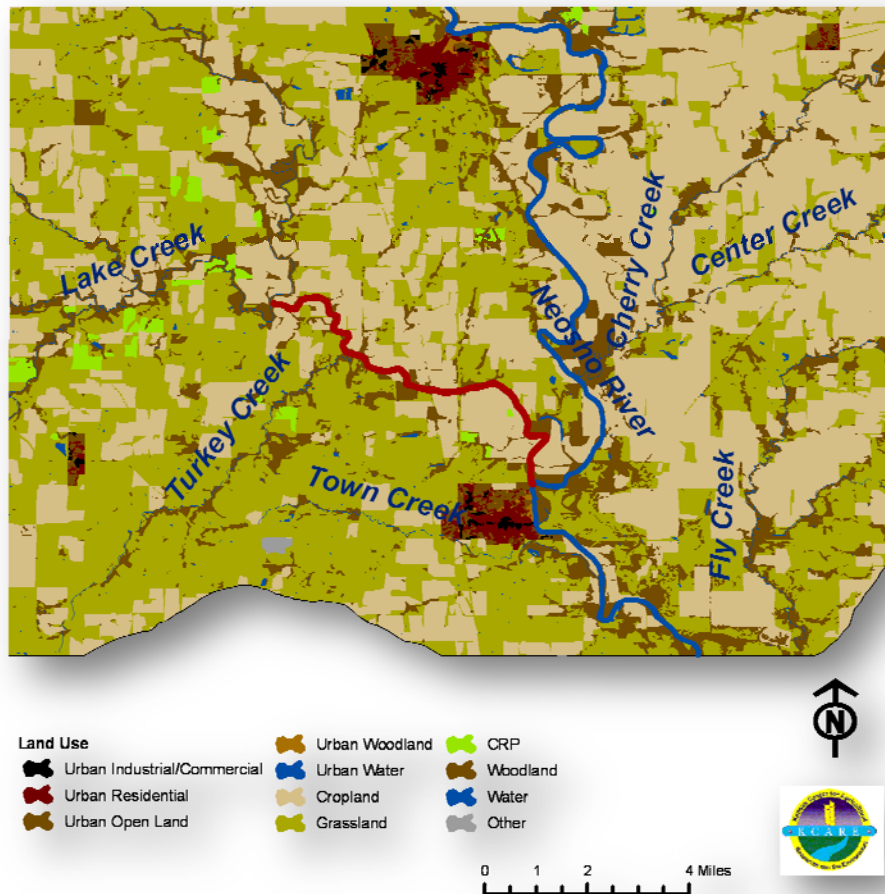


Figure 7. Special Aquatic Life Use Waters in the Watershed with Land Use Showing the Predominance of Cropland near the Stream.⁶

4.4 Public Water Supply (PWS) and National Pollutant Discharge Elimination System (NPDES)

This watershed has numerous PWSs and Rural Water Districts (RWD) that draw water from groundwater aquifers or surface water intakes. The PWSs that derive their water from a surface water supply point in this watershed 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 – primarily phosphorus or nitrogen,
- FCB - human or animal.

A listing of PWSs is included in Table 3 on the following page. A map delineating the PWS diversion points or intakes is included in Figure 8 on Page 28. These diversion points may not be active at this time, but have been active in the past. The diversion points may not coincide the PWS s since PWSs may have

diversion points outside the watershed or diversion points may exist in the watershed that supply PWSs outside the watershed.

RWDs exist across the watershed. RWDs provide potable water for patrons that live outside city limits and would otherwise not have access other than private wells.

Table 3 Public Water Suppliers in the Middle Neosho Watershed ⁷

Public Water Suppliers	County	Source of Water	Population
Cherokee	Crawford	Groundwater	755
Chetopa	Labette	Neosho (storage)	1425
Erie	Neosho	Neosho River	1,120
Girard	Crawford	Groundwater	2,763
Mulberry	Crawford	Groundwater	590
Neosho County RWD No. 2	Neosho	Canville Creek Trib 1	1,320
Oswego	Labette	Neosho River	2,046
Parsons	Labette	Neosho River	11,514
PWWSD 05	Allen	Neosho River	
Scammon	Cherokee	Groundwater	463
St. Paul	Neosho	Neosho River	680
West Mineral	Cherokee	Groundwater	228

Wastewater treatment facilities are permitted and regulated through KDHE. They are considered point sources for pollutants. National Pollutant Discharge Elimination System (NPDES) permits specify the maximum amount of pollutants allowed to be discharged to surface waters. Having these point sources located on streams or rivers 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. Treatment of industrial waste water is specific to the industry and pollutant discharged. ⁸ Any pollutant discharge from point sources that is allowed by the state is considered to be Wasteload Allocation (WLA).

In this watershed, there are nine municipalities that have NPDES sites in close proximity with PWS sites. There could be a possible threat of nitrates and bacteria in the PWS from the NPDES site. Those municipalities that draw drinking water from a surface supply are: Chetopa, Erie, Oswego, St. Paul and Parsons. These PWS intakes are at a higher risk for contamination than those supplies that draw from groundwater. The cities that have both a NPDES site and PWS diversion point are highlighted in the table below in tan.

Table 4 List of Permitted Point Source Facilities ⁹ Municipalities that have both NPDES and PWS sites are highlighted in tan.

Permitted Point Source Facilities					
Facility Name	Ownership	Description	Industrial Classification	City	County
Kansas Gas & Elect Co Parsons	Pub Pri	Electrical Services	Primary O	Parsons	Labette
Mccune City Of Stp	Public	Sewerage Systems	Municipal	Mccune	Crawford
Girard City Of Wwtp	Public	Sewerage Systems	Municipal	Girard	Crawford
Stark City Of Wwtp	Public	Sewerage Systems	Municipal	Stark	Neosho
Hepler City Of Stp	Public	Sewerage Systems	Municipal	Hepler	Crawford
Us Army-Kansas Army Ammunition	Federal	National Security	Not On El	Parsons	Labette
Chetopa City Of Wwtp	Public	Sewerage Systems	Municipal	Chetopa	Labette
Parsons Water & Sewer Dept	Public	Sewerage Systems	Municipal	Parsons	Labette
Altamont City Of Stp	Public	Sewerage Systems	Municipal	Altamont	Labette
Erie City Of Wwtp	Public	Sewerage Systems	Municipal	Erie	Neosho
Oswego City Of Stp	Public	Sewerage Systems	Municipal	Oswego	Labette
Savonburg City Of Wwtp	Public	Sewerage Systems	Municipal	Savonburg	Allen
Scammon Wastewater Treatment F	Public	Sewerage Systems	Municipal	Scammon	Cherokee
West Mineral City Of Wwtp	Public	Sewerage Systems	Municipal	West Mineral	Cherokee
Bartlett City Of Wwtp	Public	Sewerage Systems	Municipal	Bartlett	Labette
Cherokee Wwtp	Public	Sewerage Systems	Municipal	Cherokee	Crawford
Walnut City Of Wwtp	Public	Sewerage Systems	Municipal	Walnut	Crawford
St. Paul City Of Munic Wwtp	Public	Sewerage Systems	Municipal	Saint Paul	Neosho
Midwest Minerals, Inc. Quarry7	Private	Meat Packing Plants	On Elg	Neosho County	Neosho
Nelson Quarry - Erie/beachner	Pub Pri			Erie	Neosho

Individual Mausoleum Company	Pub Pri			Parsons	Labette
Galesburg	Pub Pri			Galesburg	Neosho
Midwest Minerals Inc Quarry 21	Private	Crushed And Broken Limestone	On Elg	Cherokee	Crawford
Midwest Minerals Inc Quarry 3	Private	Crushed And Broken Limestone	On Elg	Parsons	Labette

See the map below for PWS intake sites, NPDES sites and RWDs.¹⁰

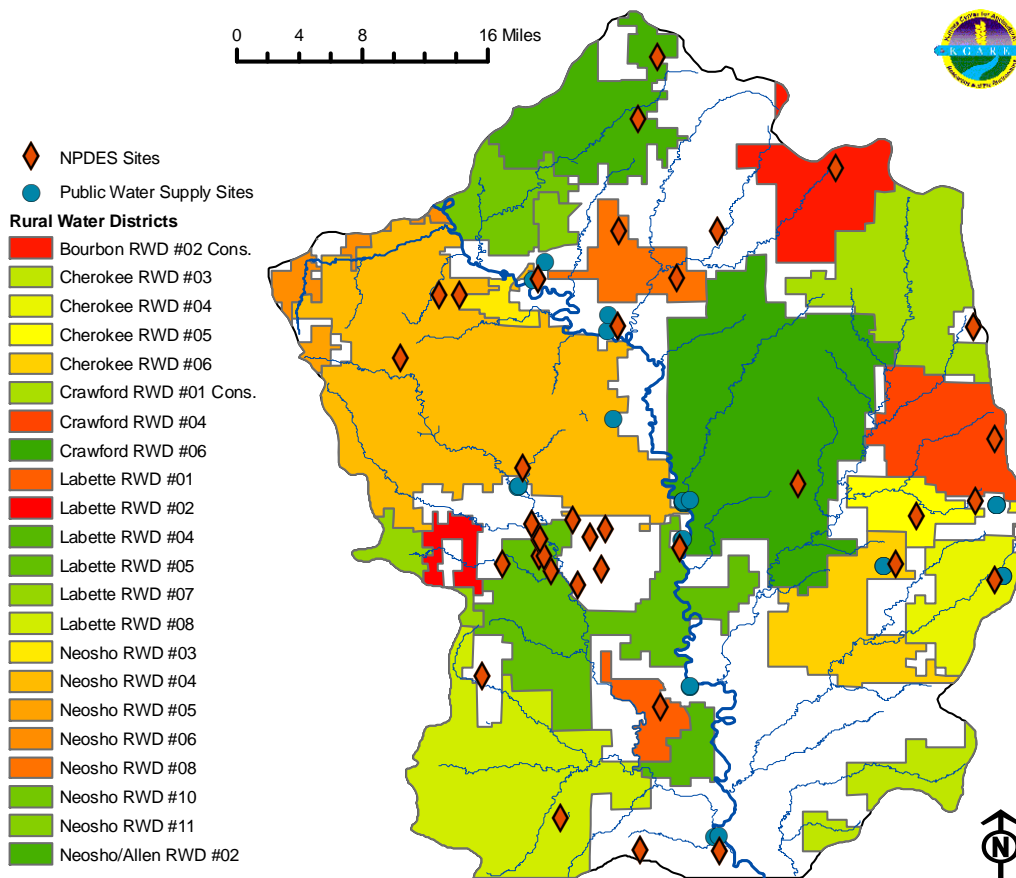


Figure 8 Water Supply Diversion Points and NPDES Treatment Facilities.¹⁰

Thousands of onsite wastewater systems exist in the basin. There is no accurate accounting number of these systems and their functional condition is generally unknown. Best guess is that ten percent of onsite wastewater systems are either failing or inadequately constructed.¹¹ All counties in the watershed have sanitary codes.

4.5 Aquifers

Two aquifers underlie the watershed: ¹²

- Alluvial Aquifer - An alluvial aquifer is a part of and connected to a river system and consists of sediments deposited by rivers in the stream valleys. The Neosho River, Labette Creek and portions of Lightning and Cherry Creeks have alluvial aquifers that lie along and below the waterway.
- Ozark Aquifer - The Ozark Aquifer extends from southeastern Kansas and eastern Oklahoma east to St. Louis and south into Arkansas. It is mainly comprised of limestone and dolomite. Historically, water from this aquifer is very hard.

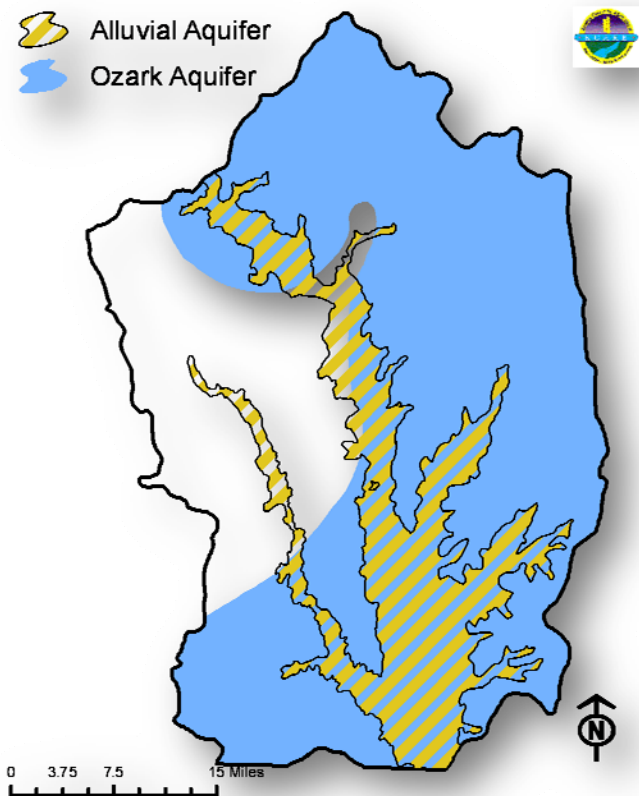


Figure 8 Aquifers in the Watershed.¹¹ Kansas Geospatial Community Commons.

4.6 TMDLs in the Watershed

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. TMDLs established by Kansas may be done on a watershed basis and may use a pollutant-by-pollutant approach or a biomonitoring approach or both as appropriate. TMDL establishment means a draft TMDL has been completed, there has been public notice and comment on the TMDL, there has been consideration of the public comment, any necessary revisions to the TMDL have been made, and the TMDL has been submitted to EPA for approval. The desired outcome of the TMDL process is indicated, using the current situation as the baseline. Deviations from the WQSs will be documented. The TMDL will state its objective in meeting the appropriate WQS by quantifying the degree of pollution reduction expected over time. Interim objectives will also be defined for midpoints in the implementation process.¹³ In summary, TMDLs provide a tool to target and reduce point and nonpoint pollution sources. The goal of the WRAPS process is to address high priority TMDLs.

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 which includes the Middle Neosho Watershed.

Table 5 TMDLs Review Schedule for the Neosho Basin.¹⁴

Year Ending in September	Implementation Period	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

Abbreviation Legend:

Dissolved Oxygen = DO

Copper = Cu

Lead = Pb

Eutrophication = E

Siltation = Silt

Sulfate = SO₄

Many TMDLs will be positively affected by this WRAPS plan even though they have not been expressly targeted. They are merely located in a Targeted Area and BMPs that are implemented for one pollutant will also reduce other pollutants. TMDLs that will be positively affected by BMPs implemented for other TMDLs are shown in bold print in the table below.

Table 6 TMDLs in the Watershed¹⁵ The shaded lines indicated high, medium or low priorities. The TMDLs in **bold** print indicate ones that will be positively affected by this WRAPS plan.

Water Segment	TMDL Pollutant	End goal of TMDL	Priority	Sampling Station
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High Priority				
Cherry Creek	Dissolved Oxygen	BOD < 2.65 mg/l under critical flow and no excursions < 5mg/l dissolved oxygen	High	SC605
Labette Creek	Dissolved Oxygen	BOD < 2.65 mg/l under critical flow and no excursions < 5mg/l dissolved oxygen	High	SC564, SC571
Bachelor Creek	Dissolved Oxygen	Dissolved oxygen > 5 mg/l	High	SC698
Medium Priority				
Canville Creek	Dissolved Oxygen	Dissolved oxygen > 5 mg/l	Medium	SC612
Neosho Co. SFL	Dissolved Oxygen	Dissolved oxygen > 5.0 mg/l	Medium	LM044601
Neosho Co. SFL	Eutrophication	Summer chlorophyll a concentrations = or < 12ug/l.	Medium	LM044601
Neosho Co. SFL	pH	pH between 6.5 and 8.5	Medium	LM044601
Neosho WMA	Eutrophication	Summer chlorophyll a concentrations = or < 20 ug/l. Total Nitrogen < 0.79 mg/l	Medium	LM 053401
Neosho WMA	pH	pH between 6.5 and 8.5	Medium	LM 053401
Neosho WMA	Siltation	Secchi Disk Depth = 0.2 m	Medium	LM 053401
Neosho WMA	Lead	Lead < 0.0032 mg/l	Medium	LM 053401
Parsons Lake	Eutrophication	Summer chlorophyll a concentrations = or < 12ug/l.	Medium	LM041401
Parsons Lake	Siltation	Secchi Disk Depth = 0.3 m	Medium	LM041401
Low Priority				
Flat Rock Creek	Copper	Copper concentration < acute WQS at both low and high flows	Low	SC613
Altamont City Lake #1, #2, and #3	Eutrophication	Summer chlorophyll a concentrations = or < 12ug/l.	Low	LM068101
Bartlett Lake	Eutrophication	Summer chlorophyll a concentrations = or < 20 ug/l.	Low	LM045401

Mined Land WA Unit #42	Dissolved Oxygen	Dissolved oxygen > 5.0 mg/l Total Nitrogen < 0.62 mg/l	Low	LM038841
Mined Land Lakes #6, #7, #12, #17, #22, #23, #27, #30, #44, Mined Land WA #42	Sulfate	Sulfate concentrations = or < 1,000mg/l	Low	LM047601, 047801, 035901, 048201, 036801, 036901, 034301, 037301, 037601, 038841, 048401

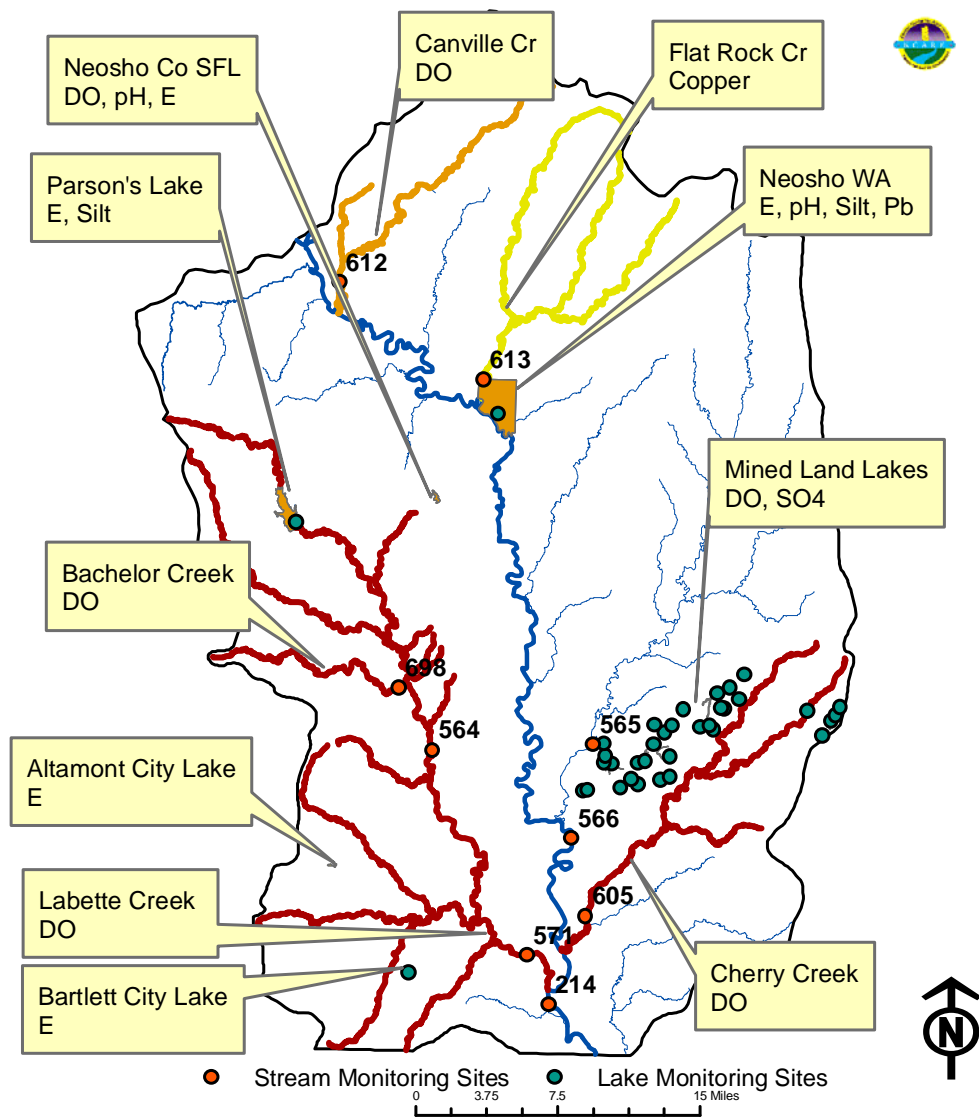


Figure 9 TMDLs in the Watershed. High priority in red, medium priority in orange, low priority in yellow.

Table 8. Current Pollutant Conditions in the Watershed. ¹⁵

Watershed and Impairment	Sampling Sites	Sampling Times	Excursions Seen	Baseline Condition
Bachelor Creek DO	Station 698 near Labette	Spring	25%	Nonsupport of designated use
		Summer/Fall	100%	
		Winter	40%	
Canville Creek DO	Station 614 near Shaw	Spring	13%	Nonsupport of designated use
		Summer/Fall	38%	
		Winter	29%	
Cherry Creek DO	Station 605 near Faulkner	Spring	60%	Nonsupport of designated use
		Summer/Fall	43%	
		Winter	22%	
Flat Rock Creek Cu	Station 613 near St. Paul	Current load = 4.673 lb/day		
Labette Creek DO	Station 564 near Labette and Station 571 near Chetopa	Spring	23%	Partial support of designated use
		Summer/Fall	12%	
		Winter	4%	
Altamont City Lake E	Stations LM068001, LM068101, LM068201	<ul style="list-style-type: none">Summer Chlorophyll-a = 79.20, 49.90, 12.15 ppb (Hypereutrophic, hypereutrophic and fully eutrophic, respectively)Total phosphorus = 0.07, NA, 0.04 ppm respectivelySecchi disk depth = 0.47, 0.47, 0.77 respectively		
Bartlett Lake E	Station LM045401	<ul style="list-style-type: none">Chlorophyll-a = 36.5 ppbTotal Phosphorus = 211ppbTotal Phosphorus in bottom deposits of lake = 390ppbTotal Kjeldahl nitrogen in bottom deposits of lake = 764ppm		
Mined Land Lake DO	Station LM038841 in Mined Land Lake #42	<ul style="list-style-type: none">DO = 5.2 mg/lTotal Phosphorus = 79ppbChlorophyll a = 12.4ppb		
Neosho Co SFL DO and E	Station LM044601 in Neosho Co SFL	<ul style="list-style-type: none">Chlorophyll a = 42.6ppbTotal Phosphorus = 310ppbTotal Kjeldahl Nitrogen = 1.72ppmpH = 7.70		
Neosho WMA E and pH	Station LM053401 in Neosho WMA	<ul style="list-style-type: none">Chlorophyll a = 109ppbTotal Phosphorus = 378ppbTotal Kjeldahl Nitrogen = 3.53ppmpH = 8.08		
Neosho WMA Silt	Station LM053401 in Neosho WMA	<ul style="list-style-type: none">Secchi Disk depth = 14cmTurbidity is 77.7ftuTotal suspended solids = 143mg/lChlorophyll a = 109ppb		
Neosho WMA Lead	Station LM053401 in Neosho WMA	Lead = 0.0125mg/l		
Parsons Lake	Station	<ul style="list-style-type: none">Chlorophyll a = 6.0ppb		

E	LM041401 in Parsons Lake	<ul style="list-style-type: none"> Total Phosphorus = 134ppb
Parsons Lake Silt	Station LM041401 in Parsons Lake	<ul style="list-style-type: none"> Secchi Disk depth = 22cm Turbidity is 51.4ftu Total suspended solids = 21.7mg/l Chlorophyll a = 6.0ppb Total Phosphorus = 134ppb
Mined Land Lakes Sulfate	Stations Lake #6 Lake #7 Lake #12 Lake #17 Lake #22 Lake #23 Lake #27 Lake #30 Lake #44 Wetland #42	<ul style="list-style-type: none"> Lake #6 = 538mg/l Lake #7 = 1,326mg/l Lake #12 = 716mg/l Lake #17 = 1,573mg/l Lake #22 = 1,146mg/l Lake #23 = 983mg/l Lake #27 = 875mg/l Lake #30 = 1,142mg/l Lake #44 = 1,165mg/l Wetland #42 = 756mg/l

4.7 303d List of Impaired Waters in the Watershed

The Middle Neosho Watershed has numerous new listings on the 2010 “303d list”. A 303d list of impaired waters is developed biennially and submitted by KDHE to EPA. To be included on the 303d list, samples taken during the KDHE monitoring program must show that WQSs are not being met. This in turn means that designated uses are not met. TMDL development and revision for waters of the Neosho basin is scheduled for 2013. Priorities are set by work schedule and TMDL development timeframe rather than severity of pollutant. If it will be greater than two years until the pollutant can be assessed, the priority will be listed as “low”. Reducing sediment and nutrient loads (the goal of this plan) will have a positive effect on all listings in the 303d list. Pollutants are assigned “categories” depending on stage of TMDL development:

- Category 5 – Waters needing TMDLs
- Category 4a – Waters that have TMDLs developed for them and remain impaired
- Category 4b – NPDES permits addressed impairment or watershed planning is addressing impairment
- Category 4c – Pollution (typically insufficient hydrology) is causing impairment
- Category 3 – Waters that are indeterminate and need more data or information
- Category 2 – Waters that are now compliant with certain WQSs
- Category 1 – All designated uses are supported, no use is threatened

Table 7 2010 303d List of Impaired Waters in the Middle Neosho Watershed. ¹⁶ The shaded lines indicated high, medium or low priorities. The TMDLs in **bold** print indicate ones that will be positively affected by this WRAPS plan.

Category	Water Segment	Impairment	Priority	Sampling Station
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Low Priority				
5 – Needing TMDL	Lightning Creek near Oswego	Atrazine	Low	SC565
5 – Needing TMDL	Canville Creek near Shaw	Copper	Low	SC612
5 – Needing TMDL	Neosho WA	Copper	Low	LM053401
5 – Needing TMDL	Mined Land Lake 19	Eutrophication	Low	LM036501
5 – Needing TMDL	Mined Land Lake 24	Eutrophication	Low	LM037001
5 – Needing TMDL	Mined Land Lake 25	Eutrophication	Low	LM037101
5 – Needing TMDL	Mined Land Lake 26	Eutrophication	Low	LM037201
5 – Needing TMDL	Mined Land Lake 31	Eutrophication	Low	LM037701
5 – Needing TMDL	Mined Land Lake 34	Eutrophication	Low	LM038001
5 – Needing TMDL	Mined Land Lake 35	Eutrophication	Low	LM038101
5 – Needing TMDL	Mined Land Lake 36	Eutrophication	Low	LM038201
5 – Needing TMDL	Mined Land Lake 40	Eutrophication	Low	LM038601
5 – Needing TMDL	Mined Land Lake 41	Eutrophication	Low	LM038701
5 – Needing TMDL	Parsons Lake	Lead	Low	LM041401
5 – Needing TMDL	Mined Land Lake 22	Perchlorate	Low	LM036801
5 – Needing TMDL	Mined Land Lake WA #42	Siltation	Low	LM038841
5 – Needing TMDL	Cherry Creek near Faulkner	Sulfate	Low	SC605
5 – Needing TMDL	Lightning Creek near Oswego	Temperature	Low	SC565
5 – Needing TMDL	Labette Creek near Labette	Total Phosphorus	Low	SC564
Indeterminate				
3 – Indeterminate and needing more data	Cherry Creek near Faulkner	Atrazine	Last exceedence 2008	SC605
3 – Indeterminate and needing more data	Labette Creek near Labette	Diazinon		SC564

Table 8 2010 Delisted Waters in the Middle Neosho Watershed ¹⁷

Category	Water Segment	Impairment	Comments	Sampling Station
2 – Now Compliant	Labette Creek	Ammonia	No longer impaired	NPDES97560
2 – Now Compliant	Labette Creek near Chetopa	Atrazine	No longer impaired	SC571

2 – Now Compliant	Labette Creek near Chetopa	Copper	No longer impaired	SC571
2 – Now Compliant	Labette Creek near Labette	Copper	No longer impaired	SC564
2 – Now Compliant	Labette Creek	FCB	No longer impaired	NPDES97560
2 – Now Compliant	Labette Creek near Chetopa	Lead	No longer impaired	SC571
2 – Now Compliant	Mined Land Lake 12	pH	Adequate water quality	LM035901
2 – Now Compliant	Neosho River near Oswego	pH	No longer impaired	SC566
2 – Now Compliant	Mined Land Lake 12	Siltation	Adequate water quality	LM035901
2 – Now Compliant	Mined Land Lake 17	Siltation	Adequate water quality	LM048201
2 – Now Compliant	Mined Land Lake 30	Siltation	Adequate water quality	LM037601
2 – Now Compliant	Labette Creek near Labette	Zinc	No longer impaired	SC564

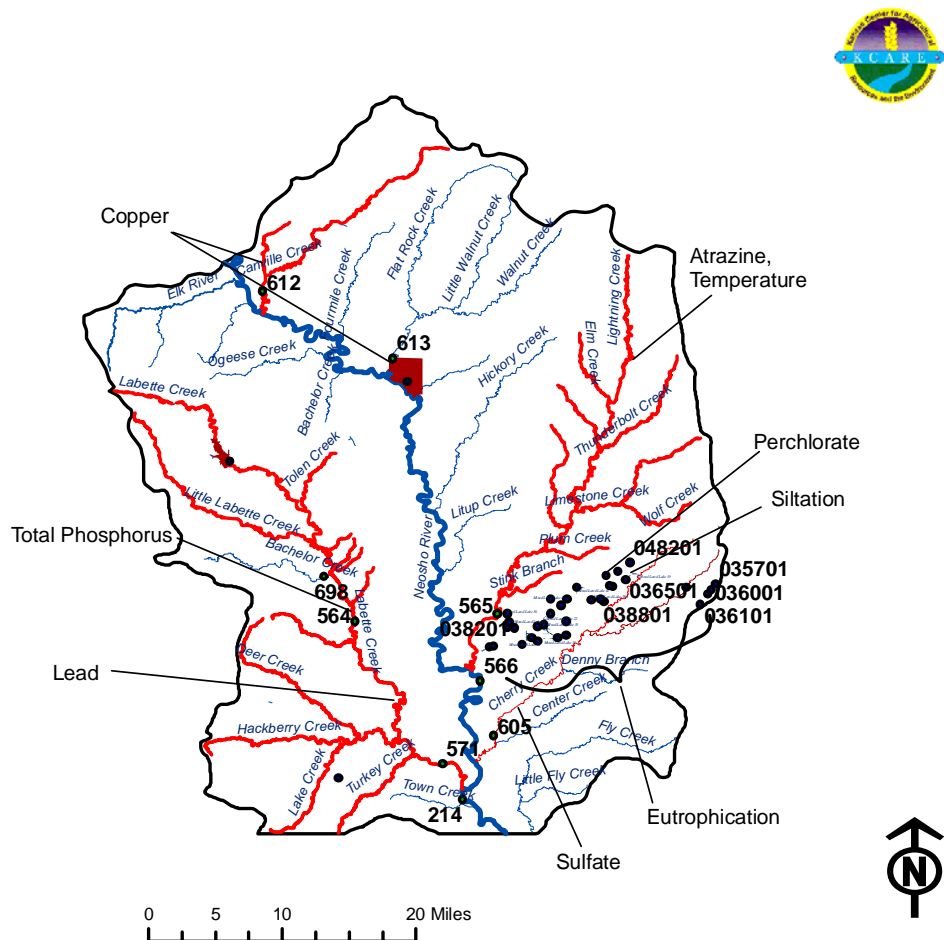


Figure 10 Impairments on the 303d List. ¹⁶

4.8 Load Allocations

Load allocations for phosphorus and sediment (expressed as Total Suspended Solids) for the Middle Neosho Watershed have been determined by KDHE. Typically, Grand Lake would have TMDLs that would determine load allocations for the Middle Neosho Watershed; however, no TMDLs have been implemented at the time of this WRAPS report. Therefore, KDHE has determined that a 30 percent load reduction in phosphorus and sediment is the reduction goal and the calculations for the Load Capacity shall be shown as 70 percent of the total in the watershed. When TMDLs in Grand Lake are established (the TMDLs are under development and the goal for establishment is 2012), this WRAPS plan can be adjusted to fit the load allocations needed to meet Grand Lake's TMDLs.

Table 9 Phosphorus Load Reduction in the Middle Neosho Watershed ¹⁸

Middle Neosho Phosphorus TMDL	
Phosphorus Current Condition (pounds)	448,000
Less Phosphorus Load Capacity (pounds)	313,600
30% Load Reduction Goal (pounds) for the outlet of the Middle Neosho Watershed	134,400

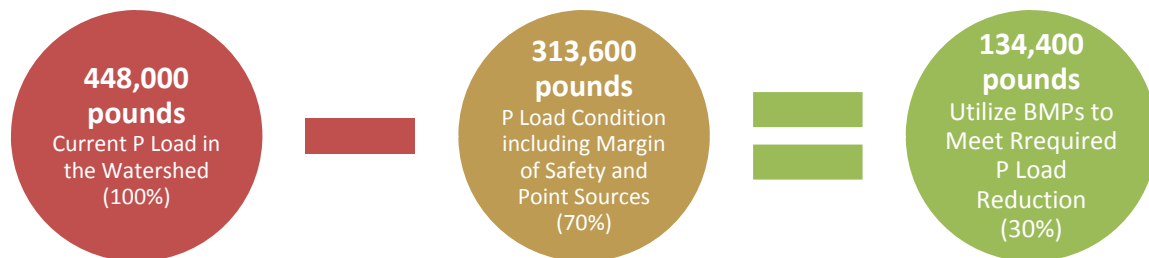
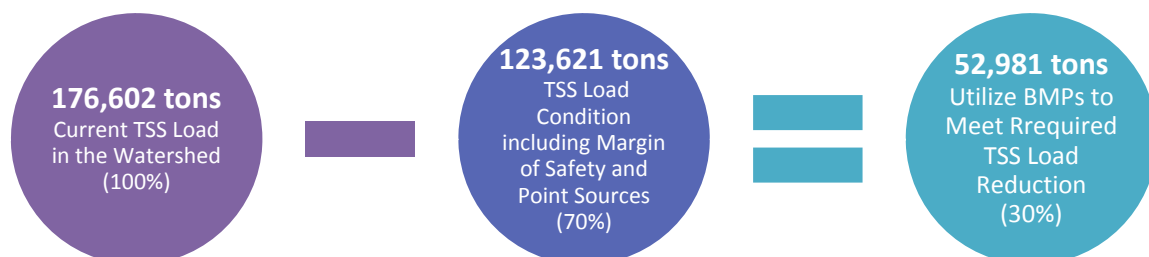


Table 10 Sediment Load Reduction in the Middle Neosho Watershed ¹⁸

Middle Neosho Siltation TMDL	
Silt Current Condition (tons)	176,602
Less Silt Load Capacity (tons)	123,621
30% Load Reduction Goal (tons) for outlet of Middle Neosho Watershed	52,981



5.0 Critical and Targeted Areas, and Load Reduction Methodology

5.1 Critical Areas

In the Middle Neosho Watershed, “Critical Areas” have been identified as areas that need to be protected or restored, such as areas that have TMDLs, emerging pollutant threats, on the 303d list or contain a public water supply. Critical areas are defined by EPA as geographic areas that are critical to implement management practices in order to achieve load reductions.¹⁹ Three areas have been identified as Critical Areas in this WRAPS:

1. Sub watersheds that have been identified by Watershed Assessment Tools as a potential source of pollutants,
2. Sub watersheds that have been identified to have a high level of pollutants, and
3. Sub watersheds with high priority TMDLs

5.2 Targeted Areas

“Targeted Areas” are those specific areas in the Critical Areas that require BMP placement in order to meet load reductions. The Targeted Areas that have been identified in this WRAPS are:

1. Cropland areas targeted for sediment runoff as identified by Assessment Tools,
2. Livestock and Poultry areas targeted for nutrients and FCB runoff as identified by water quality monitoring, and
3. High priority TMDLs areas targeted for nutrients.

There is significant overlap in these targeted areas which is to the benefit of water quality in that applying BMPs for one pollutant will also positively affect other pollutants. Detailed discussion of each Targeted Area follows in the next sections of this report.

Table 11 Overlapping Targeted Areas for Cropland, Livestock, Poultry and High Priority TMDLs.

Targeted Areas	Cropland Sediment	Livestock Nutrients	Poultry Nutrients	High Priority TMDLs
Bachelor Creek		X		X
Cherry Creek	X		X	X
Fly Creek	X		X	
Labette Creek		X		X
Lightning Creek	X		X	



The Cropland Targeted Area of this project was determined by the Soil and Water Assessment Tool (SWAT) as having the potential to runoff sediment (overland origin), and nutrients and is to be used for the determination of BMP placement.

SWAT was used as an assessment tool by Kansas State University Department of Biological and Agricultural Engineering to estimate annual average pollutant loadings such as nutrients and sediment that are coming from the land into the stream. At the end of simulation runs the average annual loads are calculated for each sub watershed. Some areas have higher loads than the others. Based on experience and technical knowledge, the areas or sub watersheds with top 20-30 percent of the highest loads among all areas within the watershed are selected as critical (targeted) areas for cropland and livestock BMPs implementation.

The SWAT model was developed by USDA-ARS from numerous equations and relationships that have evolved from years of runoff and erosion research in combination with other models used to estimate pollutant loads from animal feedlots, fertilizer and agrochemical applications, etc. The SWAT model has been tested for a wide range of regions, conditions, practices, and time scales. Evaluation of monthly and annual streamflow and pollutant outputs indicate SWAT functioned well in a wide range of watersheds. The model directly accounts for many types of common agricultural conservation practices, including terraces and small ponds; management practices, including fertilizer applications; and common landscape features, including grass waterways. The model incorporates various grazing management practices by specifying amount of manure applied to the pasture or grassland, grazing periods, and amount of biomass consumed or trampled daily by the livestock. Septic systems, NPDES discharges, and other point-sources are considered as combined point-sources and applied to inlets of sub watersheds. These features made SWAT a good tool for assessing rural watersheds in Kansas.

The Soil and Water Assessment Tool (SWAT) model is a physically based, deterministic, continuous, watershed-scale simulation model developed by the USDA Agricultural Research Service. ArcGIS interface of ArcSWAT version 9.2 was used. It uses spatially distributed data on topography, soils, land cover, land management, and weather to predict water, sediment, nutrient, and pesticide yields. A modeled watershed is divided spatially into sub watersheds using digital elevation data according to the drainage area specified by the user. Sub watersheds are modeled as having non-uniform slope, uniform climatic conditions determined from the nearest weather station, and they are further subdivided into lumped, non-spatial hydrologic response units (HRUs) consisting of all areas within the sub watershed having similar soil, land use, and slope characteristics. The use of HRUs allows slope, soil, and land-use heterogeneity to be simulated within each sub watershed, but ignores pollutant attenuation between the source area and stream and limits spatial representation of wetlands, buffers, and other BMPs within a sub watershed.

The model includes subbasin, reservoir, and channel routing components.

1. The subbasin component simulates runoff and erosion processes, soil water movement, evapotranspiration, crop growth and yield, soil nutrient and carbon cycling, and pesticide and bacteria degradation and transport.

It allows simulation of a wide array of agricultural structures and practices, including tillage, fertilizer and manure application, subsurface drainage, irrigation, ponds and wetlands, and edge-of-field buffers. Sediment yield is estimated for each subbasin with the Modified Universal Soil Loss Equation (MUSLE). The hydrology model supplies estimates of runoff volume and peak runoff rates. The crop management factor is evaluated as a function of above ground biomass, residue on the surface, and the minimum C factor for the crop.

2. The reservoir component detains water, sediments, and pollutants, and degrades nutrients, pesticides and bacteria during detention. This component was not used during the simulations.
3. The channel component routes flows, settles and entrains sediment, and degrades nutrients, pesticides and bacteria during transport. SWAT produces daily results for every sub watershed outlet, each of which can be summed to provide daily, monthly, and annual load estimates. The sediment deposition component is based on fall velocity, and the sediment degradation component is based on Bagnold's stream power concepts. Bed degradation is adjusted by the USLE soil erodibility and cover factors of the channel and the floodplain. This component was utilized in the simulations but not used in determining the critical areas.

Data for the Middle Neosho SWAT model were collected from a variety of reliable online and printed data sources and knowledgeable agency personnel within the watershed. Input data and their online sources are:

1. 30 meters DEM (USGS National Elevation Dataset)
2. 30m NLCD 2001 Land Cover data layer (USDA-NRCS)
3. STATSGO soil dataset (USDA-NRCS)
4. NCDC NOAA daily weather data (NOAA National Climatic Data Center)
5. Point sources (KDHE on county basis)
6. Septic tanks (US Census)
7. Crop rotations (local knowledge)
8. Grazing management practices (local knowledge)

In every watershed, there are specific locations that contribute a greater pollutant load due to soil type, proximity to a stream and land use practices. By focusing BMPs in these areas; pollutants can be reduced at a more efficient rate.

Through research at the University of Wisconsin, it has been shown that there is a "bigger bang for the buck" with streamlining BMP placement in contrast to a "shotgun" approach of applying BMPs in a random nature throughout the watershed. Therefore, the SLT has targeted areas in the watershed to focus BMP placement for sediment and nutrient runoff. Targeting for this watershed will be accomplished in two different areas:

1. Cropland, livestock and poultry areas will be targeted for phosphorus
2. Cropland will be targeted for sediment.
3. High priority TMDL areas will be targeted for nutrients.

The maps produced by the modeling are displayed below. It is noted that the darker or brighter the color on the map, the higher the pollutant load potential. The watersheds in the southern end of the watershed show the greatest potential for erosion, phosphorus and nitrogen runoff. As stated earlier, this model accounts for land use, soil type, slope, and current conservation practices.

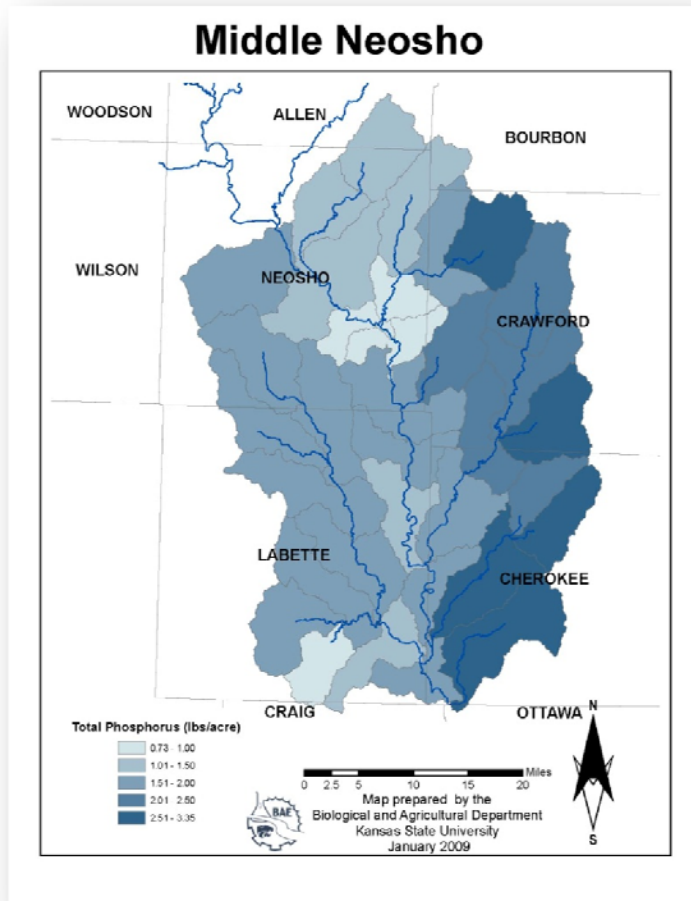


Figure 12 Phosphorus (pounds/acre) Yield as Determined by SWAT

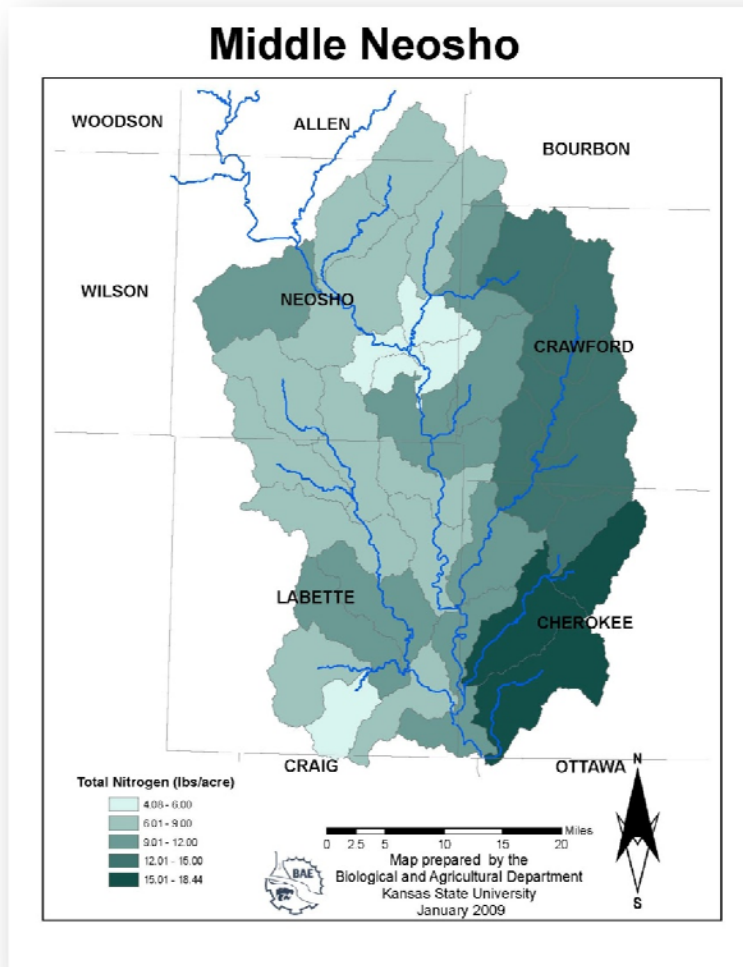


Figure 13 Nitrogen (pounds/acre) Yield as Determined by SWAT

Middle Neosho

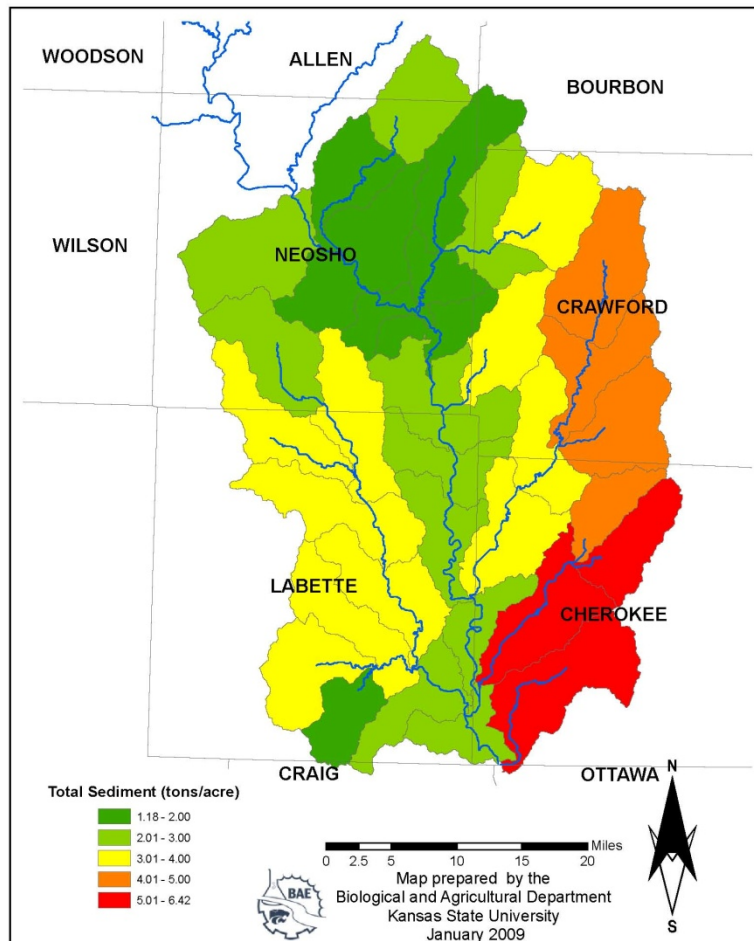


Figure 14 Sediment Yield (tons/acre) as Determined by SWAT

After locating initial critical targeted areas, the area was groundtruthed. Groundtruthing is a method used to determine what BMPs are currently being utilized in the targeted areas. It involves conducting windshield surveys throughout the targeted areas identified by the watershed models to determine which BMPs are currently installed. These surveys are conducted by local agency personnel and members of the SLT that are familiar with the area and its land use history. Groundtruthing provides the current adoption rate of BMPs, pictures of the targeted areas, and may bring forth additional water quality concerns not captured by watershed modeling. In 2009, the groundtruthing provided the current adoption rates for six common BMPs that will be incorporated into the plan (no-till, buffers, grassed terraces, permanent vegetation, grassed waterways and conservation crop rotation) in the cropland targeted area of the watershed. The results are as follows:

- No-till cultivation – current adoption rate of <1 percent
- Vegetative buffer strips – current adoption rate of <1 percent

- Grassed terraces – current adoption rate of 61 percent
- Permanent vegetation – current adoption rate of 10 percent
- Grassed waterways – current adoption rate of 61 percent
- Minimum tillage – current adoption rate of 2 percent

The SWAT model was revised using the groundtruthing information. This allows the SWAT model to develop a more accurate determination of appropriate targeted areas.

The SWAT model has delineated the targeted area into seven subbasins. The HUC 12s that are included in these subbasins are:

- Subbasin #46: 110702050302
- Subbasin #47: 110702050303
- Subbasin #50: 110702050304
- Subbasin #53: northern half of 110702050602 (Cherry Creek drainage)
- Subbasin #54: southern half of 110702050602 (Little Cherry Creek drainage)
- Subbasin #62: 110702050603
- Subbasin #66: 110702050604

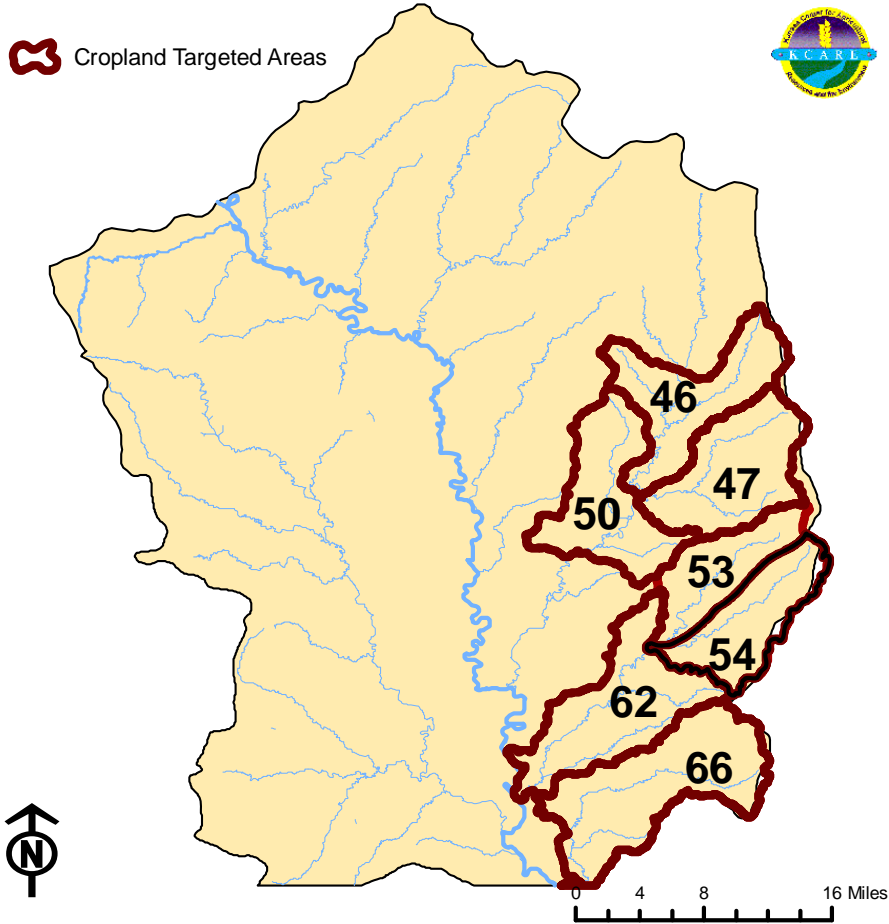


Figure 15 Cropland Targeted Areas in the Watershed

Table 12 Land Use in the Cropland Targeted Area`²⁰

Land Use Breakdown (acres)						
Sub-basin	Pasture or Hay	Percent Pasture or Hay	Cultivated	Percent Cultivated	Percent Other Land Uses	Total Acres in Subbasin
46	12,333	45	10,701	39	14	27,650
47	13,646	45	11,582	38	17	30,599
50	12,268	44	10,235	40	16	25,418
53	4,639	28	7,556	46	26	16,352
54	6,231	28	11,810	54	18	21,940
62	7,890	24	19,273	58	18	32,956
66	15,274	38	20,248	50	12	40,355
	80,375		86,249			196,263

5.2.2 Livestock Targeted Areas

The Livestock Targeted Area of this project was determined primarily by stream monitoring data conducted by KDHE that demonstrated repeatable high levels of nutrients and FCB. Some additional areas were added through the watershed knowledge of the SLT. The targeted area is to be used for the determination of BMP placement for nutrients as determined by phosphorus.

There are eight subbasins in the livestock targeted area. The HUC 12s that are included in these subbasins are:

- Subbasin #35: 110702050106
- Subbasin #38: 110702050107
- Subbasin #42: 110702050301
- Subbasin #44: 110702050401
- Subbasin #51: 110702050403
- Subbasin #55: 110702050404
- Subbasin #58: 110702050501
- Subbasin #64: 110702050505

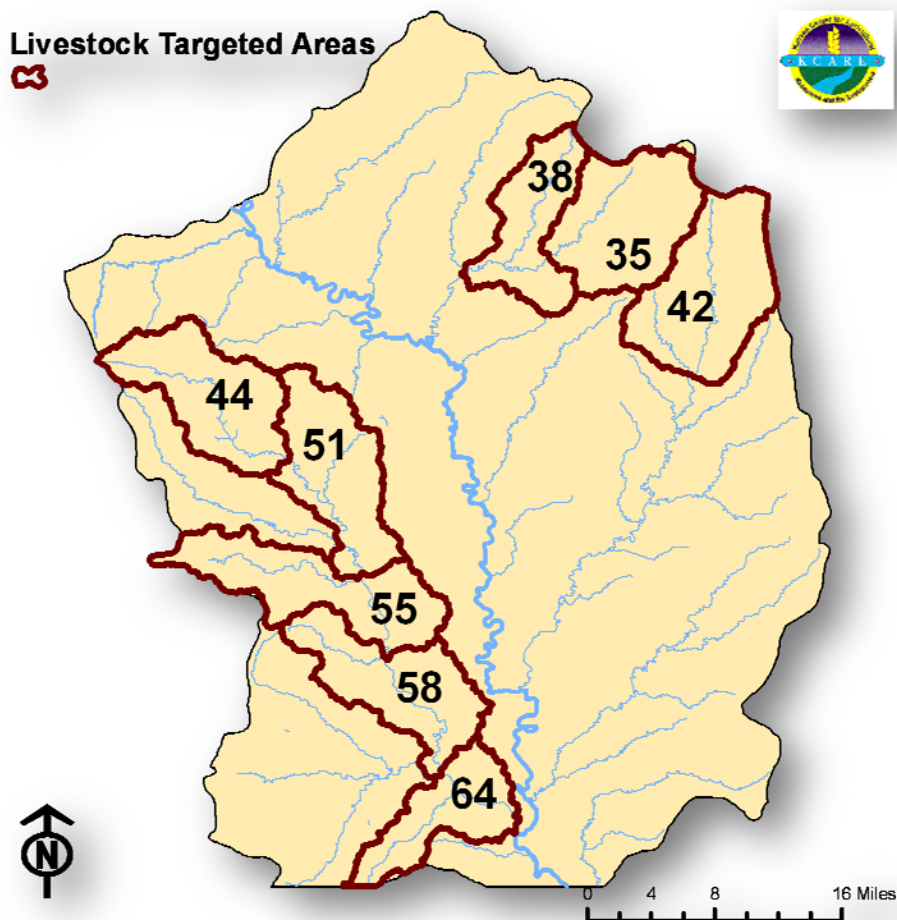


Figure 16 Livestock Targeted Areas in the Watershed

Table 13 Land Use in the Livestock Targeted Area ²⁰

Land Use Breakdown (acres)						
Sub-basin	Pasture or Hay	Percent Pasture or Hay	Cultivated	Percent Cultivated	Percent Other Land Uses	Total
35	13,961	46	11,766	39	15	30,514
38	15,512	60	6,432	25	15	25,806
42	20,286	53	13,749	36	11	38211
44	18,536	59	8,112	26	15	31,671
51	17,847	57	7,112	23	20	31,092
55	19,038	58	8,514	26	16	33,092
58	15,148	50	9,904	33	17	30,010
64	12,654	58	5,209	24	18	21,874
	132,982		70,798			242,270

5.2.3 Poultry Targeted Areas

The Poultry Targeted Area of this project was determined by the knowledge of the watershed by the SLT and is to be used for the determination of BMP placement for nutrients as determined by phosphorus. Subbasins 46, 47, 54, and 66 are also included in the cropland targeted area.

The SWAT model has delineated the targeted area into six subbasins. The HUC 12s that are included in these subbasins are:

- Subbasin #46: 110702050302
- Subbasin #47: 110702050303
- Subbasin #53: northern half of 110702050602 (Cherry Creek drainage)
- Subbasin #54: southern half of 110702050602 (Little Cherry Creek drainage)
- Subbasin #62: 110702050603
- Subbasin #66: 110702050604

Poultry Targeted Areas

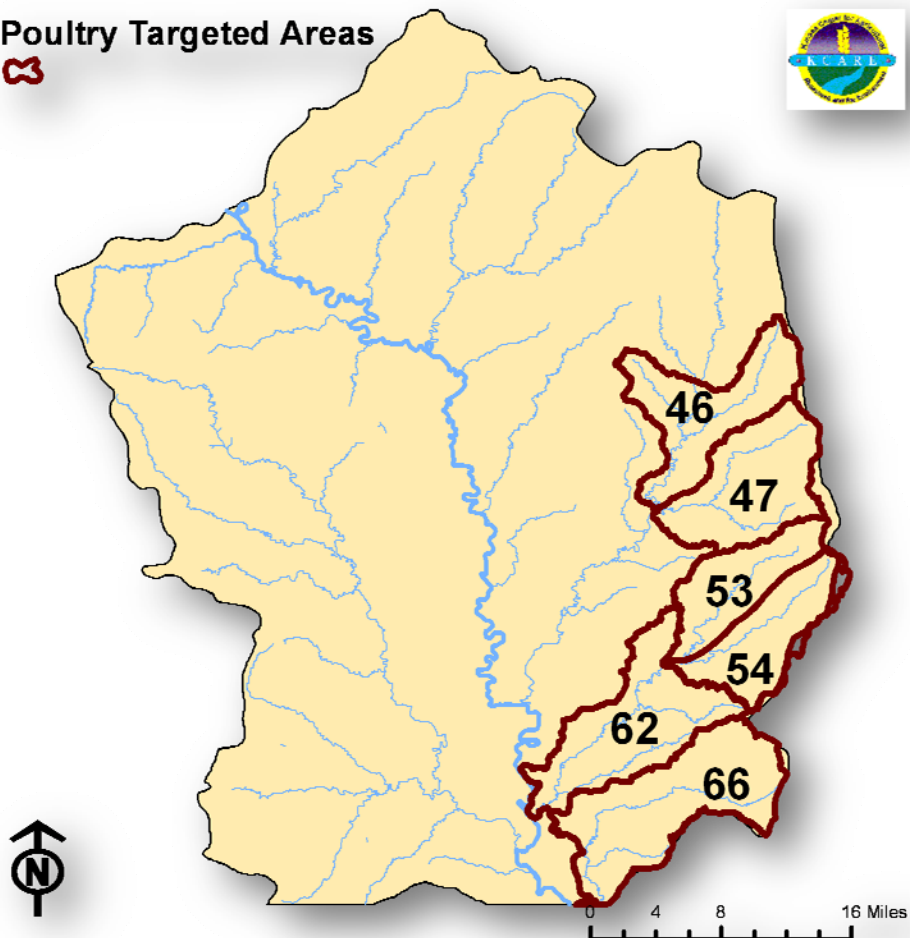


Figure 17 Poultry Targeted Areas in the Watershed

Table 14 Land Use in the Poultry Targeted Area ²⁰

Land Use Breakdown (acres)						
Sub-basin	Pasture or Hay	Percent Pasture or Hay	Cultivated	Percent Cultivated	Percent Other Land Uses	Total
46	12,333	45	10,701	39	14	27,650
47	13,646	45	11,582	38	17	30,599
53	4,731	29	7,556	46	25	16,352
54	6,231	28	11,810	54	18	21,940
62	7,887	24	19,273	58	18	32,956
66	15,274	38	20,248	50	12	40,355
	60,102		81,170			169,852

5.2.4 High Priority TMDL Targeted Areas

The High Priority TMDL Targeted Area is driven from high priority TMDLs in the watershed. Labette Creek, Cherry Creek, and Bachelor Creek all have high priority TMDLs for dissolved oxygen. Dissolved oxygen will be discussed later in this report. It is related to excess nutrients that can be caused by livestock related issues. The High Priority TMDL Targeted Areas are all located in the Livestock and Poultry Targeted Areas. Therefore, they will be dealt with in conjunction with livestock/poultry BMPs.

The high priority TMDL area is delineated into eight subbasins. The seven HUC 12s that are included in these subbasins are:

- Subbasin #44: 110702050401
- Subbasin #51: 110702050403
- Subbasin #53: northern half of 110702050602 (Cherry Creek drainage)
- Subbasin #54: southern half of 110702050602 (Little Cherry Creek drainage)
- Subbasin #55: 110702050404
- Subbasin #58: 110702050501
- Subbasin #62: 110702050603
- Subbasin #64: 110702050505

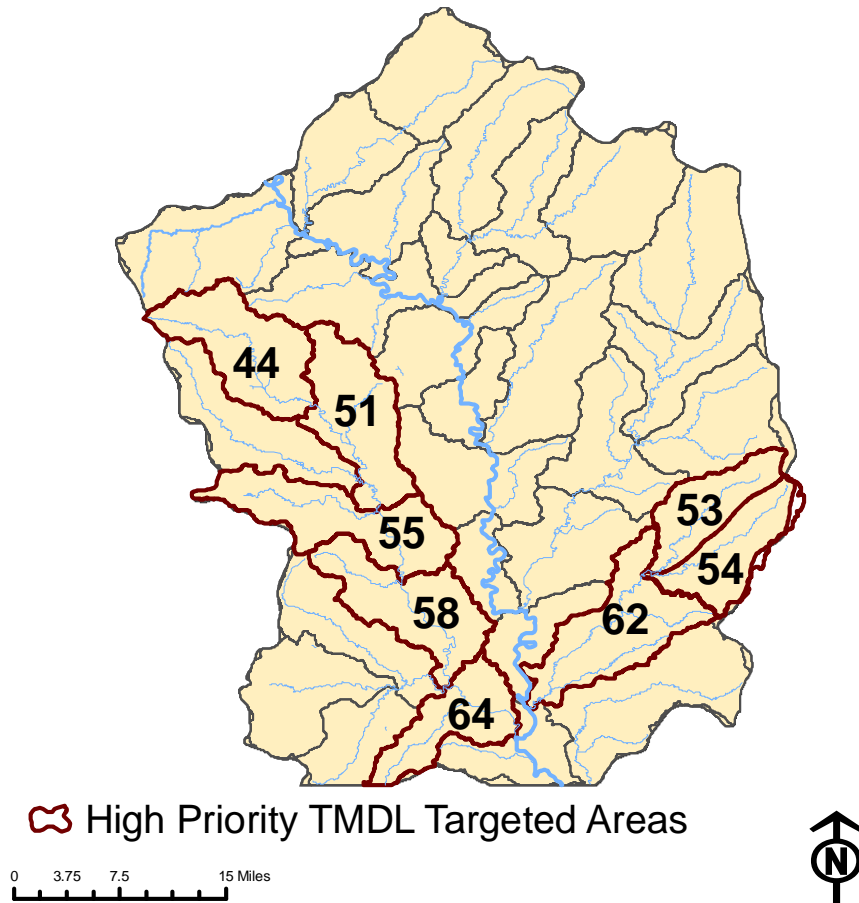


Figure 18 High Priority Targeted Areas

Table 15 Land Use in the High Priority TMDL Targeted Area

Land Use Breakdown (acres)						
Sub-basin	Pasture or Hay	Percent Pasture or Hay	Cultivated	Percent Cultivated	Percent Other Land Uses	Total
44	18,536	59	8,112	26	15	31,671
51	17,847	57	7,112	23	20	31,092
53	4,731	29	7,556	46	25	16,352
54	6,231	28	11,810	54	18	21,940
55	19,038	58	8,514	26	16	33,092
58	15,148	50	9,904	33	17	30,010
62	7,887	24	19,273	58	18	32,956
64	12,654	58	5,209	24	18	21,874
	102,072		77,490			248,987

5.3 Load Reduction Estimate Methodology

5.3.1 Cropland

Baseline loadings are calculated using the SWAT model delineated to the HUC 14 watershed scale. Best management practice (BMP) load reduction efficiencies are derived from K-State Research and Extension Publication MF-2572.²¹ Load reduction estimates are the product of baseline loading and the applicable BMP load reduction efficiencies.

5.3.2 Livestock

Baseline nutrient loadings per animal unit are calculated using the Livestock Waste Facilities Handbook.²² Livestock management practice load reduction efficiencies are derived from numerous sources including K-State Research and Extension Publication MF-2737 and MF-2454.²³ Load reduction estimates are the product of baseline loading and the applicable BMP load reduction efficiencies.

5.3.3 Poultry

Load reductions for managing stockpiled poultry litter are based off of the University of Georgia's *Best Management Practices for Storing and Applying Poultry Litter* Publication. Bulletin 1230.

NOTE: The SLT of the Middle Neosho Watershed has determined that the focus of this WRAPS process will be on two key impairments of the watershed listed in order of importance:

1. Eutrophication

a. Livestock and poultry (nutrients)

Note: Reduction in livestock manure and poultry litter will also reduce ECB

b. Cropland (nutrients)

2. Sedimentation

a. Cropland erosion

All goals and best management practices will be aimed at either restoring water quality or protecting the watershed from further degradation. The following sections in this report will address these concerns.

6.0 Impairments Addressed by the SLT

6.1 Nutrients

The majority of TMDLs and listings on the 303d list are related to excess **nutrient** related pollutant issues. These TMDLs and 303d listings are low dissolved oxygen, eutrophication, total phosphorus and pH.²⁴

In order to quantify eutrophication in the waters of the watershed, this WRAPS plan will concentrate on phosphorus contributions. All BMPs will be aimed at reducing phosphorus

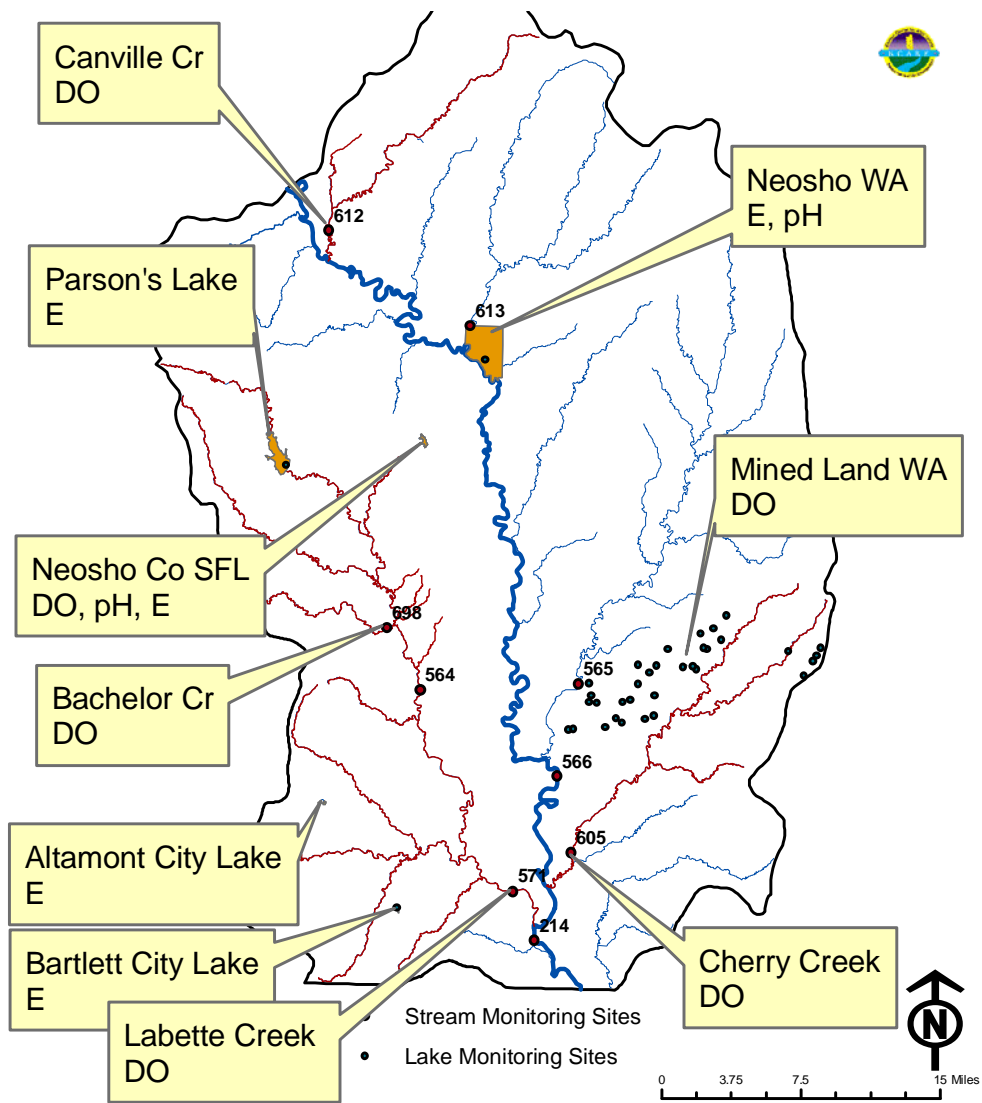


Figure 19 Nutrient Related TMDLs in the Watershed. 15

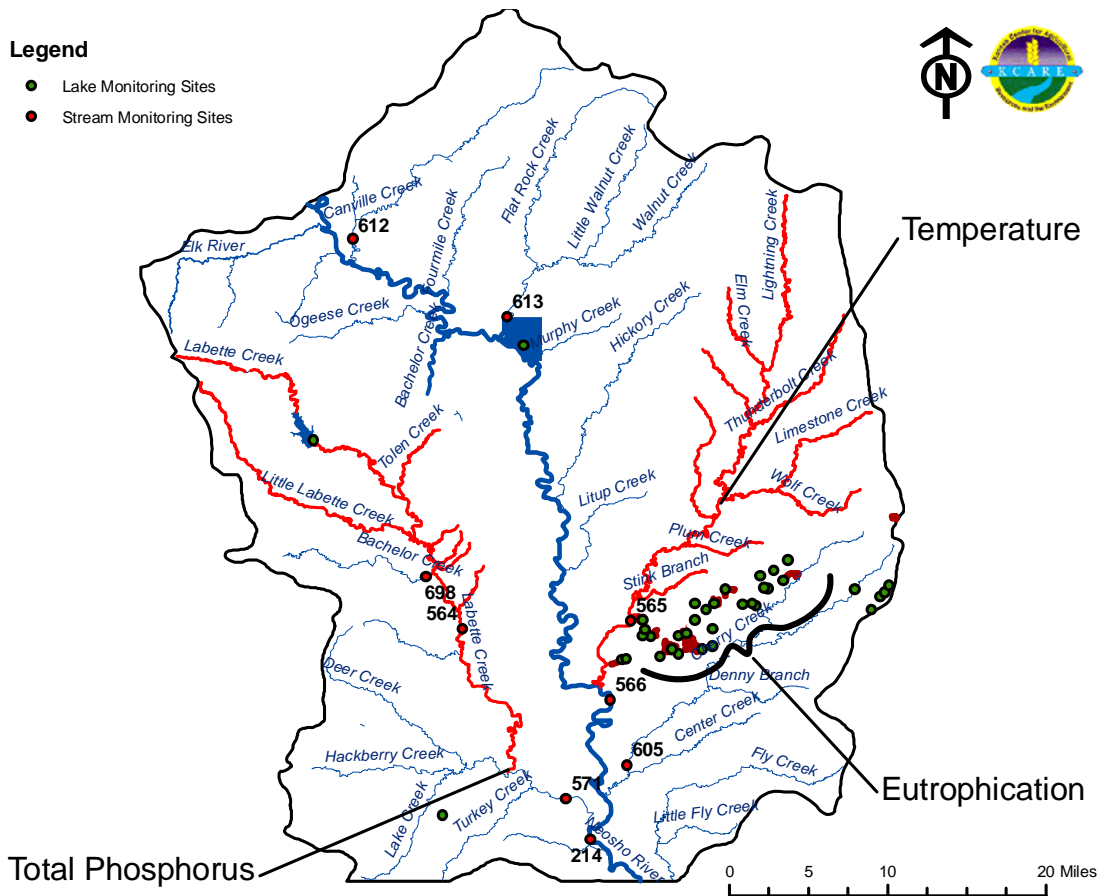


Figure 20 303d Nutrient Related Listings in the Watershed ¹⁶

Eutrophication is a natural process that occurs when a water body receives excess nutrients. These excess nutrients, primarily nitrogen and phosphorus, create optimum conditions that are favorable for algal blooms and plant growth. Altamont City Lakes #1, 2 and 3, Bartlett Lake, Neosho County State Fishing Lake, Neosho Wildlife Management Area and Parsons Lake have TMDLs for eutrophication. Ten of the Mined Land Lakes and Mined Land Lake Wildlife Area are on the 303d list for eutrophication. Proliferation of algae and subsequent decomposition depletes available dissolved oxygen (DO) in the water profile. This lack of oxygen is devastating for aquatic species and can lead to fish kills. Both excessive nutrients and low water flow can contribute to DO violations. Bachelor Creek, Canville Creek, Cherry Creek, Labette Creek, Mined Land Wildlife Area, and Neosho County State Fishing Lake have TMDLs for DO. Desirable criteria for a healthy water profile includes DO rates greater than 5 milligrams per liter and biological oxygen demand (BOD) less than 3.5 milligrams per liter. BOD is a measure of the amount of oxygen removed in water from biodegradable organic matter. It can be used to indicate organic pollution levels. Excess nutrients can originate from failing septic systems and manure and fertilizer runoff in rural and urban areas. pH is another indicator of excess organic matter.

6.1.1 Possible Sources of the Impairment

An excess in nutrients can be caused by any land practice that will contribute to nitrogen or phosphorus in surface waters. Examples are (but not limited to):

- Fertilizer runoff from agricultural and urban lands,
- Manure runoff from domestic livestock and wildlife in close proximity to streams and rivers,
- Failing septic systems, and
- Phosphorus recycling from lake sediment.

Activities performed on the land affect nutrient loading in the lakes of the watershed. Land use in this watershed is primarily agricultural related; therefore, agricultural BMPs are necessary for reducing nitrogen and phosphorus. Some examples of nitrogen and phosphorus BMPs include:

- Soil sampling and appropriate fertilizer recommendations,
- Minimum and continuous no-till farming practices,
- Filter and buffer strips installed along waterways,
- Reduce contact to streams from domestic livestock,
- Develop nutrient management plans for manure management, and
- Replace failing septic systems.

BMPs that have been selected by the SLT based on acceptability by the landowners, cost effectiveness and pollutant load reduction effectiveness are:

- Establish no-till conservation practices
- Establish buffers
- Installation of terraces
- Establish permanent vegetation
- Establish grassed waterways
- Establish minimum tillage conservation practices

This section will review several potential sources or environmental actions that have the potential of increasing nutrients in the waters. They are (in no order of importance):

- Land use
- Grazing density and Confined Animal Feeding Operations
- Cropland distribution within the watershed
- Population and nutrient runoff
- Precipitation

6.1.1.A Land Use

Land use activities have a significant impact on nutrients that are dissolved in water flow. In the rural areas of the watershed, the primary land use in the watershed is grassland. Below are the pros and cons of having grassland, cropland and CRP in the watershed.

- Grassland with livestock that have access to streams and creeks can contribute to phosphorus loading. Cattle that are allowed to loaf in the water source during the hot summer months contribute phosphorus and fecal coliform by defecating directly in the streams. Similarly, livestock that are housed in close proximity to a stream will also contribute phosphorus and FCB during a runoff rainfall event. However, grassland is much more stable than cropland and, if managed properly, can be an asset in minimizing nutrient runoff.
- Cropland commonly has manure applied from livestock confinement operations or poultry litter. This manure can wash into streams and creeks if applied too thickly, on frozen ground or immediately prior to a rainfall event. Phosphorus and nitrogen can runoff during rainfall events from fertilized fields and urban yards and contribute to eutrophication. Conservation practices, such as no-till, buffers and terraces are known to limit nutrient runoff from cropland.
- CRP, or Conservation Reserve Program, land has been removed from cropping practices and reestablished into permanent grass cover. This land cannot be grazed and therefore, is not fertilized. For this reason, CRP land is the least likely to contribute to phosphorus and eutrophication.

Table 16 Acres of Cropland, Grassland and CRP in the Watershed. ²

Land Use	Acres	Percentage of Watershed
Grassland	427,178	46.8
Cropland	355,752	39.0
CRP	14,281	1.6
Total	797,211	87.3

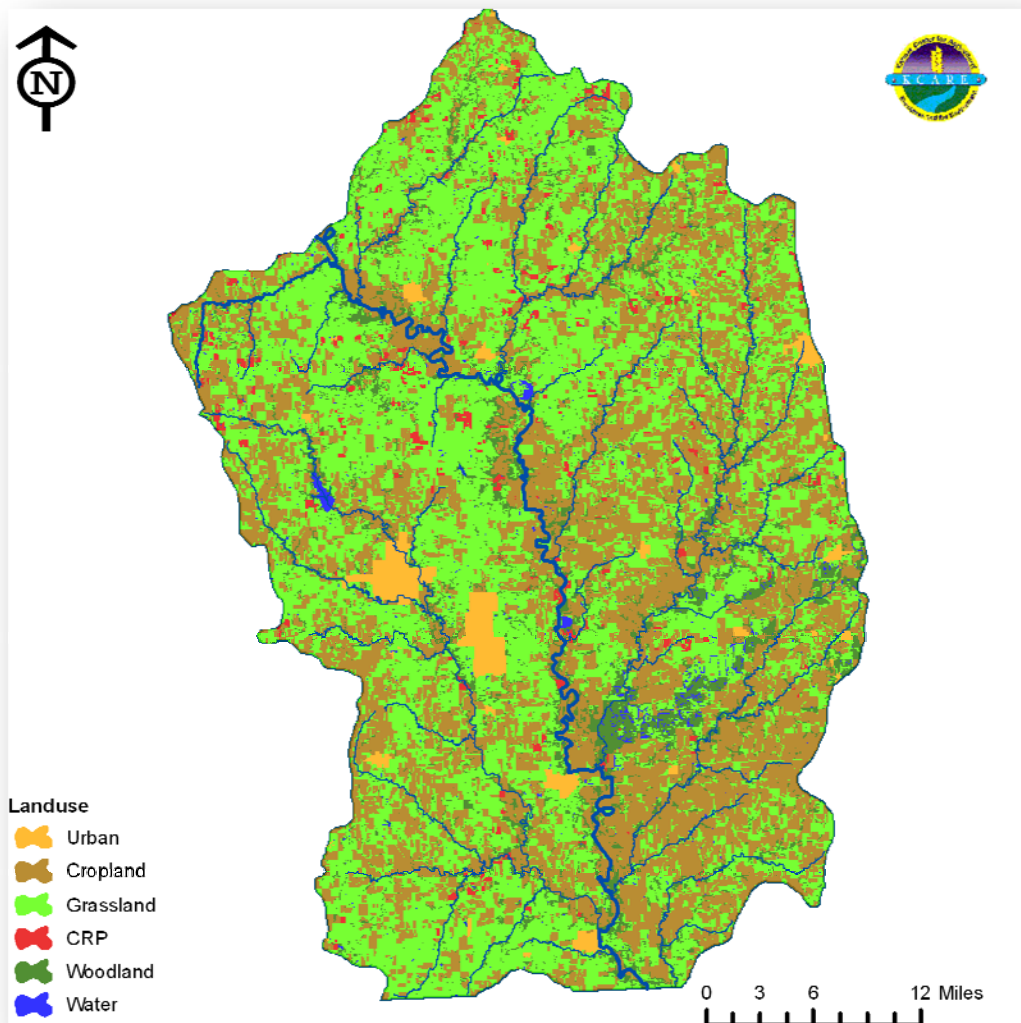


Figure 21 Land Use within the Watershed. ²

6.1.1.B Grazing Density and Confined Animal Feeding Operations

Grasslands consist of approximately 48 percent (includes CRP) of the watershed. This area is a highly productive forage source for beef cattle. Grazing density will affect grass cover and potential manure runoff since a thicker and healthier grass cover will trap manure and inhibit runoff. In Kansas, animal feeding operations (AFOs) with greater than 300 animal units must register with KDHE. Confined animal feeding operations (CAFOs), those with more than 999 animal units, must be permitted with the EPA. An animal unit or AU is an equal standard for all animals based on size and manure production. For example: 1 AU=one animal weighing 1,000 pounds. The watershed contains numerous CAFOs. (This data is derived from KDHE, 2003. It may be dated and subject to change). Number of and location of CAFOs is important in nutrient reduction because of the manure that is generated and must be disposed of by the CAFOs.

Most farmers haul manure or litter to cropland and apply it to be used as fertilizer for the crops. However, due to hauling costs, fields close to the CAFO tend to receive more manure over the course of time than fields that are at a more distant location. These close fields will have a higher concentration of soil phosphorus and therefore, a higher incidence of runoff potential not only as ortho phosphate, but also as phosphorus that is attached to soil particles. Therefore, prevention of erosion is a part of reduction of phosphorus in surface water.

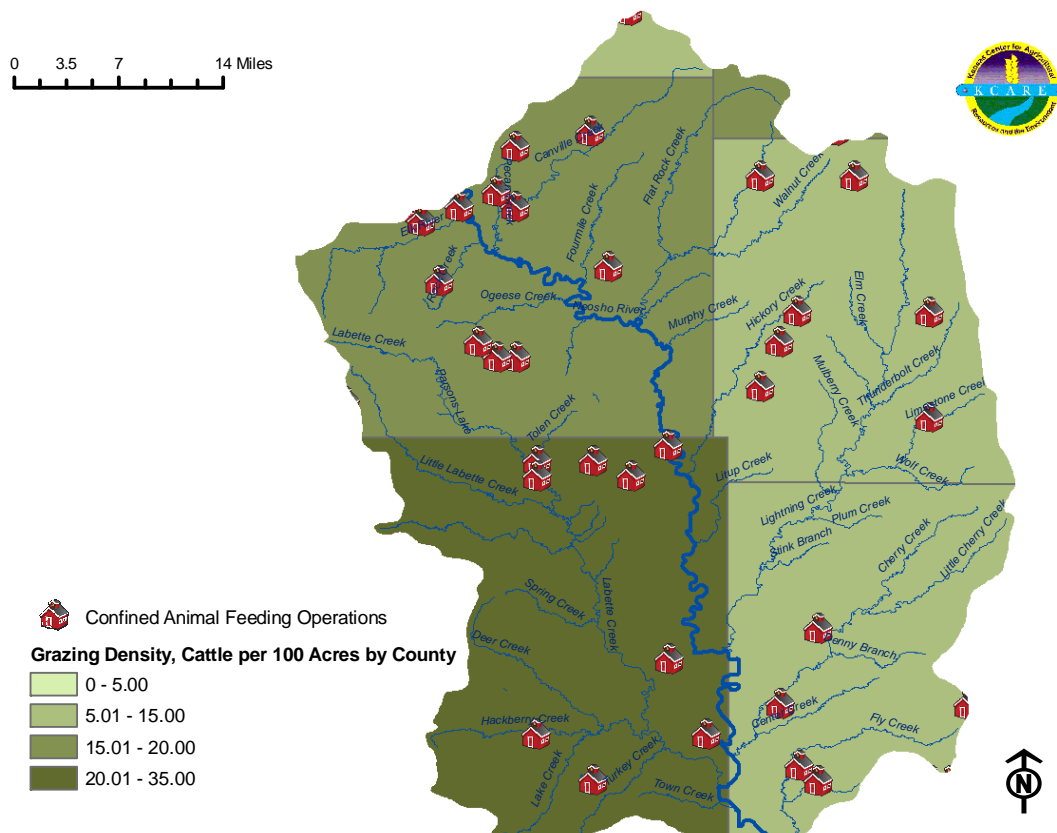


Figure 22 Grazing Density and CAFOs in the Watershed

National Agricultural Statistics Service, 2002. CAFO data provided by Kansas Department of Health and Environment, 2003. Data may be dated and subject to change.²⁵

6.1.1.C Poultry Litter Runoff

The Middle Neosho Watershed has a unique issue with poultry litter. Poultry farms in Arkansas haul excess litter to the Middle Neosho Watershed for cropland distribution as fertilizer. The litter is stored in piles on the ground until the farmer is ready to field apply it. With rainfall events, the litter can wash into creeks and streams. The SLT has determined that BMPs to avoid litter runoff must deal with storage containment and protection from the weather. The SLT has determined poultry litter BMPs as:

- building earthen dams to contain runoff,
- covering the litter pile with plastic, and

- building covered structures to protect the litter from the weather.

6.1.1.D Nutrient Runoff from Cropland

Fertilizer runoff and manure or poultry litter runoff will add phosphorus to waterways in the watershed. Many of the crop fields naturally occur near creeks and streams. This is the area of more fertile, deeper soil. With buffer strips surrounding the fields or lying adjacent to the creeks, manure runoff is slowed and allowed more time to percolate down into the soil profile before entering the creek. Grassed waterways in the fields also help to slow the rainfall runoff. No-till or minimum tillage has proven to provide a higher incidence of soil absorption of rainfall. And a permanent grass cover will naturally slow runoff. All of these BMPs have been included in this WRAPS plan.

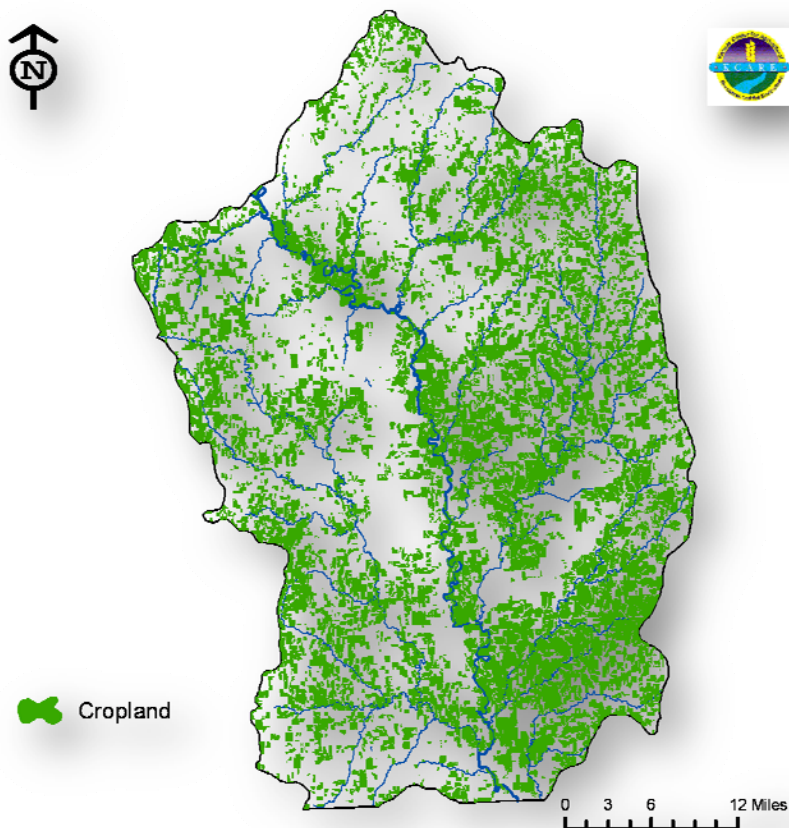


Figure 23 Cropland Distribution in the Watershed. ²

6.1.1.E Population and Nutrient Runoff

Failing, improperly installed or lack of an onsite wastewater system can leak nutrients to the watershed. There is no way of knowing how many failing or improperly constructed systems exist in the watershed. Thousands of onsite wastewater systems may exist in this watershed and the functional condition of

these systems is generally unknown. However, best guess would be that ten percent of households have failing or insufficient wastewater systems.²⁶ Therefore, the exact number of systems is directly tied to population.²⁷

Table 17 Population in the Watershed.²⁸

County	Population	Persons per square mile	Population Change (2000 to 2008), percent
Cherokee	21,082	38.5	-6.7
Crawford (excluding Pittsburg)	19,620	33.1	3.2 (estimated)
Labette	21,871	35.2	-4.2
Neosho	16,223	29.7	-4.5
	Total: 78,796	Average: 34.1	-3.1

Most of the watershed would be considered average population. According to the US Census Bureau, the Kansas average for persons per square mile is 32.9, whereas, the average for this watershed is 34.1. This is excluding Pittsburg, which is the largest city in the counties, but is not contained in the watershed.

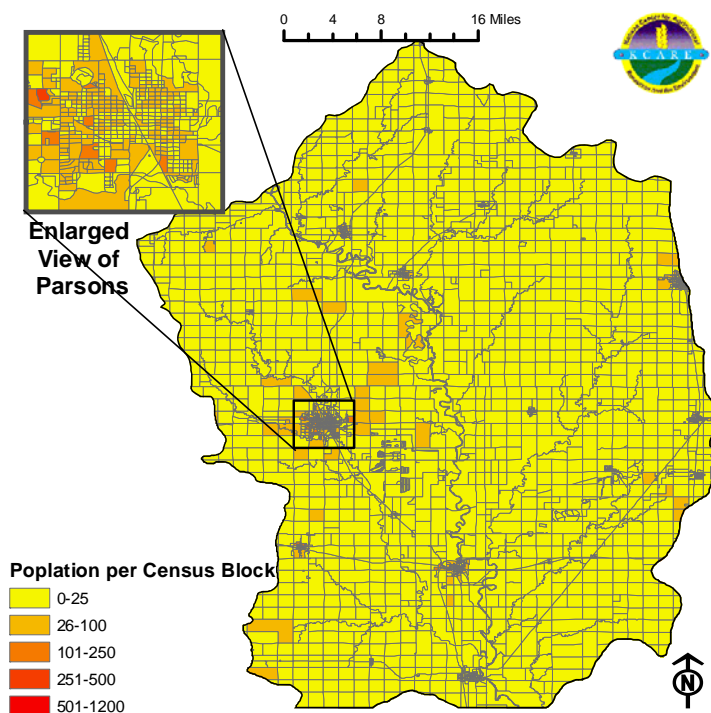


Figure 24 Census Count 2000 with the Targeted Area Highlighted.²⁷

6.1.1.F Rainfall and Nutrient Runoff

Rainfall amounts and subsequent runoff can affect nutrient runoff from agricultural areas and urban areas into streams and the Neosho River. High intensity events (rainfall rates that overwhelm soil adsorptive capacity) or extended periods of rainfall (causing soil saturation and subsequent runoff) mobilize soluble phosphorus from fertilizer and manure and carry it with the rain

water into streams and lakes. It can also carry soil particles which may have attached phosphorus. Also, streambank sloughing occurs during high flows after rainfall events. This streambank soil can also carry attached phosphorus particles.

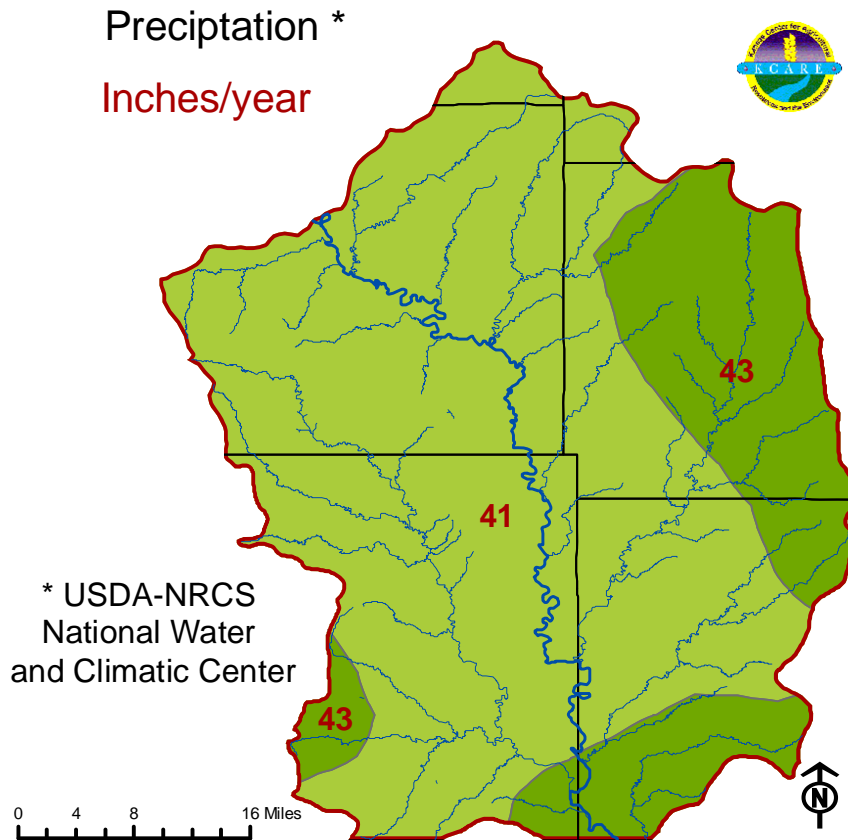
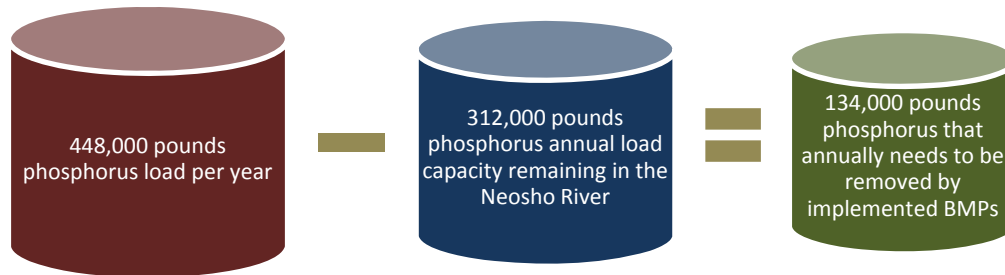


Figure 25 Precipitation in the Watershed. ²⁹

6.1.2 Best Management Practices Needed to Meet TMDL

The current estimated phosphorus load in the Middle Neosho Watershed is 448,000 pounds per year according to the TMDL section of KDHE. This amount of phosphorus in the system contributes to nutrient related TMDLs (dissolved oxygen, pH, and eutrophication) as discussed previously in this section. There is no phosphorus TMDL at this time, therefore, the goal of reducing phosphorus, according to KDHE, is a reduction at the endpoint of the watershed by 30 percent. **At the end of this forty year plan, if all BMPs have been implemented, 134,000 pounds phosphorus will have been reduced from the watershed per year.**



The SLT has laid out specific BMPs that they have determined will be acceptable to watershed residents. At the beginning of this process, BMPs were discussed at the SLT meeting. The SLT came to an agreement of a list of BMPs that they felt would be acceptable and result in significant pollutant reduction progress. Each individual at the meeting then ranked the list of BMPs. These individual rankings were compiled and the top six cropland BMPs and the top four livestock BMPs were determined. These BMPs are listed in the table below. The livestock and poultry BMP goals were determined by utilizing local agency personnel experience and knowledge of the watershed. The acres and number of projects needed annually have been approved by the SLT. All acreages and projects are considered to be stand alone BMPs and not in combination with other acres and projects. **It is to be noted that the cropland BMPs are in support of the sediment goal, however, an added bonus by implementing cropland BMPs is that phosphorus will also be reduced.**

Table 18 Cropland, Livestock and Poultry BMPs and Number of Acres or Installed Projects to be Implemented Aimed at Meeting the 30 percent Phosphorus Reduction Goal as well as the DO TMDL in Labette Creek, Cherry Creek, Mined Lakes, Parson's Lake and to Remove from the 303d List Labette Creek Total Phosphorus Impairment and Ten of the Mined Lakes for Eutrophication Impairment.

Protection Measures	Best Management Practices and Other Actions	Number of Acres or Projects Needed to be Installed Per Year		
		Cropland Groundtruthing Determined by Adoption Rates		
1.0 Prevention of phosphorus contribution from cropland	1.1 Encourage continuous no-till cultivation practices	Current adoption rate = 0.07%	Adoption rate goal = 5%	234 acres per year
	1.2 Establish vegetative buffer strips along crop fields	Current adoption rate = 0.05%	Adoption rate goal = 5%	117 acres per year
	1.3 Installation of terraces	Current adoption rate = 61%	Adoption rate goal = 65%	585 acres per year
	1.4 Establish permanent vegetation in cropland	Current adoption rate = 10%	Adoption rate goal = 15%	234 acres per year
	1.5 Establish grassed waterways in crop fields	Current adoption rate = 61%	Adoption rate goal = 65%	585 acres per year
	1.6 Establish minimum tillage	Current adoption rate = 2%	Adoption rate goal = 6%	585 acres per year
2.0 Prevention of phosphorus contribution	2.1 Establish grazing management plans	1 project per year		
	2.2 Relocate pasture feeding	4 projects per year		

from livestock	sites away from streams	
	2.3 Promote alternative watering sites away from stream	3 projects per year
	2.4. Establish rotational grazing	1 project every other year
3.0 Prevention of phosphorus contribution from poultry litter	3.1 Earthen dams	1 project every three years
	3.2 Plastic enclosures	1 project every three years
	3.3 Covered buildings	1 project every three years

The table below lists the cropland and livestock BMPs and acres implemented with the associated load reductions attained by implementing all of these BMPs. All livestock and poultry BMPs were chosen by the SLT as feasible goals with agency input.

Table 19 Estimated Phosphorus Load Reductions for Implemented Cropland BMPs Aimed at Meeting the 30 percent Phosphorus Reduction Goal as well as the DO TMDL in Labette Creek, Cherry Creek, Mined Lakes, Parson's Lake and to Remove from the 303d List Labette Creek Total Phosphorus Impairment and Ten of the Mined Lakes for Eutrophication Impairment.

		Annual Phosphorous Reduction (lbs), Cropland BMPs					
Year	No-Till	Buffers	Terraces	Permanent Vegetation	Waterways	Minimum Till	Total Load Reduction
1	262	164	491	621	654	327	2,518
2	523	327	981	1,243	1,308	654	5,036
3	785	491	1,472	1,864	1,962	981	7,554
4	1,046	654	1,962	2,485	2,616	1,308	10,072
5	1,308	818	2,453	3,107	3,270	1,635	12,590
6	1,570	981	2,943	3,728	3,924	1,962	15,109
7	1,831	1,145	3,434	4,349	4,578	2,289	17,627
8	2,093	1,308	3,924	4,971	5,232	2,616	20,145
9	2,355	1,472	4,415	5,592	5,886	2,943	22,663
10	2,616	1,635	4,905	6,213	6,540	3,270	25,181
11	2,878	1,799	5,396	6,835	7,195	3,597	27,699
12	3,139	1,962	5,886	7,456	7,849	3,924	30,217
13	3,401	2,126	6,377	8,077	8,503	4,251	32,735
14	3,663	2,289	6,868	8,699	9,157	4,578	35,253
15	3,924	2,453	7,358	9,320	9,811	4,905	37,771
16	4,186	2,616	7,849	9,942	10,465	5,232	40,289
17	4,448	2,780	8,339	10,563	11,119	5,559	42,807

18	4,709	2,943	8,830	11,184	11,773	5,886	45,326
19	4,971	3,107	9,320	11,806	12,427	6,213	47,844
20	5,232	3,270	9,811	12,427	13,081	6,540	50,362
21	5,494	3,434	10,301	13,048	13,735	6,868	52,880
22	5,756	3,597	10,792	13,670	14,389	7,195	55,398
23	6,017	3,761	11,282	14,291	15,043	7,522	57,916
24	6,279	3,924	11,773	14,912	15,697	7,849	60,434
25	6,540	4,088	12,263	15,534	16,351	8,176	62,952
26	6,802	4,251	12,754	16,155	17,005	8,503	65,470
27	7,064	4,415	13,244	16,776	17,659	8,830	67,988
28	7,325	4,578	13,735	17,398	18,313	9,157	70,506
29	7,587	4,742	14,226	18,019	18,967	9,484	73,025
30	7,849	4,905	14,716	18,640	19,621	9,811	75,543
31	8,110	5,069	15,207	19,262	20,276	10,138	78,061
32	8,372	5,232	15,697	19,883	20,930	10,465	80,579
33	8,633	5,396	16,188	20,504	21,584	10,792	83,097
34	8,895	5,559	16,678	21,126	22,238	11,119	85,615
35	9,157	5,723	17,169	21,747	22,892	11,446	88,133
36	9,418	5,886	17,659	22,368	23,546	11,773	90,651
37	9,680	6,050	18,150	22,990	24,200	12,100	93,169
38	9,942	6,213	18,640	23,611	24,854	12,427	95,687
39	10,203	6,377	19,131	24,232	25,508	12,754	98,205
40	10,465	6,540	19,621	24,854	26,162	13,081	100,723

The table below demonstrates the phosphorus load reductions for implemented livestock BMPs in the watershed.

Table 20 Estimated Load Reductions for Implemented Livestock BMPs Aimed at Meeting the 30 Percent Phosphorus Reduction Goal as well as the DO TMDL in Labette Creek, Cherry Creek, Mined Lakes, Parson's Lake and to Remove from the 303d List Labette Creek Total Phosphorus Impairment and Ten of the Mined Lakes for Eutrophication Impairment.

Year	Grazing Management Plans	Relocated Pasture Feeding Site	Off-Stream Watering System	Rotational Grazing	Total
1	152	306	229	0	687
2	304	611	459	76	1,451
3	456	917	688	76	2,138
4	608	1,223	917	153	2,901

5	760	1,529	1,147	153	3,588
6	912	1,834	1,376	229	4,352
7	1,064	2,140	1,605	229	5,039
8	1,216	2,446	1,834	306	5,802
9	1,368	2,752	2,064	306	6,489
10	1,520	3,057	2,293	382	7,253
11	1,672	3,363	2,522	382	7,940
12	1,824	3,669	2,752	459	8,703
13	1,976	3,975	2,981	459	9,390
14	2,128	4,280	3,210	535	10,154
15	2,280	4,586	3,440	535	10,841
16	2,432	4,892	3,669	611	11,604
17	2,584	5,198	3,898	611	12,292
18	2,736	5,503	4,128	688	13,055
19	2,888	5,809	4,357	688	13,742
20	3,040	6,115	4,586	764	14,506
21	3,192	6,421	4,816	764	15,193
22	3,344	6,726	5,045	841	15,956
23	3,496	7,032	5,274	841	16,643
24	3,648	7,338	5,503	917	17,407
25	3,800	7,644	5,733	917	18,094
26	3,952	7,949	5,962	994	18,857
27	4,104	8,255	6,191	994	19,544
28	4,256	8,561	6,421	1,070	20,308
29	4,408	8,867	6,650	1,070	20,995
30	4,560	9,172	6,879	1,147	21,758
31	4,712	9,478	7,109	1,147	22,445
32	4,864	9,784	7,338	1,223	23,209
33	5,016	10,090	7,567	1,223	23,896
34	5,168	10,395	7,797	1,299	24,660
35	5,320	10,701	8,026	1,299	25,347
36	5,472	11,007	8,255	1,376	26,110
37	5,624	11,313	8,485	1,376	26,797
38	5,776	11,618	8,714	1,452	27,561
39	5,928	11,924	8,943	1,452	28,248

40	6,080	12,230	9,172	1,529	29,011
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Table 21 Estimated Load Reductions for Implemented Poultry BMPs Aimed at Meeting the 30 Percent Phosphorus Reduction Goal as well as the DO TMDL in Labette Creek, Cherry Creek, Mined Lakes, Parson's Lake and to Remove from the 303d List Labette Creek Total Phosphorus Impairment and Ten of the Mined Lakes for Eutrophication Impairment.

Year	Earthen Dams	Plastic Enclosure	Covered Building	Total
1	500	0	0	500
2	0	500	0	500
3	0	0	500	500
4	500	0	0	500
5	0	500	0	500
6	0	0	500	500
7	500	0	0	500
8	0	500	0	500
9	0	0	500	500
10	500	0	0	500
11	0	500	0	500
12	0	0	500	500
13	500	0	0	500
14	0	500	0	500
15	0	0	500	500
16	500	0	0	500
17	0	500	0	500
18	0	0	500	500
19	500	0	0	500
20	0	500	0	500
21	0	0	500	500
22	500	0	0	500
23	0	500	0	500
24	0	0	500	500
25	500	0	0	500
26	0	500	0	500
27	0	0	500	500
28	500	0	0	500
29	0	500	0	500
30	0	0	500	500
31	500	0	0	500

32	0	500	0	500
33	0	0	500	500
34	500	0	0	500
35	0	500	0	500
36	0	0	500	500
37	500	0	0	500
38	0	500	0	500
39	0	0	500	500
40	500	0	0	500

The table below shows the combined load reduction for phosphorus that is attained if all cropland and livestock BMPs are implemented annually. At the end of Year Forty, the phosphorus goal will be met.

Table 22 Combined Cropland and Livestock Phosphorus Reductions if All BMPs are Implemented Aimed at Meeting the 30 Percent Phosphorus Reduction Goal as well as the DO TMDL in Labette Creek, Cherry Creek, Mined Lakes, Parson's Lake and to Remove from the 303d List Labette Creek Total Phosphorus Impairment and Ten of the Mined Lakes for Eutrophication Impairment.

Total Phosphorous Reduction					
Year	Cropland Reduction (lbs)	Livestock Reduction (lbs)	Poultry Reduction (lbs)	Total Reduction (lbs)	Percent of Requirement
1	2,518	687	500	3,705	3%
2	5,036	1,451	1,000	7,487	6%
3	7,554	2,138	1,500	11,192	8%
4	10,072	2,901	2,000	14,973	11%
5	12,590	3,588	2,500	18,679	14%
6	15,109	4,352	3,000	22,460	17%
7	17,627	5,039	3,500	26,165	20%
8	20,145	5,802	4,000	29,947	22%
9	22,663	6,489	4,500	33,652	25%
10	25,181	7,253	5,000	37,434	28%
11	27,699	7,940	5,500	41,139	31%
12	30,217	8,703	6,000	44,920	34%
13	32,735	9,390	6,500	48,626	36%
14	35,253	10,154	7,000	52,407	39%
15	37,771	10,841	7,500	56,112	42%

16	40,289	11,604	8,000	59,894	45%
17	42,807	12,292	8,500	63,599	47%
18	45,326	13,055	9,000	67,381	50%
19	47,844	13,742	9,500	71,086	53%
20	50,362	14,506	10,000	74,867	56%
21	52,880	15,193	10,500	78,572	59%
22	55,398	15,956	11,000	82,354	61%
23	57,916	16,643	11,500	86,059	64%
24	60,434	17,407	12,000	89,841	67%
25	62,952	18,094	12,500	93,546	70%
26	65,470	18,857	13,000	97,328	73%
27	67,988	19,544	13,500	101,033	75%
28	70,506	20,308	14,000	104,814	78%
29	73,025	20,995	14,500	108,519	81%
30	75,543	21,758	15,000	112,301	84%
31	78,061	22,445	15,500	116,006	87%
32	80,579	23,209	16,000	119,788	89%
33	83,097	23,896	16,500	123,493	92%
34	85,615	24,660	17,000	127,274	95%
35	88,133	25,347	17,500	130,980	98%
36	90,651	26,110	18,000	134,761	101%
37	93,169	26,797	18,500	138,466	103%
38	95,687	27,561	19,000	142,248	106%
39	98,205	28,248	19,500	145,953	109%
40	100,723	29,011	20,000	149,735	112%

Phosphorus reduction goal has been met

Phosphorus Reduction Goal: 134,000 lbs/year

Table 23 Phosphorus Load Reduction by Category Aimed at Meeting the 30 Percent Phosphorus Reduction Goal as well as the DO TMDL in Labette Creek, Cherry Creek, Mined Lakes, Parson's Lake and to Remove from the 303d List Labette Creek Total Phosphorus Impairment and Ten of the Mined Lakes for Eutrophication Impairment.

Best Management Practice Category	Total Load Reduction (pounds)	Percent of Phosphorous Reduction Goal
Cropland	100,723	75%
Livestock	29,011	22%
Poultry	20,000	15%
Total	149,735	112%

Refer to Section 8, “Costs of BMP Implementation” for specific BMP costs.

6.2 Sediment

Neosho Wildlife Management Area and Parsons Lake have medium priority TMDLs for **Siltation (sedimentation)**. Mined Land Lake Wildlife Area is listed on the 303d listing (refer to page 32) for Siltation.³⁰

Silt or sediment accumulation in lakes and wetlands reduces reservoir volume and therefore, limits public access to the lakes because of inaccessibility to boat ramps, beaches and the water side. In addition to the problem of sediment loading in lakes, pollutants can be attached to the suspended soil particles in the water column causing higher than normal concentrations. Reducing erosion is necessary for a reduction in sediment. Agricultural best management practices (BMPs) such as continuous no-till, conservation tillage, grass buffer strips around cropland, terraces, grassed waterways and reducing activities within the riparian areas will reduce erosion and improve water quality. BMPs have been selected by the SLT (and will be discussed later in this section) based on acceptability by the landowners, cost effectiveness and pollutant load reduction effectiveness.

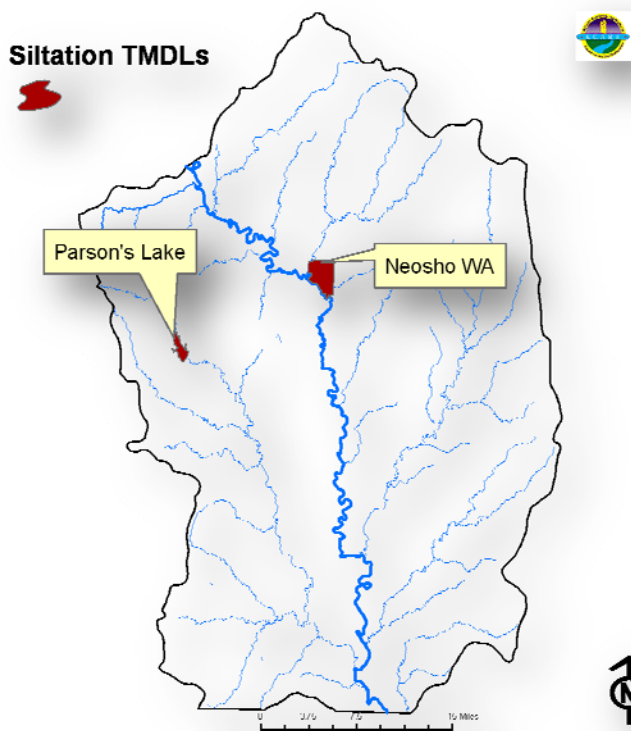


Figure 26 Siltation TMDLs in the Watershed¹⁵

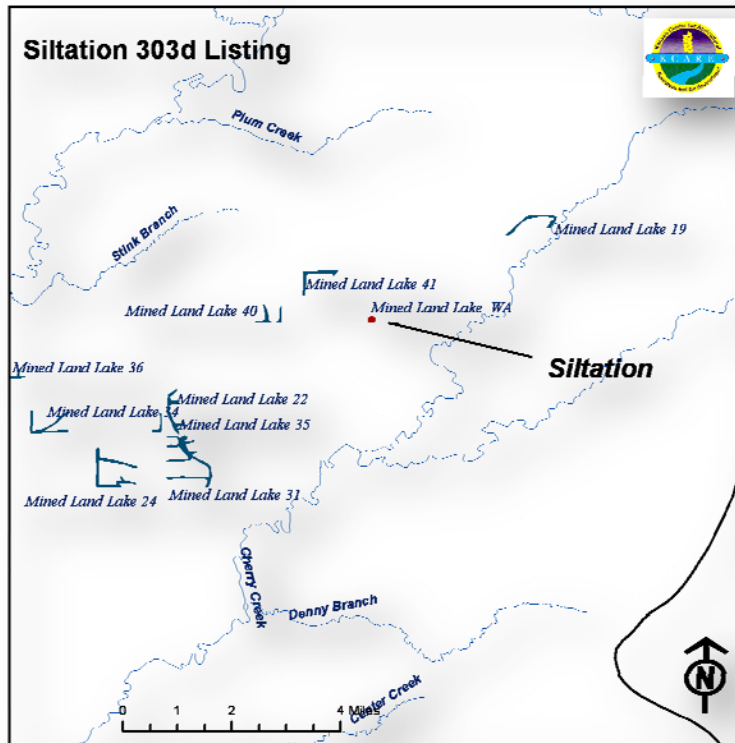


Figure 27 303d Siltation Listing in the Watershed ¹⁶

6.2.1 Possible Sources of the Impairment

Physical components of the terrain are important in sediment movement, such as:

- Slope of the land, propensity to generate runoff and soil type
- Streambank erosion and sloughing of the sides of the river and stream bank. A lack of riparian cover can cause washing on the banks of streams or rivers and enhance erosion.
- Animal movement, such as livestock that regularly cross the stream or follow trails in pastures, can cause pathways that will erode.
- Silt that is present in the stream from past activities and is gradually moving downstream with each high intensity rainfall event.

Activities performed on the land affect sediment that is transported downstream to the lakes. Agricultural BMPs that will help reduce sediment deposition in waterways are (in no particular order, many other BMPs exist):

- No-till
- Minimum tillage
- Vegetative buffers and riparian areas
- Grassed waterways
- Grassed terraces
- Wetland creation

- Establishing permanent vegetative cover
- Farming on the contour
- Conservation crop rotation
- Wetlands

BMPs that have been selected by the SLT based on acceptability by the landowners, cost effectiveness and pollutant load reduction effectiveness are:

- No-till
- Vegetative buffers
- Installation of terraces
- Permanent vegetation to replace crops
- Grassed waterways
- Minimum tillage

This section will review several potential sources or environmental actions that have the potential of increasing sediment in the waters. They are (in no particular order of importance):

- Land use
- T-factor or soil loss
- Hydrologic soil groups
- Riparian quality
- Precipitation distribution

6.2.1.A *Land Use*

Land use activities have a significant impact on the types and quantity of sediment transfer in the watershed. Construction projects in the watershed and in communities can leave disturbed areas of soil and unvegetated roadside ditches that can wash in a rainfall event. In addition, agricultural cropland that is under conventional tillage practice activities and lack of maintenance of agricultural BMP structures can have cumulative effects on land transformation through sheet and rill erosion. The primary land uses in the basins are grasslands (48.4 percent which includes CRP), cropland (39.0 percent), woodlands (9.6 percent), water (1.0 percent) and other (2.0 percent). The land cover map and corresponding table are included on pages 15 through 17 of this report.

6.1.1.B *Soil Erosion by Wind and/or Water*

NRCS has established a “T factor” in evaluating soil erosion by productivity. T is the soil loss tolerance factor. It is defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. It is assigned to soils without respect to land use or cover and ranges from 1 ton per acre for shallow soils to 5 tons per acre for deep soils that are not as affected by

loss of productivity through erosion. T factors represent the goal for maximum annual soil loss in sustaining productivity of the land use.³¹ Erosion is considered to be greater than T if either the water (sheet and rill) erosion or the wind erosion rate exceeds the soil loss tolerance rate. Forty one percent of the watershed is soil loss of 5 tons/acre which is the highest soil loss rating. This represents the deepest soils, but also the most highly erodible. Additionally, forty one percent of the watershed rates as the T factor of 3 tons/acre, which is medium range in erosion capability.

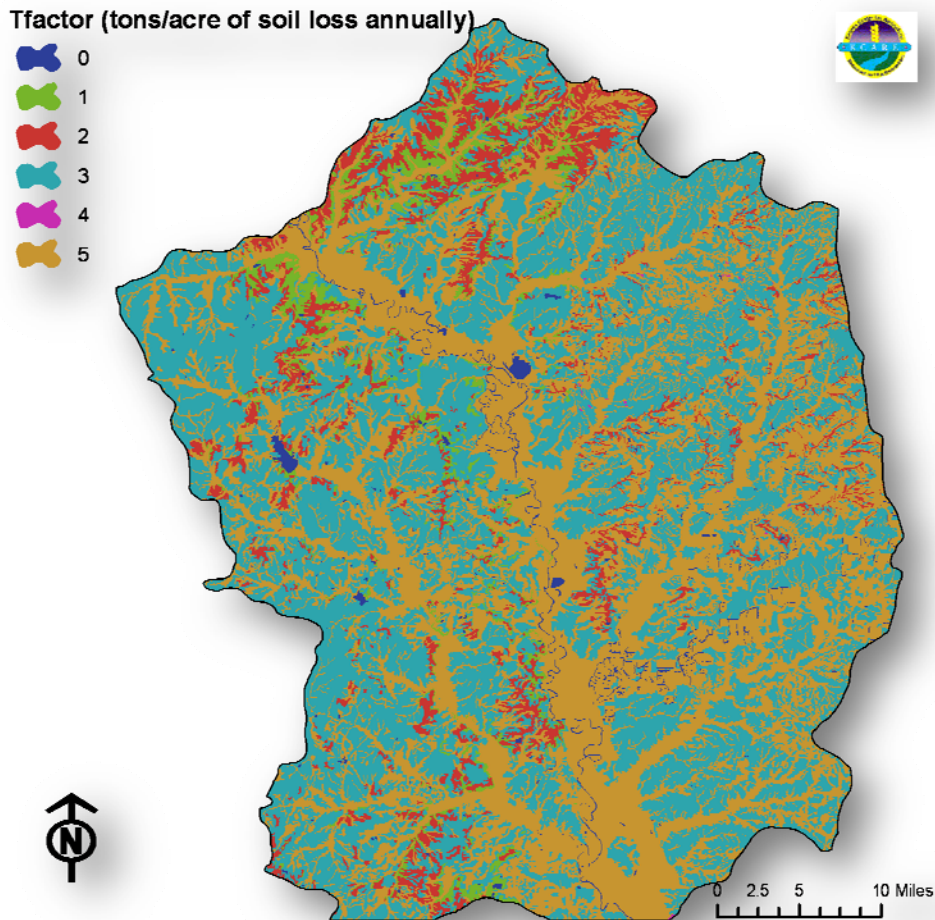


Figure 28 T Factor of the Watershed.³²

Table 24 T Factor of the Watershed³²

T Factor	Percent of Watershed
0	1
1	3
2	13
3	41
4	1
5	41

Total	100
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6.2.1.C Soil Type and Runoff Potential

Soil type has an influence on runoff potential and erosion throughout the watershed. Soils are classified into four hydrologic soil groups (HSG). The soils within each of these groups have the same runoff potential after a rainfall event if the same conditions exist, such as plant cover or storm intensity. Soils are categorized into four groups: A, B, C and D. The watershed is predominantly (50 percent) soil group D. This soil group has the highest potential for runoff.

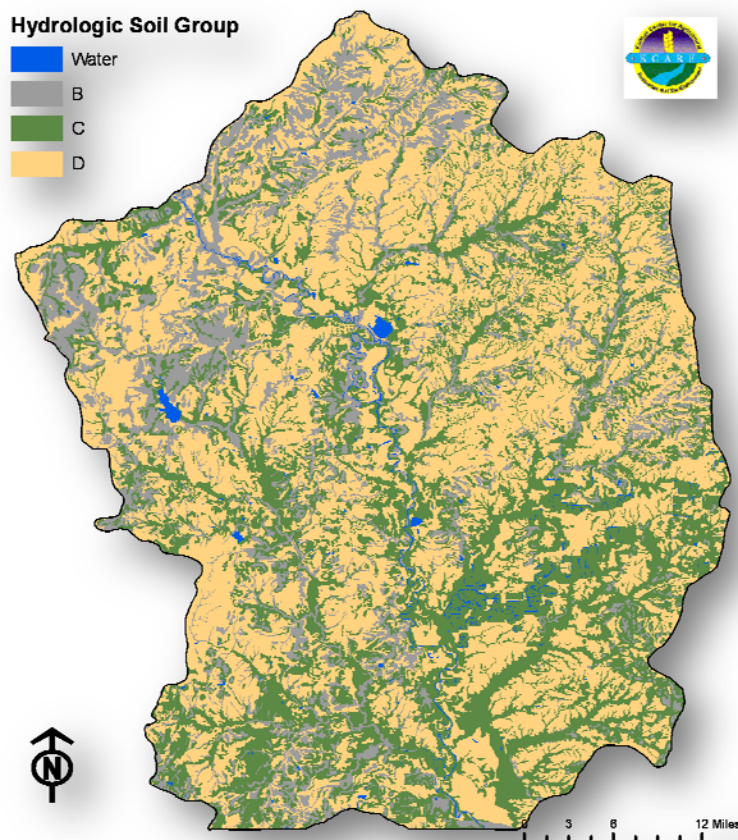


Figure 29 Hydrologic Soil Groups of the Watershed. ³³

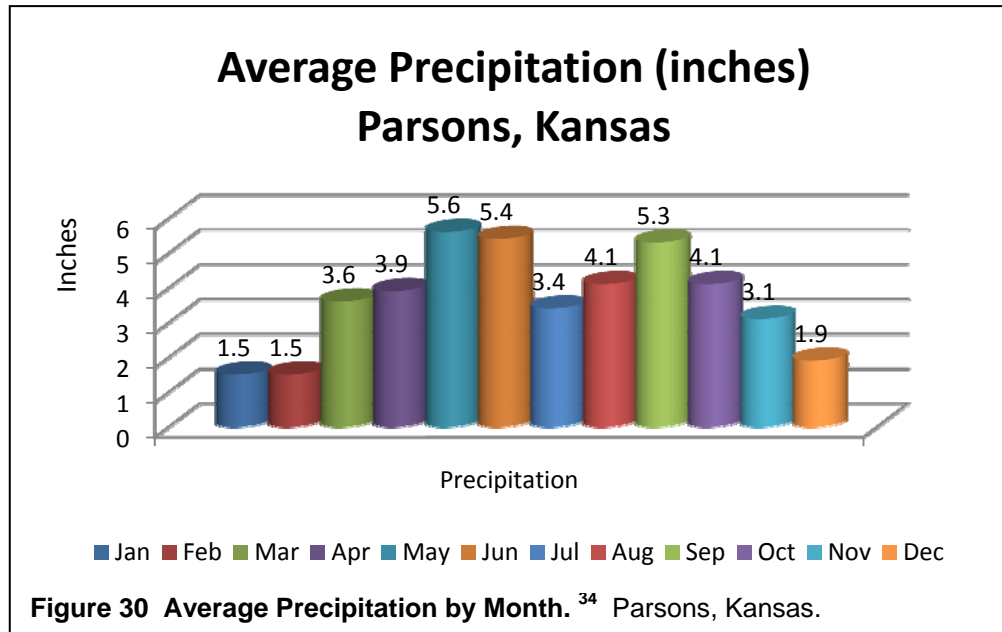
Table 25 Hydrologic Soil Groups. ³³

Hydrologic Soil Group	Definition	Acres of Watershed in HSG	Percentage of Targeted Area in HSG
A	Soils with low runoff potential. Soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep well drained to excessively well-drained sands or gravels.	0	0

B	Soils having moderate infiltration rates even when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well drained to well drained soils with moderately fine to moderately coarse textures.	148,879	16
C	Soils having slow infiltration rates even when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine textures.	292,548	32
D	Soils with high runoff potential. Soils having very slow infiltration rates even when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material.	462,173	51
Other	Water, dams, pits, sewage lagoons	9,072	1.0
Total		912,671	100

6.2.1.D *Rainfall and Runoff* ³⁴

Duration (length of rainfall events causing soil saturation and subsequent runoff) and intensity (rainfall rates that overwhelm soil adsorptive capacity) are key components that affect sediment runoff from agricultural cropland. When rainfall events occur in the late spring and summer, the chances are greater that cropland will not have an adequate crop cover and the fields will erode. This creates ephemeral gullies, or gullies in crop fields that are small enough to plow through every year. However, they keep washing and eroding soil. High rainfall events also add pressure to streambanks and lead to undercuts that deposit large amounts of soil when they fail. High intensity rainfall events primarily occur in the late spring and summer in this watershed. For this reason, it is important to have cropland BMPs in place and stable riparian areas along creeks and streams to prevent erosion.



6.2.1.E Riparian Quality

An adequately functioning and healthy riparian area will stop sediment flow from cropland and rangeland and provide stability for streambanks. Cropland lying adjacent to the stream without buffer protection can result in erosion along the streambanks.

In the watershed, the predominant land use in the riparian areas is forestland at 25 percent. This shows an adequate riparian system. Cropland is 15 percent of the buffer area. This is the land that can be most vulnerable to runoff and erosion. Buffers and filter strips along with forested riparian areas can be used to impede erosion and streambank sloughing in the edges of crop fields.

Table 26 Riparian Land use in the Watershed for a 100 foot Buffer along Streams. ³⁵

Land Use	Acres	Percent
Barren Land	7	0.0
Crop Land	17,422	14.8
Crop/Tree Mix	8,767	7.5
Forest Land	30,520	25.9
Pasture	21,395	18.2
Pasture/Tree Mix	25,333	21.5
Shrub/Shrub Land	1,287	1.1
Urban Land	1,200	1.0
Urban/Tree Mix	1,213	1.0
Water	10,490	8.9
	117,634	100.0

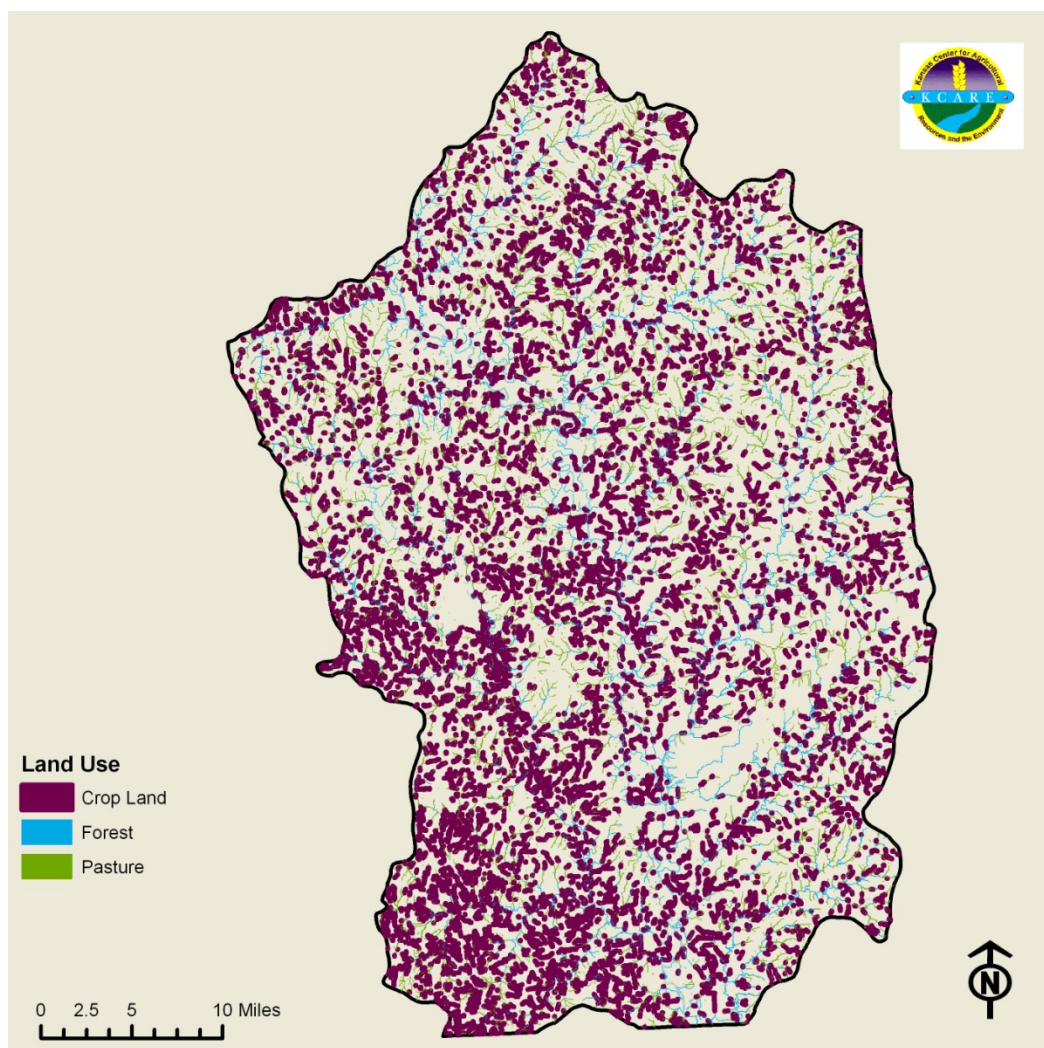


Figure 31 Riparian Inventory of the Watershed.³⁶ Data only includes crop, forest and pasture land lying within a 100 foot buffer of the stream.

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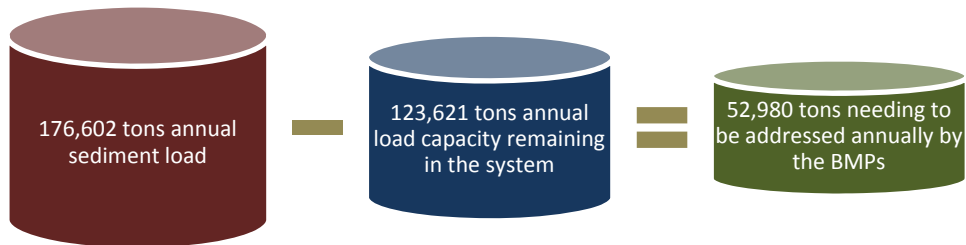
Crop Land - Areas adjacent to a stream where no trees are present and in which 51% of the 100 foot buffer is planted or was planted during the previous growing season for the production of adapted crops for harvest, including row crops, small-grain crops, legume, hay crops, nursery crops, and other specialty crops. Includes **Crop/Tree Mix** - Cropland land use areas that contain a tree canopy cover of less than 50% of the 100 foot buffer zone.

Pasture- Areas adjacent to a stream in which 51% or more of the 100 foot buffer contains pastureland, native pasture, or range land. Includes **Pasture/Tree Mix** - Grassland land use areas that contain a tree canopy cover of less than 50% of the 100 foot buffer zone.

Forest Land - Areas adjacent to a stream that contains trees with a canopy cover greater than 51% of the 100 foot buffer zone. Includes **Shrub/Scrub Land** - Areas adjacent to a stream that contain shrubs or brush/scrub vegetation with a canopy cover greater than 51% of the 100 foot buffer zone. Areas are composed of multi-stemmed woody plants, shrubs, and vines including areas that contain a wide diversity of vegetative cover that are not distinguishable.

6.1.2 Best Management Practices for Sediment Reduction

The current estimated sediment load in the Middle Neosho Watershed is 176,602 tons per year according to the TMDL section of KDHE. There is no sediment TMDL at this time, therefore, the goal of reducing sediment, according to KDHE, is a reduction at the endpoint of the watershed by 30 percent. **By Year 11 of this plan, if all BMPs have been implemented, 52,980 tons sediment will have been reduced from the watershed per year.**



The SLT has laid out specific BMPs that they have determined will be acceptable to watershed residents as listed below. At the beginning of this process, BMPs were discussed at the SLT meeting. The SLT came to an agreement of a list of BMPs that they felt would be acceptable and result in significant pollutant reduction progress. Each individual at the meeting then ranked the list of BMPs. These individual rankings were compiled and the top six were determined for cropland. Specific acreages that need to be implemented per year have been determined through modeling and economic analysis and approved by the SLT as listed below.

Table 27 BMPs to be Implemented to Meet the Sediment Reduction Goal of 30 Percent.

Protection Measures	Best Management Practices and Other Actions	Number of Acres Needed to be Implemented Annually		
		Cropland Groundtruthing Determined by Adoption Rates		
1.0 Prevention of sediment contribution from cropland	1.1 Encourage continuous no-till cultivation practices	Current adoption rate = 0.07%	Adoption rate goal = 5%	234 acres
	1.2 Establish vegetative buffer strips along crop fields	Current adoption rate = 0.05%	Adoption rate goal = 5%	117 acres
	1.3 Installation of grassed terraces	Current adoption rate = 61%	Adoption rate goal = 65%	585 acres
	1.4 Establish permanent vegetation in cropland	Current adoption rate = 10%	Adoption rate goal = 15%	234 acres
	1.5 Establish grassed waterways in crop fields	Current adoption rate = 61%	Adoption rate goal = 65%	585 acres
	1.6 Establish minimum tillage practices	Current adoption rate = 2%	Adoption rate goal = 4%	585 acres

The table below lists the cropland BMPs and acres implemented with the associated load reductions attained by implementing all of these BMPs. The sediment reduction goal will be met in Year 11. At this time, the sediment portion of this plan will be considered “protection” rather than “restoration”.

Table 28 Estimated Sediment Load Reductions to Meet the Sediment Reduction Goal of 30 Percent and the 303d listing of Siltation for Mined Land Lake Wildlife Area.

Annual Soil Erosion Reduction (tons), Cropland BMPs							
Year	No-Till	Buffers	Terraces	Permanent Vegetation	Waterways	Minimum Till	Total Load Reduction
1	856	285	856	1,084	1,141	1,055	5,276
2	1,711	570	1,711	2,167	2,282	2,110	10,552
3	2,567	856	2,567	3,251	3,422	3,166	15,828
4	3,422	1,141	3,422	4,335	4,563	4,221	21,104
5	4,278	1,426	4,278	5,419	5,704	5,276	26,380
6	5,133	1,711	5,133	6,502	6,845	6,331	31,656
7	5,989	1,996	5,989	7,586	7,985	7,386	36,932
8	6,845	2,282	6,845	8,670	9,126	8,442	42,208
9	7,700	2,567	7,700	9,753	10,267	9,497	47,484
10	8,556	2,852	8,556	10,837	11,408	10,552	52,760
11	9,411	3,137	9,411	11,921	12,548	11,607	58,036
12	10,267	3,422	10,267	13,005	13,689	12,662	63,312
13	11,122	3,707	11,122	14,088	14,830	13,718	68,588
14	11,978	3,993	11,978	15,172	15,971	14,773	73,864
15	12,834	4,278	12,834	16,256	17,111	15,828	79,140
16	13,689	4,563	13,689	17,340	18,252	16,883	84,416
17	14,545	4,848	14,545	18,423	19,393	17,938	89,692
18	15,400	5,133	15,400	19,507	20,534	18,994	94,968
19	16,256	5,419	16,256	20,591	21,674	20,049	100,244
20	17,111	5,704	17,111	21,674	22,815	21,104	105,520
21	17,967	5,989	17,967	22,758	23,956	22,159	110,796
22	18,823	6,274	18,823	23,842	25,097	23,214	116,072
23	19,678	6,559	19,678	24,926	26,237	24,270	121,348
24	20,534	6,845	20,534	26,009	27,378	25,325	126,624
25	21,389	7,130	21,389	27,093	28,519	26,380	131,900
26	22,245	7,415	22,245	28,177	29,660	27,435	137,176
27	23,100	7,700	23,100	29,260	30,800	28,490	142,452
28	23,956	7,985	23,956	30,344	31,941	29,546	147,728
29	24,812	8,271	24,812	31,428	33,082	30,601	153,004
30	25,667	8,556	25,667	32,512	34,223	31,656	158,280

Sedi-
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31	26,523	8,841	26,523	33,595	35,364	32,711	163,556
32	27,378	9,126	27,378	34,679	36,504	33,766	168,832
33	28,234	9,411	28,234	35,763	37,645	34,822	174,108
34	29,089	9,696	29,089	36,847	38,786	35,877	179,384
35	29,945	9,982	29,945	37,930	39,927	36,932	184,660
36	30,800	10,267	30,800	39,014	41,067	37,987	189,936
37	31,656	10,552	31,656	40,098	42,208	39,042	195,212
38	32,512	10,837	32,512	41,181	43,349	40,098	200,488
39	33,367	11,122	33,367	42,265	44,490	41,153	205,764
40	34,223	11,408	34,223	43,349	45,630	42,208	211,040

Refer to Section 8, “Costs of BMP Implementation” for specific BMP costs in order to meet the TMDL.

7.0 Information and Education (I&E) in Support of BMPs

7.1 I&E Activities

The SLT has determined which I&E 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. I&E projects will be emphasized in the Targeted Areas, but open to the entire watershed. Even though open to the entire watershed, special attention will be paid to residents of the Targeted Areas with supplemental postcards and mailings.

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.

BMP	Target Audience	Information/Education Activity/Event	Time Frame	Estimated Costs	Sponsor/Responsible Agency
Cropland BMP Implementation					
Riparian Buffers	Landowners and farmers	Demonstration Projects	Annual – Spring	\$5,000 per project	KAWS, Conservation Districts
		Tour/Field Day highlighting grassed buffers	Annual - Summer	\$1,000 per tour	KAWS, Conservation Districts
		Tour/Field Day highlighting forested buffers	Annual – Spring, Summer, Fall	\$1,930 per tour	Kansas Forest Service
		One-on-One Technical Assistance for Landowners	Annual - Ongoing	No charge	SCC Conservation Technician, Buffer Coordinator
No-till & Minimum Tillage	Farmers and Rental Operators	Scholarships for 2 farmers to attend No-Till Winter Conference	Annual – Winter	\$300 (\$150 per person)	No-till on the Plains

		Tour/Field Day	Annual – Summer	\$1,500	Conservation District and County Extension Offices
		One on One Technical Assistance for Farmers	Annual - Ongoing	\$2,000 per year	County Extension Offices
		Seasonal Informational Meetings (planting)	Annual – spring (plant) summer (harvest)	\$5,500 (\$2,750/meeting)	County Extension Offices No-till on the Plains
Permanent Vegetation	Farmers	Tour/Field Day	Annual – Summer	\$1,500 per tour	Conservation Districts, County Extension Offices
Grassed Waterways					
Livestock BMP Implementation					
Grazing Management Plans	Ranchers	Tour/Field Day	Annual - Summer	\$2,000 per tour	Kansas Rural Center
		Workshop	Annual - Summer	\$2,000 per tour	Kansas Rural Center
		One-on-One Technical Assistance	Ongoing	\$5,000 per year	Kansas Rural Center
Relocate Pasture Feeding Sites	Ranchers	Demonstration Project	Annual – Spring	\$5,000 per project	Kansas Rural Center
		Tour/Field Day	Annual - Summer	\$500 per tour	Kansas Rural Center
		Informational Meeting/ Workshop	Annual - Fall	\$500 per meeting	Kansas Rural Center
Off-Stream Watering Systems	Ranchers	Demonstration projects for pond construction and spring developments	Annual - Fall	\$10,000 per project	Kansas Rural Center, County Extension Offices
		Tour/Field Day	Annual - Summer	\$500 per tour or field day	Kansas Rural Center County Extension Offices

		Informational Meeting/ Workshop	Annual - Fall	Combine with relocating pasture feeding sites meeting	Kansas Rural Center County Extension Offices
Rotational Grazing	Landowners and Ranchers	Tour/Field Day	Annual - Summer	Combine with pond meeting	Kansas Rural Center County Extension Offices
Poultry Litter BMP Implementation					
Earthen Dams	Farmers	Nutrient Monitoring	Annual	\$6,000	Kansas Alliance for Wetlands and Streams
Plastic Enclosures					
Covered Buildings		Workshop	Annual -Ongoing	\$2,500 per workshop	Kansas Alliance for Wetlands and Streams
General / Watershed Wide Information and Education					
Educational Activities Targeting Youth	Educators, K-12 Students	Day on the Farm	Annual – Spring	\$500 per event	Conservation Districts, County Farm Bureaus, Kansas FFA Organization, County Extension Office
		Poster, essay, speech contests promoting WQ	Annual – Spring	\$200	Conservation Districts
		Envirothon	Annual - Spring	\$250	Conservation Districts
		Curriculum workshop for K-12 educators	Annual – Summer	\$2,000 per workshop	KACEE
		Environmental education	Ongoing	\$5,000 per year	Project EARTH
		Service learning project	Ongoing	\$10,000 per year	Water Link
Educational Activities Targeting Adults	Watershed residents	Newspaper/newsletter articles	Annual – Ongoing	No charge	Conservation Districts, County Extension Offices
		Presentation about water quality issues & WRAPS update at annual meetings	Annual – Winter	No charge	Conservation Districts, County Extension Offices, Flint Hills RC&D
		River Friendly Farms Informational Meetings	Annual - Ongoing	\$150 per meeting	Kansas Rural Center

		Educational campaign to promote forestry practices to conserve Cross Timbers forest	Ongoing	\$1,500 per year	Kansas Forest Service
		Educational campaign to about leaking/failing septic systems	Ongoing	\$1,500 per year	Local Environmental Protection Programs
		Healthy Ecosystems – Healthy Communities Program	Ongoing	\$15,000 per year	Kansas PRIDE Program
Total annual cost for Information and Education if all events are implemented				\$88,830	

7.2 Evaluation of I&E Activities

All service providers conducting I&E activities funded through the Middle Neosho WRAPS will be required to include an evaluation component in their project proposals and PIPs. The evaluation methods will vary based on the activity.

At a minimum, all I&E projects must include participant learning objectives as the basis for the overall evaluation. Depending on the scope of the project, development of a basic logic model identifying long-term, medium-term, and short-term behavior changes or other outcomes that are expected to result from I&E activity may be required.

Specific evaluation tools or methods may include (but are not limited to):

- Feedback forms allowing participants to provide rankings of the content, presenters, useful of information, etc.
- Pre and post surveys to determine amount of knowledge gained, anticipated behavior changes, need for further learning, etc.
- Follow up interviews (one-on-one contacts, phone calls, e-mails) with selected participants to gather more in-depth input regarding the effectiveness of the I&E activity.

All service providers will be required to submit a brief written evaluation of their I&E activity, summarizing how successful the activity was in achieving the learning objectives, and how the activity contributed to achieving the long-term WRAPS goals and/or objectives for pollutant load reductions.

8.0 Costs of Implementing BMPs and Possible Funding Sources

The SLT has reviewed all the recommended BMPs listed in Section 5 of this report for each individual impairment. It has been determined by the SLT that specific BMPs will be the target of implementation funding for each category (cropland, livestock and poultry). Most of the BMPs that are targeted will be advantageous to more than one impairment, thus being more efficient.

Summarized Derivation of Cropland BMP Cost Estimates

No-Till: After being presented with information from K-State Research and Extension (Craig Smith and Josh Roe) on the costs and benefits of no-till, the SLT decided that a fair price to entice a producer to adopt no-till would be to pay them \$10 per acre for 10 years, or a net present value of \$77.69 per acre upfront assuming the NRCS discount rate of 4.75%.

Riparian Vegetative Buffer: The cost of \$1,000 per acre was arrived at using average cost of installation figures from the conservation districts within the watershed and cost estimates from the KSU Vegetative Buffer Tool developed by Craig Smith.

Terraces: In consulting with numerous conservation districts it was determined by Josh Roe that the average cost of building a terrace at this point in time is \$1.25 per foot.

Permanent Vegetation: The cost of \$150 an acre was calculated based of K-State Research and Extension estimates of the cost of planting and maintaining native grass.

Grassed Waterway: \$2,200 per acre was arrived at using average cost of installation figures from the conservation districts within the watershed and updated costs of brome grass seeding from Josh Roe.

Minimum Tillage: This BMP is an off shoot of no-till, this allows producers some tillage within a continuous no-till system, the amount of tillage will be further defined by the SLT, there is no NRCS cost-share for this practice, the SLT decided producers should be reimbursed at half the rate of no-till or \$5 per acre for 10 years, or a net present value of \$38.85 per acre upfront assuming the NRCS discount rate of 4.75%.

Summarized Derivation of Livestock BMP Cost Estimates

Grazing Management Plans: The SLT decided that a price of \$3 an acre for 4 years would be adequate to persuade a livestock producer to adopt a grazing management plan.

Relocated Pasture Feeding Site: The cost of moving a pasture feeding site of \$2,203 was calculated by Josh Roe figuring the cost of building ¼ mile of fence, a permeable surface, and labor.

Off-Stream Watering System: The average cost of installing an alternative watering system of \$3,500 was estimated by Herschel George, Marais des Cygnes Watershed Specialist, who has installed numerous systems and has detailed average cost estimates.

Rotational Grazing: The average cost of implementing a rotational grazing system for \$7,000 was estimated by Herschel George, Marais des Cygnes Watershed Specialist, who has installed numerous systems and has detailed average cost estimates. More complex systems that require significant cross fencing and buried water lines will come with a much higher price.

Summarized Derivation of Poultry BMP Cost Estimates

Earthen Dams: \$2,000 includes 4 hours of dozer work for leveling and barrier supplies.

Plastic Enclosures: \$1,000 includes materials and labor.

Covered Buildings: \$5,000 average cost. Projects requiring new construction may be considerably more expensive, while retrofitting may require smaller costs.

Table 30 Estimated Costs before Cost Share for Cropland Implemented BMPs. Expressed in 2009 dollar amounts.

Annual Cost Before Cost Share							
Year	No-Till	Buffers	Terraces	Permanent Vegetation	Waterways	Minimum Till	Total Cost
1	\$18,167	\$116,921	\$58,461	\$35,076	\$467,686	\$22,709	\$719,021
2	\$18,712	\$120,429	\$60,215	\$36,129	\$481,716	\$23,390	\$740,591
3	\$19,274	\$124,042	\$62,021	\$37,213	\$496,168	\$24,092	\$762,809
4	\$19,852	\$127,763	\$63,882	\$38,329	\$511,053	\$24,815	\$785,693
5	\$20,447	\$131,596	\$65,798	\$39,479	\$526,385	\$25,559	\$809,264
6	\$21,061	\$135,544	\$67,772	\$40,663	\$542,176	\$26,326	\$833,542
7	\$21,693	\$139,610	\$69,805	\$41,883	\$558,441	\$27,116	\$858,548
8	\$22,343	\$143,799	\$71,899	\$43,140	\$575,195	\$27,929	\$884,305

9	\$23,014	\$148,113	\$74,056	\$44,434	\$592,450	\$28,767	\$910,834
10	\$23,704	\$152,556	\$76,278	\$45,767	\$610,224	\$29,630	\$938,159
11	\$24,415	\$157,133	\$78,566	\$47,140	\$628,531	\$30,519	\$966,304
12	\$25,148	\$161,847	\$80,923	\$48,554	\$647,387	\$31,435	\$995,293
13	\$25,902	\$166,702	\$83,351	\$50,011	\$666,808	\$32,378	\$1,025,152
14	\$26,679	\$171,703	\$85,852	\$51,511	\$686,812	\$33,349	\$1,055,906
15	\$27,480	\$176,854	\$88,427	\$53,056	\$707,417	\$34,350	\$1,087,583
16	\$28,304	\$182,160	\$91,080	\$54,648	\$728,639	\$35,380	\$1,120,211
17	\$29,153	\$187,625	\$93,812	\$56,287	\$750,499	\$36,441	\$1,153,817
18	\$30,028	\$193,253	\$96,627	\$57,976	\$773,013	\$37,535	\$1,188,432
19	\$30,929	\$199,051	\$99,525	\$59,715	\$796,204	\$38,661	\$1,224,085
20	\$31,856	\$205,022	\$102,511	\$61,507	\$820,090	\$39,820	\$1,260,807
21	\$32,812	\$211,173	\$105,587	\$63,352	\$844,693	\$41,015	\$1,298,632
22	\$33,796	\$217,508	\$108,754	\$65,253	\$870,033	\$42,246	\$1,337,591
23	\$34,810	\$224,034	\$112,017	\$67,210	\$896,134	\$43,513	\$1,377,718
24	\$35,855	\$230,755	\$115,377	\$69,226	\$923,018	\$44,818	\$1,419,050
25	\$36,930	\$237,677	\$118,839	\$71,303	\$950,709	\$46,163	\$1,461,621
26	\$38,038	\$244,808	\$122,404	\$73,442	\$979,230	\$47,548	\$1,505,470
27	\$39,179	\$252,152	\$126,076	\$75,646	\$1,008,607	\$48,974	\$1,550,634
28	\$40,355	\$259,716	\$129,858	\$77,915	\$1,038,865	\$50,443	\$1,597,153
29	\$41,565	\$267,508	\$133,754	\$80,252	\$1,070,031	\$51,957	\$1,645,068
30	\$42,812	\$275,533	\$137,767	\$82,660	\$1,102,132	\$53,515	\$1,694,420
31	\$44,097	\$283,799	\$141,900	\$85,140	\$1,135,196	\$55,121	\$1,745,252
32	\$45,420	\$292,313	\$146,157	\$87,694	\$1,169,252	\$56,775	\$1,797,610
33	\$46,782	\$301,082	\$150,541	\$90,325	\$1,204,330	\$58,478	\$1,851,538
34	\$48,186	\$310,115	\$155,057	\$93,034	\$1,240,460	\$60,232	\$1,907,084
35	\$49,631	\$319,418	\$159,709	\$95,826	\$1,277,673	\$62,039	\$1,964,297
36	\$51,120	\$329,001	\$164,500	\$98,700	\$1,316,004	\$63,900	\$2,023,226
37	\$52,654	\$338,871	\$169,435	\$101,661	\$1,355,484	\$65,817	\$2,083,922
38	\$54,233	\$349,037	\$174,519	\$104,711	\$1,396,148	\$67,792	\$2,146,440
39	\$55,860	\$359,508	\$179,754	\$107,852	\$1,438,033	\$69,825	\$2,210,833
40	\$57,536	\$370,293	\$185,147	\$111,088	\$1,481,174	\$71,920	\$2,277,158
3 Percent Annual Cost Inflation							

Table 31 Estimated Costs after Cost Share for Cropland Implemented BMPs. Expressed in 2009 dollar amounts.

Annual Cost After Cost Share							
Year	No-Till	Buffers	Terraces	Permanent Vegetation	Waterways	Minimum Till	Total Cost
1	\$17,454	\$106,332	\$55,519	\$33,312	\$444,154	\$22,709	\$679,480
2	\$17,978	\$109,522	\$57,185	\$34,311	\$457,478	\$23,390	\$699,864
3	\$18,517	\$112,808	\$58,900	\$35,340	\$471,203	\$24,092	\$720,860
4	\$19,073	\$116,192	\$60,667	\$36,400	\$485,339	\$24,815	\$742,486
5	\$19,645	\$119,678	\$62,487	\$37,492	\$499,899	\$25,559	\$764,760
6	\$20,234	\$123,268	\$64,362	\$38,617	\$514,896	\$26,326	\$787,703
7	\$20,841	\$126,966	\$66,293	\$39,776	\$530,343	\$27,116	\$811,334
8	\$21,467	\$130,775	\$68,282	\$40,969	\$546,253	\$27,929	\$835,674
9	\$22,111	\$134,698	\$70,330	\$42,198	\$562,640	\$28,767	\$860,744
10	\$22,774	\$138,739	\$72,440	\$43,464	\$579,520	\$29,630	\$886,567
11	\$23,457	\$142,901	\$74,613	\$44,768	\$596,905	\$30,519	\$913,164
12	\$24,161	\$147,188	\$76,852	\$46,111	\$614,812	\$31,435	\$940,559
13	\$24,886	\$151,604	\$79,157	\$47,494	\$633,257	\$32,378	\$968,775
14	\$25,632	\$156,152	\$81,532	\$48,919	\$652,254	\$33,349	\$997,839
15	\$26,401	\$160,837	\$83,978	\$50,387	\$671,822	\$34,350	\$1,027,774
16	\$27,193	\$165,662	\$86,497	\$51,898	\$691,977	\$35,380	\$1,058,607
17	\$28,009	\$170,632	\$89,092	\$53,455	\$712,736	\$36,441	\$1,090,365
18	\$28,849	\$175,750	\$91,765	\$55,059	\$734,118	\$37,535	\$1,123,076
19	\$29,715	\$181,023	\$94,518	\$56,711	\$756,142	\$38,661	\$1,156,768
20	\$30,606	\$186,454	\$97,353	\$58,412	\$778,826	\$39,820	\$1,191,471
21	\$31,524	\$192,047	\$100,274	\$60,164	\$802,191	\$41,015	\$1,227,216
22	\$32,470	\$197,809	\$103,282	\$61,969	\$826,256	\$42,246	\$1,264,032
23	\$33,444	\$203,743	\$106,381	\$63,828	\$851,044	\$43,513	\$1,301,953
24	\$34,447	\$209,855	\$109,572	\$65,743	\$876,575	\$44,818	\$1,341,012
25	\$35,481	\$216,151	\$112,859	\$67,715	\$902,873	\$46,163	\$1,381,242
26	\$36,545	\$222,635	\$116,245	\$69,747	\$929,959	\$47,548	\$1,422,679
27	\$37,642	\$229,315	\$119,732	\$71,839	\$957,858	\$48,974	\$1,465,360
28	\$38,771	\$236,194	\$123,324	\$73,995	\$986,593	\$50,443	\$1,509,320
29	\$39,934	\$243,280	\$127,024	\$76,214	\$1,016,191	\$51,957	\$1,554,600
30	\$41,132	\$250,578	\$130,835	\$78,501	\$1,046,677	\$53,515	\$1,601,238
31	\$42,366	\$258,096	\$134,760	\$80,856	\$1,078,077	\$55,121	\$1,649,275
32	\$43,637	\$265,838	\$138,802	\$83,281	\$1,110,420	\$56,775	\$1,698,753

33	\$44,946	\$273,814	\$142,967	\$85,780	\$1,143,732	\$58,478	\$1,749,716
34	\$46,295	\$282,028	\$147,256	\$88,353	\$1,178,044	\$60,232	\$1,802,208
35	\$47,683	\$290,489	\$151,673	\$91,004	\$1,213,385	\$62,039	\$1,856,274
36	\$49,114	\$299,203	\$156,223	\$93,734	\$1,249,787	\$63,900	\$1,911,962
37	\$50,587	\$308,180	\$160,910	\$96,546	\$1,287,281	\$65,817	\$1,969,321
38	\$52,105	\$317,425	\$165,737	\$99,442	\$1,325,899	\$67,792	\$2,028,400
39	\$53,668	\$326,948	\$170,710	\$102,426	\$1,365,676	\$69,825	\$2,089,252
40	\$55,278	\$336,756	\$175,831	\$105,498	\$1,406,646	\$71,920	\$2,151,930
<i>3 Percent Annual Cost Inflation</i>							

Table 32 Estimated Costs for Livestock Implemented BMPs. Expressed in 2009 dollar amounts.

Annual Cost of Implementing Livestock BMPs					
Year	Grazing Management Plans	Relocated Pasture Feeding Site	Off-Stream Watering System	Rotational Grazing	Total
1	\$960	\$4,406	\$5,693		\$11,059
2	\$989	\$4,538	\$5,863	\$3,605	\$14,995
3	\$1,018	\$4,674	\$6,039		\$11,732
4	\$1,049	\$4,815	\$6,220	\$3,825	\$15,908
5	\$1,080	\$4,959	\$6,407		\$12,446
6	\$1,113	\$5,108	\$6,599	\$4,057	\$16,877
7	\$1,146	\$5,261	\$6,797		\$13,204
8	\$1,181	\$5,419	\$7,001	\$4,305	\$17,905
9	\$1,216	\$5,581	\$7,211		\$14,009
10	\$1,253	\$5,749	\$7,427	\$4,567	\$18,996
11	\$1,290	\$5,921	\$7,650		\$14,862
12	\$1,329	\$6,099	\$7,880	\$4,845	\$20,152
13	\$1,369	\$6,282	\$8,116		\$15,767
14	\$1,410	\$6,470	\$8,360	\$5,140	\$21,380
15	\$1,452	\$6,664	\$8,610		\$16,727
16	\$1,496	\$6,864	\$8,869	\$5,453	\$22,682
17	\$1,541	\$7,070	\$9,135		\$17,746
18	\$1,587	\$7,282	\$9,409	\$5,785	\$24,063
19	\$1,634	\$7,501	\$9,691		\$18,826
20	\$1,683	\$7,726	\$9,982	\$6,137	\$25,528
21	\$1,734	\$7,958	\$10,281		\$19,973

22	\$1,786	\$8,196	\$10,590	\$6,511	\$27,083
23	\$1,839	\$8,442	\$10,907		\$21,189
24	\$1,895	\$8,696	\$11,235	\$6,908	\$28,732
25	\$1,951	\$8,956	\$11,572		\$22,480
26	\$2,010	\$9,225	\$11,919	\$7,328	\$30,482
27	\$2,070	\$9,502	\$12,276		\$23,849
28	\$2,132	\$9,787	\$12,645	\$7,775	\$32,339
29	\$2,196	\$10,081	\$13,024		\$25,301
30	\$2,262	\$10,383	\$13,415	\$8,248	\$34,308
31	\$2,330	\$10,695	\$13,817		\$26,842
32	\$2,400	\$11,015	\$14,232	\$8,750	\$36,397
33	\$2,472	\$11,346	\$14,659		\$28,477
34	\$2,546	\$11,686	\$15,098	\$9,283	\$38,614
35	\$2,623	\$12,037	\$15,551		\$30,211
36	\$2,701	\$12,398	\$16,018	\$9,849	\$40,966
37	\$2,782	\$12,770	\$16,498		\$32,051
38	\$2,866	\$13,153	\$16,993	\$10,448	\$43,460
39	\$2,952	\$13,547	\$17,503		\$34,002
40	\$3,040	\$13,954	\$18,028	\$11,085	\$46,107
<i>3 Percent Annual Cost Inflation</i>					

Table 33 Estimated Costs for Poultry Implemented BMPs. Expressed in 2009 dollar amounts.

Annual Cost of Implementing Poultry BMPs				
Year	Earthen Dams	Plastic Enclosures	Covered Building	Total
1	\$2,000	\$0	\$0	\$2,000
2	\$0	\$1,030	\$0	\$1,030
3	\$0	\$0	\$5,305	\$5,305
4	\$2,185	\$0	\$0	\$2,185
5	\$0	\$1,126	\$0	\$1,126
6	\$0	\$0	\$5,796	\$5,796
7	\$2,388	\$0	\$0	\$2,388
8	\$0	\$1,230	\$0	\$1,230
9	\$0	\$0	\$6,334	\$6,334
10	\$2,610	\$0	\$0	\$2,610
11	\$0	\$1,344	\$0	\$1,344
12	\$0	\$0	\$6,921	\$6,921

13	\$2,852	\$0	\$0	\$2,852
14	\$0	\$1,469	\$0	\$1,469
15	\$0	\$0	\$7,563	\$7,563
16	\$3,116	\$0	\$0	\$3,116
17	\$0	\$1,605	\$0	\$1,605
18	\$0	\$0	\$8,264	\$8,264
19	\$3,405	\$0	\$0	\$3,405
20	\$0	\$1,754	\$0	\$1,754
21	\$0	\$0	\$9,031	\$9,031
22	\$3,721	\$0	\$0	\$3,721
23	\$0	\$1,916	\$0	\$1,916
24	\$0	\$0	\$9,868	\$9,868
25	\$4,066	\$0	\$0	\$4,066
26	\$0	\$2,094	\$0	\$2,094
27	\$0	\$0	\$10,783	\$10,783
28	\$4,443	\$0	\$0	\$4,443
29	\$0	\$2,288	\$0	\$2,288
30	\$0	\$0	\$11,783	\$11,783
31	\$4,855	\$0	\$0	\$4,855
32	\$0	\$2,500	\$0	\$2,500
33	\$0	\$0	\$12,875	\$12,875
34	\$5,305	\$0	\$0	\$5,305
35	\$0	\$2,732	\$0	\$2,732
36	\$0	\$0	\$14,069	\$14,069
37	\$5,797	\$0	\$0	\$5,797
38	\$0	\$2,985	\$0	\$2,985
39	\$0	\$0	\$15,374	\$15,374
40	\$6,334	\$0	\$0	\$6,334
*3% inflation				

Table 34 Technical Assistance Needed to Implement BMPs.

BMP		Technical Assistance	Projected Annual Cost
Cropland	1. Continuous No-till	WRAPS Coordinator KRC River Friendly Farms Technician	SCC Buffer Technician No Charge
	2. Buffers	SCC Buffer Technician WRAPS Coordinator KRC River Friendly Farms Technician	
			WRAPS

	3. Permanent Vegetation	WRAPS Coordinator KRC River Friendly Farms Technician	Coordinator \$25,000 KRC River Friendly Farms Technician \$20,000
	4. Waterways	SCC Buffer Technician WRAPS Coordinator KRC River Friendly Farms Technician	
	5. Minimum Tillage	WRAPS Coordinator KRC River Friendly Farms Technician	
Livestock	1. Grazing Management Plans	KRC River Friendly Farms Technician	KAWS Technician No Charge
	2. Relocate pasture feeding sites	KRC River Friendly Farms Technician	
	3. Establish off stream watering systems	KRC River Friendly Farms Technician	
	4. Rotational grazing	River Friendly Farms Technician	
Poultry	1. Earthen dams	KAWS Technician KDHE Livestock Section	
	2. Plastic enclosures		
	3. Covered buildings		
Total			\$45,000

Table 35 Total Annual Costs for Implementing Entire WRAPS Plan in Support of Attaining Watershed Reduction Goals.

Total Annual Costs of Implementing Cropland and Livestock BMPs, in addition to Information and Education and Technical Assistance						
Year	BMPs Implemented			I&E and Technical Assistance		Total
	Cropland	Livestock	Poultry	I&E	Technical Assistance	
1	\$679,480	\$11,059	\$2,000	\$88,830	\$45,000	\$826,369
2	\$699,864	\$14,995	\$1,030	\$91,495	\$46,350	\$853,734
3	\$720,860	\$11,732	\$5,305	\$94,240	\$47,741	\$879,878
4	\$742,486	\$15,908	\$2,185	\$97,067	\$49,173	\$906,819
5	\$764,760	\$12,446	\$1,126	\$99,979	\$50,648	\$928,959
6	\$787,703	\$16,877	\$5,796	\$102,978	\$52,167	\$965,521
7	\$811,334	\$13,204	\$2,388	\$106,068	\$53,732	\$986,726
8	\$835,674	\$17,905	\$1,230	\$109,250	\$55,344	\$1,019,403
9	\$860,744	\$14,009	\$6,334	\$112,527	\$57,005	\$1,050,619
10	\$886,567	\$18,996	\$2,610	\$115,903	\$58,715	\$1,082,791
11	\$913,164	\$14,862	\$1,344	\$119,380	\$60,476	\$1,109,226
12	\$940,559	\$20,152	\$6,921	\$122,961	\$62,291	\$1,152,884
13	\$968,775	\$15,767	\$2,852	\$126,650	\$64,159	\$1,178,203
14	\$997,839	\$21,380	\$1,469	\$130,450	\$66,084	\$1,217,222
15	\$1,027,774	\$16,727	\$7,563	\$134,363	\$68,067	\$1,254,494
16	\$1,058,607	\$22,682	\$3,116	\$138,394	\$70,109	\$1,292,908

17	\$1,090,365	\$17,746	\$1,605	\$142,546	\$72,212	\$1,324,474
18	\$1,123,076	\$24,063	\$8,264	\$146,822	\$74,378	\$1,376,603
19	\$1,156,768	\$18,826	\$3,405	\$151,227	\$76,609	\$1,406,835
20	\$1,191,471	\$25,528	\$1,754	\$155,764	\$78,908	\$1,453,425
21	\$1,227,216	\$19,973	\$9,031	\$160,437	\$81,275	\$1,497,932
22	\$1,264,032	\$27,083	\$3,721	\$165,250	\$83,713	\$1,543,799
23	\$1,301,953	\$21,189	\$1,916	\$170,207	\$86,225	\$1,581,490
24	\$1,341,012	\$28,732	\$9,868	\$175,314	\$88,811	\$1,643,737
25	\$1,381,242	\$22,480	\$4,066	\$180,573	\$91,476	\$1,679,837
26	\$1,422,679	\$30,482	\$2,094	\$185,990	\$94,220	\$1,735,465
27	\$1,465,360	\$23,849	\$10,783	\$191,570	\$97,047	\$1,788,609
28	\$1,509,320	\$32,339	\$4,443	\$197,317	\$99,958	\$1,843,377
29	\$1,554,600	\$25,301	\$2,288	\$203,237	\$102,957	\$1,888,383
30	\$1,601,238	\$34,308	\$11,783	\$209,334	\$106,045	\$1,962,708
31	\$1,649,275	\$26,842	\$4,855	\$215,614	\$109,227	\$2,005,813
32	\$1,698,753	\$36,397	\$2,500	\$222,082	\$112,504	\$2,072,236
33	\$1,749,716	\$28,477	\$12,875	\$228,745	\$115,879	\$2,135,692
34	\$1,802,208	\$38,614	\$5,305	\$235,607	\$119,355	\$2,201,089
35	\$1,856,274	\$30,211	\$2,732	\$242,675	\$122,936	\$2,254,828
36	\$1,911,962	\$40,966	\$14,069	\$249,955	\$126,624	\$2,343,576
37	\$1,969,321	\$32,051	\$5,797	\$257,454	\$130,423	\$2,395,046
38	\$2,028,400	\$43,460	\$2,985	\$265,178	\$134,335	\$2,474,358
39	\$2,089,252	\$34,002	\$15,374	\$273,133	\$138,365	\$2,550,126
40	\$2,151,930	\$46,107	\$6,334	\$281,327	\$142,516	\$2,628,214

Potential funding sources for these BMPs are (but not limited to) the following organizations:

Table 36 Potential BMP Funding Sources

Potential Funding Sources	Potential Funding Programs
Natural Resources Conservation Service	Environmental Quality Incentives Program (EQIP)
	Wetland Reserve Program (WRP)
	Conservation Reserve Program (CRP)
	Wildlife Habitat Incentive Program (WHIP)
	Cooperative Conservation Partnership Initiative (CCPI)
	State Acres for Wildlife Enhancement (SAFE)

	Grassland Reserve Program (GRP)
	Farmable Wetlands Program (FWP)
EPA/KDHE	319 Funding Grants KDHE WRAPS Funding Clean Water Neighbor Grants
Kansas Department of Wildlife and Parks	Partnering for Wildlife
Kansas Alliance for Wetlands and Streams	
State Conservation Commission	
Conservation Districts	
No-till on the Plains	
Kansas Forest Service	
US Fish and Wildlife	

Table 37 Potential Service Providers for BMP Implementation *

BMP		Services Needed to Implement BMP		Service Provider **
		Technical Assistance	Information and Education	
Cropland	1. Continuous No-till	Design, cost share and maintenance	BMP workshops, tours, field days	NRCS FSA KRC SCC No-Till on the Plains KFS KSRE CD RC&D KDWP
	2. Buffers	Design, cost share and maintenance	BMP workshops, tours, field days	
	3. Waterways	Design, cost share and maintenance	BMP workshops, tours, field days	
	3. Permanent Vegetation	Development of management plan	BMP workshops, tours, field days	
	4. Waterways	Design, cost share and maintenance	BMP workshops, field days, tours	
	5. Minimum Tillage	Design, cost share and maintenance	BMP workshops, field days, tours	
Livestock	1. Grazing Management Plans	Design, cost share and maintenance	BMP workshops, field days, tours	KSRE NRCS SCC KRC KAWS CD RC&D KDWP
	2. Relocate pasture feeding sites	Design, cost share and maintenance	BMP workshops, field days, tours	
	3. Establish off stream watering systems	Design, cost share and maintenance	BMP workshops, field days, tours	
	4. Rotational grazing	Design, cost share and maintenance	BMP workshops, field days, tours	
Poultry	1. Earthen dams	Design, cost share and maintenance	BMP workshops, field days, tours	KAWS NRCS SCC FSA KRC KSRE
	2. Plastic enclosures	Design, cost share and maintenance	BMP workshops, field days, tours	

	3. Covered buildings	Design, cost share and maintenance	BMP workshops, field days, tours	CD RC&D
** See Appendix for service provider directory				

** All service providers are responsible for evaluation of the installed or implemented BMPs and/or other services provided and will report to SLT for completion approval.*

9.0 Timeframe

The interim timeframe for all BMP implementation would be forty years from the date of publication of this report. The plan will be reviewed every five years starting in 2015. Sediment and phosphorus will not be reviewed until 2020 due to a lag time in the BMP placement and its effect on water quality.

Table 38 Review Schedule for Pollutants and BMPs.

Review Year	Sediment	Phosphorus	BMP Placement
2015			X
2020	X	X	X
2025	X	X	X
2030	X	X	X
2035	X	X	X
2040	X	X	X
2045	X	X	X
2050	X	X	X

Targeting and BMP implementation might shift over time in order to achieve TMDLs.

- Timeframe for reaching the **phosphorus reduction goal** is forty years. This is the entire length of this plan.
- Timeframe for reaching the **sediment reduction goal** is ten years. At that time, the sediment portion of this plan will be considered a water quality “protection” plan instead of “restoration”.

10.0 Measureable Milestones

10.1 Measurable Milestones for BMP Implementation

Milestones will be determined by number of acres treated, projects installed, contacts made to residents of the watershed and water quality parameters at the end of every five years. The SLT will examine these criteria to determine if adequate progress has been made from the current BMP implementations. If they determine that adequate progress has not been made, they will readjust the implementation projects in order to achieve the reduction goal of 30 percent by the end of forty years.

Table 39 Short, Medium and Long Term Goals for BMP Cropland Adoption Rates in the Cropland Targeted Area.

Cropland BMP Adoption Rates (acres)								
	Year	No-Till	Buffers	Terraces	Permanent Vegetation	Waterways	Minimum Till	Total

Short-Term	1	234	117	585	234	585	585	2,338
	2	234	117	585	234	585	585	2,338
	3	234	117	585	234	585	585	2,338
	4	234	117	585	234	585	585	2,338
	5	234	117	585	234	585	585	2,338
Total		1,169	585	2,923	1,169	2,923	2,923	11,692
Medium-Term	6	234	117	585	234	585	585	2,338
	7	234	117	585	234	585	585	2,338
	8	234	117	585	234	585	585	2,338
	9	234	117	585	234	585	585	2,338
	10	234	117	585	234	585	585	2,338
Total		2,338	1,169	5,846	2,338	5,846	5,846	23,384
Long-Term	11	234	117	585	234	585	585	2,338
	12	234	117	585	234	585	585	2,338
	13	234	117	585	234	585	585	2,338
	14	234	117	585	234	585	585	2,338
	15	234	117	585	234	585	585	2,338
	16	234	117	585	234	585	585	2,338
	17	234	117	585	234	585	585	2,338
	18	234	117	585	234	585	585	2,338
	19	234	117	585	234	585	585	2,338
	20	234	117	585	234	585	585	2,338
	21	234	117	585	234	585	585	2,338
	22	234	117	585	234	585	585	2,338
	23	234	117	585	234	585	585	2,338
	24	234	117	585	234	585	585	2,338
	25	234	117	585	234	585	585	2,338
	26	234	117	585	234	585	585	2,338
	27	234	117	585	234	585	585	2,338
	28	234	117	585	234	585	585	2,338
	29	234	117	585	234	585	585	2,338
	30	234	117	585	234	585	585	2,338
	31	234	117	585	234	585	585	2,338
	32	234	117	585	234	585	585	2,338
	33	234	117	585	234	585	585	2,338
	34	234	117	585	234	585	585	2,338
	35	234	117	585	234	585	585	2,338
	36	234	117	585	234	585	585	2,338
	37	234	117	585	234	585	585	2,338
	38	234	117	585	234	585	585	2,338
	39	234	117	585	234	585	585	2,338

	40	234	117	585	234	585	585	2,338
Total		9,354	4,677	23,384	9,354	23,384	23,384	93,537

Table 40 Short, Medium and Long Term Goals for BMP Livestock Adoption Rates in the Livestock Targeted Area.

Short, Medium, and Long-Term Livestock BMP Adoption (projects)					
	Year	Grazing Mgmt Plans	Relocated Pasture Feeding Site	Off-Stream Watering System	Rotational Grazing
Short-Term	1	1	4	3	
	2	1	4	3	1
	3	1	4	3	
	4	1	4	3	1
	5	1	4	3	
Total		5	20	15	2
Medium-Term	6	1	4	3	1
	7	1	4	3	
	8	1	4	3	1
	9	1	4	3	
	10	1	4	3	1
Total		10	40	30	5
Long-Term	11	1	4	3	
	12	1	4	3	1
	13	1	4	3	
	14	1	4	3	1
	15	1	4	3	
	16	1	4	3	1
	17	1	4	3	
	18	1	4	3	1
	19	1	4	3	
	20	1	4	3	1
	21	1	4	3	
	22	1	4	3	1
	23	1	4	3	
	24	1	4	3	1
	25	1	4	3	
	26	1	4	3	1
	27	1	4	3	
	28	1	4	3	1
	29	1	4	3	
	30	1	4	3	1
	31	1	4	3	

	32	1	4	3	1
	33	1	4	3	
	34	1	4	3	1
	35	1	4	3	
	36	1	4	3	1
	37	1	4	3	
	38	1	4	3	1
	39	1	4	3	
	40	1	4	3	1
Total		40	160	120	20

Table 41. Short, Medium and Long Term Goals for BMP Poultry Adoption Rates in the Poultry Targeted Area.

Short, Medium, and Long-Term Poultry BMP Adoption (projects)				
	Year	Earthen Dam	Plastic Enclosure	Covered Building
Short-Term	1	1		
	2		1	
	3			1
	4	1		
	5		1	
Total		2	2	1
Medium-Term	6			1
	7	1		
	8		1	
	9			1
	10	1		
Total		4	3	3
Long-Term	11		1	
	12			1
	13	1		
	14		1	
	15			1
	16	1		
	17		1	
	18			1
	19	1		
	20		1	
	21			1
	22	1		
	23		1	

	24			1
	25	1		
	26		1	
	27			1
	28	1		
	29		1	
	30			1
	31	1		
	32		1	
	33			1
	34	1		
	35		1	
	36			1
	37	1		
	38		1	
	39			1
	40	1		
Total		14	13	13

Table 42 Short, Medium and Long Term Goals for Information and Education Adoption Rates in the Entire Watershed.

	Year	Demo Projects	Workshops	Tours and Field Days	Informational Meetings	Presentations	Newsletter Inserts	One on One Meetings	Conference Attendees	Educational Events	Media Campaign	Contacts made by Tech Assistance
Short Term	1	3	2	7	3	1	1	3	2	4	4	250
	2	3	2	7	3	1	1	3	2	4	4	250
	3	3	2	7	3	1	1	3	2	4	4	250
	4	3	2	7	3	1	1	3	2	4	4	250
	5	3	2	7	3	1	1	3	2	4	4	250
	Total	15	10	35	15	5	5	15	10	20	20	1,250
Medium Term	6	3	2	7	3	1	1	3	2	4	4	250
	7	3	2	7	3	1	1	3	2	4	4	250
	8	3	2	7	3	1	1	3	2	4	4	250
	9	3	2	7	3	1	1	3	2	4	4	250
	10	3	2	7	3	1	1	3	2	4	4	250
	Total	30	20	70	30	10	10	30	20	40	40	2,500
Long Term	11	3	2	7	3	1	1	3	2	4	4	250
	12	3	2	7	3	1	1	3	2	4	4	250

	13	3	2	7	3	1	1	3	2	4	4	250
	14	3	2	7	3	1	1	3	2	4	4	250
	15	3	2	7	3	1	1	3	2	4	4	250
	16	3	2	7	3	1	1	3	2	4	4	250
	17	3	2	7	3	1	1	3	2	4	4	250
	18	3	2	7	3	1	1	3	2	4	4	250
	19	3	2	7	3	1	1	3	2	4	4	250
	20	3	2	7	3	1	1	3	2	4	4	250
	21	3	2	7	3	1	1	3	2	4	4	250
	22	3	2	7	3	1	1	3	2	4	4	250
	23	3	2	7	3	1	1	3	2	4	4	250
	24	3	2	7	3	1	1	3	2	4	4	250
	25	3	2	7	3	1	1	3	2	4	4	250
	26	3	2	7	3	1	1	3	2	4	4	250
	27	3	2	7	3	1	1	3	2	4	4	250
	28	3	2	7	3	1	1	3	2	4	4	250
	29	3	2	7	3	1	1	3	2	4	4	250
	30	3	2	7	3	1	1	3	2	4	4	250
	31	3	2	7	3	1	1	3	2	4	4	250
	32	3	2	7	3	1	1	3	2	4	4	250
	33	3	2	7	3	1	1	3	2	4	4	250
	34	3	2	7	3	1	1	3	2	4	4	250
	35	3	2	7	3	1	1	3	2	4	4	250
	36	3	2	7	3	1	1	3	2	4	4	250
	37	3	2	7	3	1	1	3	2	4	4	250
	38	3	2	7	3	1	1	3	2	4	4	250
	39	3	2	7	3	1	1	3	2	4	4	250
	40	3	2	7	3	1	1	3	2	4	4	250
	Total	120	80	280	120	40	40	120	80	160	160	10,000

10.2 Benchmarks to Measure Water Quality and Social Progress

Over a forty year time frame, this WRAPS project hopes to improve water quality throughout the watershed. Measurements taken at the border of Kansas where the Neosho River crosses into Oklahoma are important because it is the drainage endpoint of the watershed. Any water quality improvements will be observed by conducting tests at this point. After reviewing the criteria listed in the table below, the SLT will assess and revise the overall strategy plan for the watershed. New goals will be set and new BMPs will be implemented in order to achieve improved water quality. Coordination with KDHE TMDL staff, Water Plan staff and the SLT will be held every five years to discuss benchmarks and TMDL update plans. Using data obtained by KDHE, KSU or the Tulsa District US Army Corps of Engineers (USACE), the following indicator and parameter criteria shall be used to assess progress in successful implementation to abate pollutant loads.

Table 43 Benchmarks to Measure Water Quality Progress

Impairment Addressed	Criteria to Measure Water Quality Progress	Information Source
Nutrients	Secchi disk depth: Neosho WMA >0.2m Parsons Lake > 0.3m	KDHE
	Dissolved oxygen > 5mg/l in streams	KDHE
	Chlorophyll a concentrations: Altamont City Lakes <12ug/l Neosho County SFL <12ug/l Neosho WMA < 20ug/l Parsons Lake <12ug/l	KDHE
	No fish kills	KDWP
	No health advisories for recreating in Neosho River	KDHE
	No listing of Neosho River for Phosphorus	KDHE
	No taste and odor problems for public water suppliers	KDHE
Sediment	Number of acres of buffers and grassed waterways installed indicating that there would be a reduction in sediment	NRCS
	Secchi disk depth: Neosho WMA >0.2m Parsons Lake > 0.3m	KDHE
	Fewer high event stream flow rates indicating better retention and slower release of storm water in the upper end of the watershed	USGS
	Turbidity in Upper Grand Lake improves over 2000-2009 conditions.	COE
Impairment Addressed	Social Indicators to Measure Water Quality Progress	Information Source
Nutrients and	Quantity and quality of fishing in watershed lakes	KDWP

Sediment	Survey of water quality issues to determine whether information and education programs are having an effect on public perception	KSRE
	Number of attendees at workshops and field days	KSRE
	BMP adoptability rates	NRCS

10.3 Milestones Used to Determine Water Quality Improvements

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10.3.1 Phosphorus and Sediment Milestones in 2020

At the end of ten years, the SLT will be able to examine water quality data for phosphorus (eutrophication determination) and suspended solids or turbidity (sediment determination) to determine if progress has been made in improving water quality. It is estimated that it will require ten years to see progress after BMP implementation on phosphorus and sediment reduction in the waterways. KDHE has outlined water quality goals for total phosphorus and total suspended solids. They are presented below.

Table 44 Water Quality Goals for Phosphorus and Sediment

	Current Condition (2000-2009) Median TP	Improved Condition (2010-2020) Median TP	Reduction Needed	Current Condition (2000-2009) Median TSS	Improved Condition (2010-2020) Median TSS	Reduction Needed
Sampling Sites	Total Phosphorus (median of data collected during indicated period), ppb			Total Suspended Solids (median of data collected during indicated period), ppm		
Upper Labette Creek	310	200*	35%	26	23	12%
Lower Labette Creek	157	141	10%	29	26	10%
Bachelor Creek	126	113	10%	21	19	10%
Canville Creek	84	76	10%	14	13	7%
Flat Rock Creek	114	103	10%	31	28	10%
Cherry Creek	80	72	10%	34	31	9%
Lightning Creek	104	94	10%	28	25	11%
Neosho River at Oswego	162	146	10%	47	42	11%
Neosho River at	204	184	10%	52	47	10%

Chetopa						
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* Listed for TP in 2010; will need a TMDL and enhanced wastewater treatment.

10.3.2 Interim Milestones

1. Median TP values on Upper Labette Creek over 2010-2020 will go below 200ppb, partly from improvements to Parsons' wastewater treatment for nutrient removal.
2. Median TP and TSS values for Neosho River and tributary stations are reduced by 10 percent over 2010-2020.
3. 2010-2020 average loads at Subbasin outlets are reduced by 10 percent.
 - a. Total Phosphorus = 705 tons/yr
 - b. Total Suspended Solids = 357,619 tons/year

10.3.3 Dissolved Oxygen Milestones in 2020

Only one incident of DO less than 5ppm will occur over 2010-2020 on DO impaired streams (Cherry, Labette, Bachelor and Canville Creeks). By reducing phosphorus and sediment loads in these streams, their channel conditions will improve and the introduction or production of organic material in the streams will diminish, lowering the probability of low DO.

Table 45 Dissolved Oxygen Excursions since 2002.

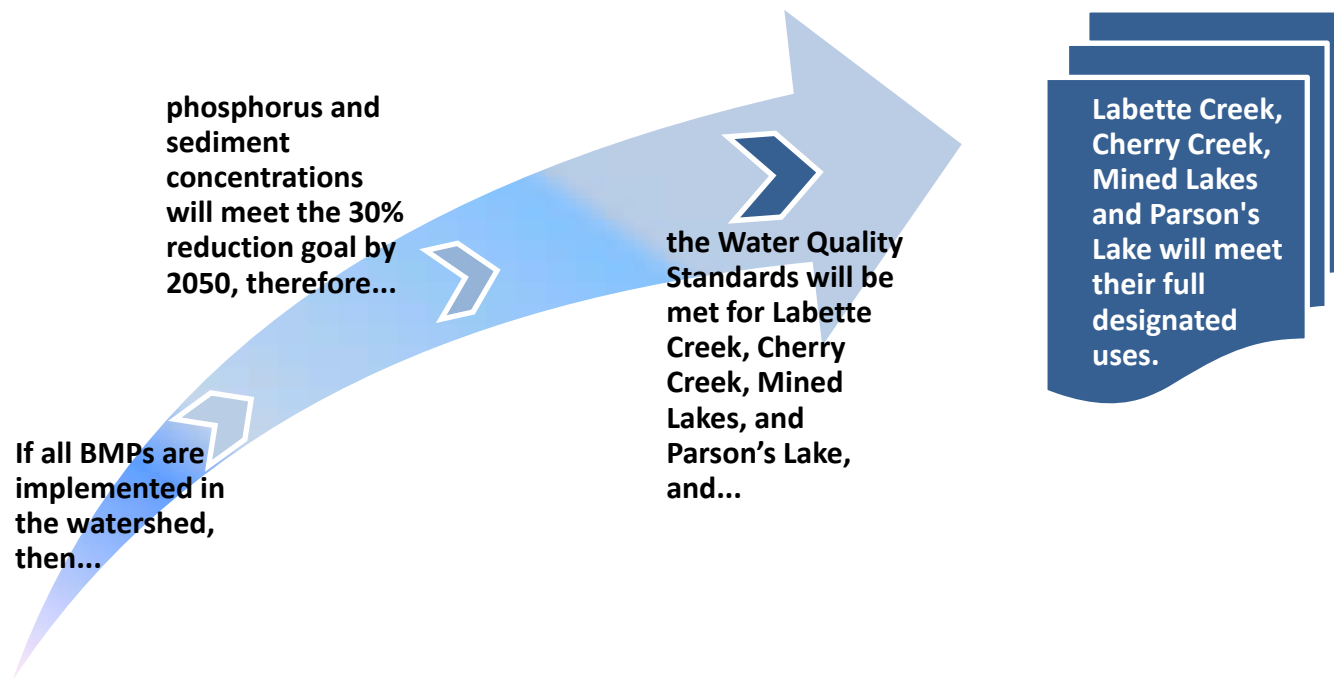
Station	Number of DO samples < 5 ppm since 2002
Upper Labette Creek	3
Lower Labette Creek	3
Bachelor Creek	4
Canville Creek	0
Cherry Creek	3

10.3.4 BMP Implementation Milestones for 2015 and 2050

The SLT will review the number of acres, projects or contacts made in the watershed every five years until the end of this WRAPS plan, which is the year 2050. At the end of each five year period, the SLT will have the option to reassess the goals and alter BMP implementations as they determine is best. Below is the outline of BMP implementations over a forty year period.

Table 46 Cumulative BMP Implementation Milestones from 2015 to 2050.

Year	Cropland						Livestock				Poultry			Information and Education	
	No-till, acres	Vegetative Buffers, acres	Terraces, acres	Permanent Vegetation, acres	Grassed Waterways, acres	Conservation Tillage, acres	Grazing Management Plans, plans	Relocated Pasture Feeding Sites, project	Off Stream Watering System, projects	Rotational Grazing, projects	Earthen Dams, projects	Plastic Enclosures, projects	Covered Buildings, projects	Demonstrations/Wo rkshops/ Tours/Field Days. number	I&E and Technical Assistance Contacts/Participan ts. number
2015	1,170	585	2,925	1,170	2,925	2,925	5	20	15	3	2	2	1	65	1,250
2020	2,340	1,170	5,850	2,340	5,850	5,850	10	40	30	5	4	3	3	130	2,500
2025	3,510	1,755	8,775	3,510	8,775	8,775	15	60	45	8	5	5	5	195	3,750
2030	4,680	2,340	11,700	4,680	11,700	11,700	20	80	60	10	7	7	6	260	5,000
2035	5,850	2,925	14,625	5,850	14,625	14,625	25	100	75	13	9	8	8	325	6,250
2040	7,020	3,510	17,550	7,020	17,550	17,550	30	120	90	15	10	10	10	390	7,500
2045	8,190	4,095	20,475	8,190	20,475	20,475	35	140	105	18	12	12	11	455	8,750
2050	9,360	4,680	23,400	9,360	23,400	23,400	40	160	120	20	14	13	13	520	10,000



11.0 Monitoring Water Quality Progress

The KDHE sampling data will be reviewed by the SLT every year. Data collected in the Targeted Area will be of special interest. A composite review of BMPs implemented and monitoring data will be analyzed for effects resulting from the BMPs. The SLT will also ask KDHE to review analyzed data from all monitoring sources on a yearly basis.

KDHE has ongoing monitoring sites in the watershed.³⁸ There are two types of monitoring sites utilized by KDHE: permanent and rotational. Permanent sites are continuously sampled, whereas rotational sites are only sampled every fourth year. All sampling sites will be continued into the future. Each site is tested for nutrients, metals, ammonia, solid fractions, turbidity, alkalinity, pH, dissolved oxygen, ECB and chemicals. Not all sites are tested for these pollutant indicators at each collection time. This is dependent upon the anticipated pollutant concern as well as other factors. KDHE will be requested by the SLT to maintain sampling in the watershed and possibly add more sampling sites in the future.

Stream flow data is collected by the USGS and will be available for SLT review. At publication time of this report, depending on the sampling site, up to six different parameters are sampled: water temperature, specific conductance, gage height, discharge, precipitation and turbidity. Samples are automatically taken every 15 minutes. Reviewing this data will indicate whether rainfall events in the upper reaches of the watershed have been slowed by BMPs such as no-till and vegetative buffers.

Much of the evaluative information can be obtained through the existing networks and sampling plans of KDHE and USGS. Public engagement can be obtained through observations of lake clarity, ease of boating and the physical appearance of various lakes in the watershed. Some communications with the USACE will supplement any information on the conditions in Grand Lake in Oklahoma.

Future assessments will be needed to evaluate the effectiveness of BMPs on manure and poultry litter applications. These assessments will include monitoring on Lightning Creek, Plum Creek, Cherry Creek and Fly Creek.

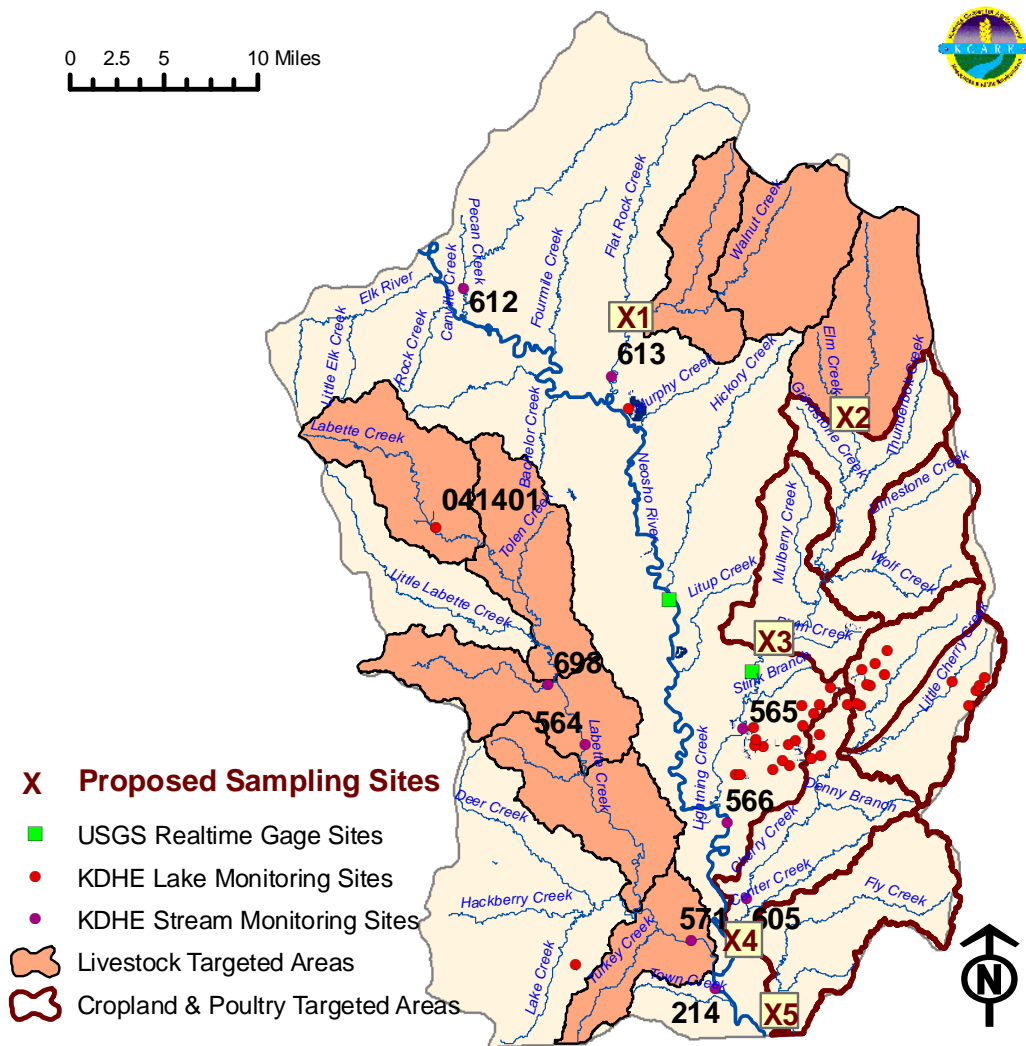


Figure 32 Monitoring Sites in the Watershed. ³⁸

Monitoring data will be used to direct the SLT in their evaluation of water quality progress. The table below indicates which current monitoring sites data will be used by the SLT in determination of effectiveness of BMP implementation. KDHE will be requested to provide additional monitoring sites needing to be installed. The cost and implementation of these sites will be dependent on KDHE funding.

Table 47 Monitoring Sites and Tests Needed to Direct SLT in Water Quality Evaluation

Cropland and Poultry Targeted Area				
Agency	Site Number or Name	Pollutant Target	River, Stream or Lake	Sampling Tests Needed
Proposed Site	X3 (refer to map above)	Sediment, Nutrients	Confluence of Lightning Creek and Plum Creek	Turbidity, TSS, pH, DO, Phosphorus, Nitrogen
Proposed Site	X4 (refer to map)	Sediment,	Confluence of	Turbidity, TSS,

	above)	Nutrients	Cherry Creek and the Neosho River	pH, DO, Phosphorus, Nitrogen
Proposed Site	X5 (refer to map above)	Sediment, Nutrients	Confluence of Fly Creek and the Neosho River	Turbidity, TSS, pH, DO, Phosphorus, Nitrogen
Livestock Targeted Area				
Agency	Site Number or Name	Pollutant Target	River, Stream or Lake	Sampling Tests Needed
KDHE	041401	Nutrients	Parsons Lake	pH, DO, Phosphorus, Nitrogen
KDHE	698	Nutrients	Bachelor Creek	pH, DO, Phosphorus, Nitrogen
KDHE	564	Nutrients	Labette Creek	pH, DO, Phosphorus, Nitrogen
KDHE	571	Nutrients	Labette Creek	pH, DO, Phosphorus, Nitrogen
Proposed Site	X1 (refer to map above)	Nutrients	Confluence of Walnut Creek and Flat Rock Creek	pH, DO, Phosphorus, Nitrogen
Proposed Site	X2 (refer to map above)	Nutrients	Confluence of Elm Creek and Lightning Creek	pH, DO, Phosphorus, Nitrogen

Overall, any monitoring site data that is being generated at this time will be helpful to the SLT. However, there are no monitoring sites at the endpoint of each sub watershed for the Cropland Targeted Area. New sites are proposed at:

- The confluence of Lightning Creek and Plum Creek (X3)
- The confluence of Cherry Creek and the Neosho River (X4)
- The confluence of Fly Creek and the Neosho River (X5)

The KDHE monitoring sites that are currently in place should be sufficient for the Livestock Targeted Area on the west side of the watershed. The Targeted Areas on the east side of the watershed need additional sites at:

- The confluence of Walnut and Flat Rock Creeks (X1)
- The confluence of Elm and Lightning Creeks (X2)

Analysis of the data generated will be used to determine effectiveness of implemented BMPs. If the SLT decides at some point in the future that more data is required, they can discuss this with KDHE. All KDHE data will be shared with the SLT and can then be passed on to the watershed residents by way of the information and education efforts discussed previously. Monitoring data will be used to direct the SLT in their evaluation of water quality progress. KDHE will be requested to meet with the SLT to review the monitoring data accumulated by their sites on a yearly basis. However, the overall strategy and alterations of the

WRAPS plan will be discussed with KDHE immediately after each update of the 303d list and subsequent TMDL designation. The upcoming dates for updates in the Middle Neosho Watershed is 2013 and 2018. At this time, the plan can be altered or modified in order to meet the water quality goals as assigned by the SLT in the beginning of the WRAPS process.

12.0 Review of the Watershed Plan in 2012

In the year 2012, the plan will be reviewed and revised according to results acquired from monitoring data. This date is chosen due to the anticipated 2012 TMDL determination for Grand Lake. Subsequently, the SLT will review the Watershed Plan every five years beginning in the Year 2015. The SLT will review the following criteria in addition to any other concerns that may occur at that time:

1. The SLT will request from KDHE a report on the milestone achievements in **sediment** load reductions.
2. The SLT will request from KDHE a report on the milestone achievements in **phosphorus** load reductions.
3. The SLT will request a report from KDHE concerning the revisions of the TMDLs in 2013.
4. The SLT will request a report from KDHE on trends in water quality in watershed lakes.
5. The SLT will request a report from the COE Tulsa District on the conditions of Grand Lake.
6. The SLT will report on progress towards achieving the adoption rates listed in Section 9.1 of this report.
7. The SLT will report on progress towards achieving the benchmarks listed in Section 9.2 of this report.
8. The SLT will report on progress towards achieving the BMP implementations in Section 9.3 of this report.
9. The SLT will discuss the effect of implementing BMPs aimed at specific TMDLs on the impairments listed on the 303d list.
10. The SLT will discuss impairments on the 303d list and the possibility of addressing these impairments prior to them being listed as TMDLs.
11. The SLT will discuss necessary adjustments and revisions needed in the targets listed in this plan.

13.0 Appendix

13.1 Service Providers

Table 49. Potential Service Provider Listing

Organization	Programs	Purpose	Technical or Financial Assistance	Phone	Website address
Environmental Protection Agency	Clean Water State Revolving Fund Program	Provides low cost loans to communities for water pollution control activities.	Financial	913-551-7003	www.epa.gov
	Watershed Protection	To conduct holistic strategies for restoring and protecting aquatic resources based on hydrology rather than political boundaries.		913-551-7003	
SeeKan RC&D	Natural resource development and protection	Plan and Implement projects and programs that improve environmental quality of life.	Technical	620-431-6180	http://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 Chapter	www.kaws.org
Kansas Dept. of Agriculture	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	Provide funds for projects that will reduce nonpoint source pollution.	Technical and Financial	785-296-5500	www.kdhe.state.ks.us
	Municipal and livestock waste				
	Livestock waste Municipal waste	Compliance monitoring.			
	State Revolving Loan Fund	Makes low interest loans for projects to improve and protect water quality.			

Kansas Department of Wildlife and Parks	Land and Water Conservation Funds	Provides funds to preserve develop and assure access to outdoor recreation.		620-672-5911	www.kdwp.state.ks.us/about/grants.html
	Conservation Easements for Riparian and Wetland Areas	To provide easements to secure and enhance quality areas in the state.		785-296-2780	
	Wildlife Habitat Improvement Program	To provide limited assistance for development of wildlife habitat.		620-672-5911	
	North American Waterfowl Conservation Act	To provide up to 50 percent cost share for the purchase and/or development of wetlands and wildlife habitat.		620-342-0658	
	MARSH program in coordination with Ducks Unlimited	May provide up to 100 percent of funding for small wetland projects.	Technical and Financial	620-672-5911	
	Chickadee Checkoff	Projects help with eagles, songbirds, threatened and endangered species, turtles, lizards, butterflies and stream darters. Funding is an optional donation line item on the KS Income Tax form.			
	Walk In Hunting Program	Landowners receive a payment incentive to allow public hunting on their property.			
	F.I.S.H. Program	Landowners receive a payment incentive to allow public fishing access to their ponds and streams.			

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
Kansas Forest Service	Conservation Tree Planting Program Rural and Riparian Forestry Technical Assistance	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)	Provide programs, expertise and educational materials that relate to minimizing the impact of rural and urban activities on water quality.	Technical	785-532-7108	www.kcare.ksu.edu
				785-532-5813	www.ksre.ksu.edu/kelp
	Kansas Environmental Leadership Program (KELP)	Educational program to develop leadership for improved water quality.		785-532-2643	www.ksre.ksu.edu/olg
	Kansas Local Government Water Quality Planning and Management	Provide guidance to local governments on water protection programs.		785-532-0416	
	Rangeland and Natural Area Services (RNAS)	Reduce non-point source pollution emanating from Kansas grasslands.		785-532-2732	www.k-state.edu/waterlink/
	WaterLINK	Service-learning projects available to college and university faculty and community watersheds in Kansas.		785-532-3039	www.kansasprideprogram.ksu.edu/healthyecosystems/
	Kansas Pride: Healthy Ecosystems/Healthy Communities	Help citizens appraise their local natural resources and develop short and long term plans and activities to protect, sustain and restore their resources for the future.		785-532-1443	
	Citizen Science	Education combined with volunteer soil and water testing for enhanced natural resource stewardship.			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

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
State Conservation Commission and Conservation Districts	Water Resources Cost Share	Provide cost share assistance to landowners for establishment of water conservation practices.	Technical and Financial	Cherokee Co 620-429-3360	www.accesskansas.org/kscd
	Nonpoint Source Pollution Control Fund	Provides financial assistance for nonpoint pollution control projects which help restore water quality.		Crawford Co 620-724-6227	http://www.kacdnet.org/
	Riparian and Wetland Protection Program	Funds to assist with wetland and riparian development and enhancement.		Neosho Co 620-244-3491	
	Stream Rehabilitation Program	Assist with streams that have been adversely altered by channel modifications.		Labette Co 620-784-5431	
	Kansas Water Quality Buffer Initiative	Compliments Conservation Reserve Program by offering additional financial incentives for grass filters and riparian forest buffers.			
	Watershed district and multipurpose lakes	Programs are available for watershed district and multipurpose small lakes.			

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
US Army Corps of Engineers (USACE)	Planning Assistance to States	Assistance in development of plans for development, utilization and conservation of water and related land resources of drainage	Technical	816-983-3157	www.usace.army.mil
	Environmental Restoration	Funding assistance for aquatic ecosystem restoration.		816-983-3157	
US Fish and Wildlife Service	Fish and Wildlife Enhancement Program	Supports field operations which include technical assistance on wetland design.	Technical	785-539-3474	www.fws.gov
	Private Lands Program	Contracts to restore, enhance, or create wetlands.		785-539-3474	
US Geological Survey	National Streamflow Information Program	Provide streamflow data	Technical	785-832-3539	ks.water.usgs.gov Nrtwq.usgs.gov
	Water Cooperative Program	Provide cooperative studies and water-quality information			

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Phone	Website address
USDA-Natural Resources Conservation Service and Farm Service Agency	Conservation Compliance	Primarily for the technical assistance to develop conservation plans on cropland.	Technical and Financial	Cherokee Co 620-429-3360	www.ks.nrcs.usda.gov
	Conservation Operations	To provide technical assistance on private land for development and application of Resource Management Plans.		Crawford Co 620-724-6227	
	Watershed Planning and Operations	Primarily focused on high priority areas where agricultural improvements will meet water quality objectives.		Neosho Co 620-244-3491	
	Wetland Reserve Program	Cost share and easements to restore wetlands.		Labette Co 620-784-5431	
	Wildlife Habitat Incentives Program	Cost share to establish wildlife habitat which includes wetlands and riparian areas.			
	Grassland Reserve Program, EQIP, and Conservation Reserve Program	Improve and protect rangeland resources with cost-sharing practices, rental agreements, and easement purchases.			

13.2 BMP Definitions

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 percent erosion reduction efficiency, 50 percent phosphorous reduction efficiency
- Approx. \$1,000/acre, 90 percent 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 percent erosion reduction efficiency, 40 percent phosphorous reduction efficiency.
- \$800 an acre, 50 percent 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 percent no-till system.
- 75 percent erosion reduction efficiency, 40 percent 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 percent cost-share available from NRCS.

Conservation Crop Rotation

- Growing various crops on the same piece of land in a planned rotation.
- High residue crops (corn) with low residue crops (wheat, soybeans).
- Low residue crops in succession may encourage erosion.
- 25 percent Erosion Reduction Efficiency, 25 percent phosphorous reduction efficiency
- WRAPS groups and KSU Ag Economists have decided \$5 an acre for 10 years is an adequate payment to entice producers to convert.

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 percent Erosion Reduction Efficiency, 30 percent phosphorous reduction efficiency

-\$1.02 per linear foot, 50 percent 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 percent erosion and 25 percent P reduction efficiency.

-WRAPS groups and KSU Ag Economists have decided \$7.30 an acre for 10 years is an adequate payment to entice producers to convert, 50 percent cost-share is available from NRCS.

Subsurface Fertilizer Application

-Placing or injecting fertilizer beneath the soil surface.

-Reduces fertilizer runoff.

-0 percent soil and 50 percent P reduction efficiency.

-\$3.50 an acre for 10 years, no cost-share.

-WRAPS groups and KSU Ag Economists have decided \$3.50 an acre for 10 years is an adequate payment to entice producers to convert, 50 percent 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 percent.

-\$714 an acre

Relocate Feeding Sites

-Feedlot- 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.

-Pasture- Move feeding site that is in a pasture away from a stream, waterway, or body of water to increase the filtration and waste removal (e.g. move bale feeders away from stream). Highly variable in price, average of \$2,203 per unit.

-Average P reduction: 30-80 percent.

Alternative (Off-Stream) Watering System

-Watering system so that livestock do not enter stream or body of water.

-Studies show cattle will drink from tank over a stream or pond 80 percent of the time.

-10-25 year lifespan, average P reduction: 30-98 percent with greater efficiencies for limited stream access.

-\$3,795 installed for solar system, including present value of maintenance costs.

Pond

- Water impoundment made by constructing an earthen dam.
- Traps sediment and nutrients from leaving edge of pasture.
- Provides source of water.
- 50 percent P Reduction.
- Approximately \$12,000

Rotational Grazing

- Rotating livestock within a pasture to spread manure more uniformly and allow grass to regenerate.
- May involve significant cross fencing and additional watering sites.
- 50-75 percent P Reduction.
- Approximately \$7,000 with complex systems significantly more expensive.

Stream Fencing

- Fencing out streams and ponds to prevent livestock from entering.
- 95 percent P Reduction.
- 25 year life expectancy.
- Approximately \$4,106 per ¼ mile of fence, including labor, materials, and maintenance.

Poultry

Earthen Dams

- Build an earthen barrier around stockpiles to prevent litter runoff and leaching during rain events.
- \$2,000 includes 4 hours of dozer work for leveling and barrier supplies.

Plastic Enclosures

- Cover stockpiles with a tarp or other impermeable material with weights to ensure the cover stays in place to prevent litter runoff and leaching during rain events.
- \$1,000 includes materials and labor.

Covered Buildings

- Build a permanent structure to stockpile litter or retrofit an existing building to prevent litter runoff and leaching during rain events.
- \$5,000 average costs
- Projects requiring new construction may be considerably more expensive, while retrofitting may require smaller costs.

13.3 Forty Year Projection Tables by Subbasin

13.3.1 Pollutant Reductions by Subbasin

Table 48 Phosphorus Reductions by Subbasin

Sub Watershed #35 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	24	15	44	56	59	29	226
2	47	29	88	112	118	59	453
3	71	44	132	168	176	88	679
4	94	59	176	224	235	118	906
5	118	74	221	279	294	147	1,132
6	141	88	265	335	353	176	1,359
7	165	103	309	391	412	206	1,585
8	188	118	353	447	471	235	1,812
9	212	132	397	503	529	265	2,038
10	235	147	441	559	588	294	2,265
11	259	162	485	615	647	324	2,491
12	282	176	529	671	706	353	2,718
13	306	191	574	727	765	382	2,944
14	329	206	618	782	824	412	3,171
15	353	221	662	838	882	441	3,397
16	377	235	706	894	941	471	3,624
17	400	250	750	950	1,000	500	3,850
18	424	265	794	1,006	1,059	529	4,077
19	447	279	838	1,062	1,118	559	4,303
20	471	294	882	1,118	1,177	588	4,530
21	494	309	927	1,174	1,235	618	4,756
22	518	324	971	1,230	1,294	647	4,983
23	541	338	1,015	1,285	1,353	677	5,209
24	565	353	1,059	1,341	1,412	706	5,436
25	588	368	1,103	1,397	1,471	735	5,662
26	612	382	1,147	1,453	1,530	765	5,889
27	635	397	1,191	1,509	1,588	794	6,115
28	659	412	1,235	1,565	1,647	824	6,342
29	682	427	1,280	1,621	1,706	853	6,568
30	706	441	1,324	1,677	1,765	882	6,795
31	730	456	1,368	1,733	1,824	912	7,021
32	753	471	1,412	1,788	1,883	941	7,248
33	777	485	1,456	1,844	1,941	971	7,474
34	800	500	1,500	1,900	2,000	1,000	7,701
35	824	515	1,544	1,956	2,059	1,030	7,927
36	847	529	1,588	2,012	2,118	1,059	8,154
37	871	544	1,633	2,068	2,177	1,088	8,380
38	894	559	1,677	2,124	2,236	1,118	8,607

39	918	574	1,721	2,180	2,294	1,147	8,833
40	941	588	1,765	2,236	2,353	1,177	9,060

Sub Watershed #42 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	26	16	49	63	66	33	254
2	53	33	99	125	132	66	508
3	79	49	148	188	198	99	762
4	106	66	198	251	264	132	1,016
5	132	82	247	313	330	165	1,270
6	158	99	297	376	396	198	1,524
7	185	115	346	439	462	231	1,779
8	211	132	396	502	528	264	2,033
9	238	148	445	564	594	297	2,287
10	264	165	495	627	660	330	2,541
11	290	181	544	690	726	363	2,795
12	317	198	594	752	792	396	3,049
13	343	214	643	815	858	429	3,303
14	370	231	693	878	924	462	3,557
15	396	247	742	940	990	495	3,811
16	422	264	792	1,003	1,056	528	4,065
17	449	280	841	1,066	1,122	561	4,319
18	475	297	891	1,129	1,188	594	4,573
19	502	313	940	1,191	1,254	627	4,828
20	528	330	990	1,254	1,320	660	5,082
21	554	346	1,039	1,317	1,386	693	5,336
22	581	363	1,089	1,379	1,452	726	5,590
23	607	379	1,138	1,442	1,518	759	5,844
24	634	396	1,188	1,505	1,584	792	6,098
25	660	412	1,237	1,567	1,650	825	6,352
26	686	429	1,287	1,630	1,716	858	6,606
27	713	445	1,336	1,693	1,782	891	6,860
28	739	462	1,386	1,755	1,848	924	7,114
29	766	478	1,435	1,818	1,914	957	7,368
30	792	495	1,485	1,881	1,980	990	7,622
31	818	511	1,534	1,944	2,046	1,023	7,877
32	845	528	1,584	2,006	2,112	1,056	8,131
33	871	544	1,633	2,069	2,178	1,089	8,385
34	898	561	1,683	2,132	2,244	1,122	8,639
35	924	577	1,732	2,194	2,310	1,155	8,893
36	950	594	1,782	2,257	2,376	1,188	9,147
37	977	610	1,831	2,320	2,442	1,221	9,401
38	1,003	627	1,881	2,382	2,508	1,254	9,655

39	1,030	643	1,930	2,445	2,574	1,287	9,909
40	1,056	660	1,980	2,508	2,640	1,320	10,163

Sub Watershed #46 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	21	13	39	49	51	26	198
2	41	26	77	98	103	51	396
3	62	39	116	146	154	77	593
4	82	51	154	195	205	103	791
5	103	64	193	244	257	128	989
6	123	77	231	293	308	154	1,187
7	144	90	270	342	360	180	1,384
8	164	103	308	390	411	205	1,582
9	185	116	347	439	462	231	1,780
10	205	128	385	488	514	257	1,978
11	226	141	424	537	565	283	2,175
12	247	154	462	586	616	308	2,373
13	267	167	501	634	668	334	2,571
14	288	180	539	683	719	360	2,769
15	308	193	578	732	770	385	2,966
16	329	205	616	781	822	411	3,164
17	349	218	655	830	873	437	3,362
18	370	231	693	878	925	462	3,560
19	390	244	732	927	976	488	3,757
20	411	257	770	976	1,027	514	3,955
21	431	270	809	1,025	1,079	539	4,153
22	452	283	848	1,074	1,130	565	4,351
23	473	295	886	1,122	1,181	591	4,548
24	493	308	925	1,171	1,233	616	4,746
25	514	321	963	1,220	1,284	642	4,944
26	534	334	1,002	1,269	1,335	668	5,142
27	555	347	1,040	1,318	1,387	693	5,339
28	575	360	1,079	1,366	1,438	719	5,537
29	596	372	1,117	1,415	1,490	745	5,735
30	616	385	1,156	1,464	1,541	770	5,933
31	637	398	1,194	1,513	1,592	796	6,130
32	657	411	1,233	1,562	1,644	822	6,328
33	678	424	1,271	1,610	1,695	848	6,526
34	699	437	1,310	1,659	1,746	873	6,724
35	719	449	1,348	1,708	1,798	899	6,921
36	740	462	1,387	1,757	1,849	925	7,119
37	760	475	1,425	1,805	1,901	950	7,317
38	781	488	1,464	1,854	1,952	976	7,515

39	801	501	1,502	1,903	2,003	1,002	7,712
40	822	514	1,541	1,952	2,055	1,027	7,910

Sub Watershed #47 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	24	15	45	57	60	30	232
2	48	30	90	114	120	60	464
3	72	45	136	172	181	90	696
4	96	60	181	229	241	120	928
5	120	75	226	286	301	151	1,159
6	145	90	271	343	361	181	1,391
7	169	105	316	401	422	211	1,623
8	193	120	361	458	482	241	1,855
9	217	136	407	515	542	271	2,087
10	241	151	452	572	602	301	2,319
11	265	166	497	629	663	331	2,551
12	289	181	542	687	723	361	2,783
13	313	196	587	744	783	391	3,014
14	337	211	632	801	843	422	3,246
15	361	226	678	858	903	452	3,478
16	385	241	723	915	964	482	3,710
17	410	256	768	973	1,024	512	3,942
18	434	271	813	1,030	1,084	542	4,174
19	458	286	858	1,087	1,144	572	4,406
20	482	301	903	1,144	1,205	602	4,638
21	506	316	949	1,202	1,265	632	4,869
22	530	331	994	1,259	1,325	663	5,101
23	554	346	1,039	1,316	1,385	693	5,333
24	578	361	1,084	1,373	1,445	723	5,565
25	602	376	1,129	1,430	1,506	753	5,797
26	626	391	1,174	1,488	1,566	783	6,029
27	650	407	1,220	1,545	1,626	813	6,261
28	675	422	1,265	1,602	1,686	843	6,493
29	699	437	1,310	1,659	1,747	873	6,724
30	723	452	1,355	1,716	1,807	903	6,956
31	747	467	1,400	1,774	1,867	934	7,188
32	771	482	1,445	1,831	1,927	964	7,420
33	795	497	1,491	1,888	1,988	994	7,652
34	819	512	1,536	1,945	2,048	1,024	7,884
35	843	527	1,581	2,003	2,108	1,054	8,116
36	867	542	1,626	2,060	2,168	1,084	8,348
37	891	557	1,671	2,117	2,228	1,114	8,579
38	915	572	1,716	2,174	2,289	1,144	8,811

39	940	587	1,762	2,231	2,349	1,174	9,043
40	964	602	1,807	2,289	2,409	1,205	9,275

Sub Watershed #50 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	19	12	35	45	47	24	181
2	38	24	71	89	94	47	363
3	56	35	106	134	141	71	544
4	75	47	141	179	188	94	725
5	94	59	177	224	235	118	906
6	113	71	212	268	282	141	1,088
7	132	82	247	313	330	165	1,269
8	151	94	282	358	377	188	1,450
9	169	106	318	403	424	212	1,631
10	188	118	353	447	471	235	1,813
11	207	129	388	492	518	259	1,994
12	226	141	424	537	565	282	2,175
13	245	153	459	581	612	306	2,356
14	264	165	494	626	659	330	2,538
15	282	177	530	671	706	353	2,719
16	301	188	565	716	753	377	2,900
17	320	200	600	760	800	400	3,082
18	339	212	636	805	847	424	3,263
19	358	224	671	850	895	447	3,444
20	377	235	706	895	942	471	3,625
21	395	247	742	939	989	494	3,807
22	414	259	777	984	1,036	518	3,988
23	433	271	812	1,029	1,083	541	4,169
24	452	282	847	1,073	1,130	565	4,350
25	471	294	883	1,118	1,177	589	4,532
26	490	306	918	1,163	1,224	612	4,713
27	508	318	953	1,208	1,271	636	4,894
28	527	330	989	1,252	1,318	659	5,075
29	546	341	1,024	1,297	1,365	683	5,257
30	565	353	1,059	1,342	1,412	706	5,438
31	584	365	1,095	1,387	1,460	730	5,619
32	603	377	1,130	1,431	1,507	753	5,801
33	621	388	1,165	1,476	1,554	777	5,982
34	640	400	1,201	1,521	1,601	800	6,163
35	659	412	1,236	1,565	1,648	824	6,344
36	678	424	1,271	1,610	1,695	847	6,526
37	697	436	1,307	1,655	1,742	871	6,707
38	716	447	1,342	1,700	1,789	895	6,888

39	734	459	1,377	1,744	1,836	918	7,069
40	753	471	1,412	1,789	1,883	942	7,251

Sub Watershed #53 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	15	9	28	36	38	19	145
2	30	19	57	72	76	38	291
3	45	28	85	108	113	57	436
4	60	38	113	144	151	76	582
5	76	47	142	179	189	94	727
6	91	57	170	215	227	113	873
7	106	66	198	251	264	132	1,018
8	121	76	227	287	302	151	1,164
9	136	85	255	323	340	170	1,309
10	151	94	283	359	378	189	1,455
11	166	104	312	395	416	208	1,600
12	181	113	340	431	453	227	1,745
13	196	123	368	467	491	246	1,891
14	212	132	397	502	529	264	2,036
15	227	142	425	538	567	283	2,182
16	242	151	453	574	604	302	2,327
17	257	161	482	610	642	321	2,473
18	272	170	510	646	680	340	2,618
19	287	179	538	682	718	359	2,764
20	302	189	567	718	756	378	2,909
21	317	198	595	754	793	397	3,055
22	332	208	623	790	831	416	3,200
23	348	217	652	826	869	434	3,345
24	363	227	680	861	907	453	3,491
25	378	236	708	897	945	472	3,636
26	393	246	737	933	982	491	3,782
27	408	255	765	969	1,020	510	3,927
28	423	264	793	1,005	1,058	529	4,073
29	438	274	822	1,041	1,096	548	4,218
30	453	283	850	1,077	1,133	567	4,364
31	468	293	878	1,113	1,171	586	4,509
32	484	302	907	1,149	1,209	604	4,655
33	499	312	935	1,184	1,247	623	4,800
34	514	321	963	1,220	1,285	642	4,945
35	529	331	992	1,256	1,322	661	5,091
36	544	340	1,020	1,292	1,360	680	5,236
37	559	349	1,048	1,328	1,398	699	5,382
38	574	359	1,077	1,364	1,436	718	5,527

39	589	368	1,105	1,400	1,473	737	5,673
40	604	378	1,133	1,436	1,511	756	5,818

Sub Watershed #54 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	30	19	57	72	76	38	291
2	60	38	113	144	151	76	582
3	91	57	170	215	227	113	873
4	121	76	227	287	302	151	1,164
5	151	94	283	359	378	189	1,455
6	181	113	340	431	454	227	1,746
7	212	132	397	503	529	265	2,037
8	242	151	454	574	605	302	2,328
9	272	170	510	646	680	340	2,619
10	302	189	567	718	756	378	2,910
11	333	208	624	790	831	416	3,201
12	363	227	680	862	907	454	3,492
13	393	246	737	933	983	491	3,783
14	423	265	794	1,005	1,058	529	4,074
15	454	283	850	1,077	1,134	567	4,365
16	484	302	907	1,149	1,209	605	4,656
17	514	321	964	1,221	1,285	642	4,947
18	544	340	1,020	1,293	1,361	680	5,238
19	574	359	1,077	1,364	1,436	718	5,529
20	605	378	1,134	1,436	1,512	756	5,820
21	635	397	1,190	1,508	1,587	794	6,111
22	665	416	1,247	1,580	1,663	831	6,402
23	695	435	1,304	1,652	1,738	869	6,693
24	726	454	1,361	1,723	1,814	907	6,984
25	756	472	1,417	1,795	1,890	945	7,275
26	786	491	1,474	1,867	1,965	983	7,566
27	816	510	1,531	1,939	2,041	1,020	7,857
28	847	529	1,587	2,011	2,116	1,058	8,148
29	877	548	1,644	2,082	2,192	1,096	8,439
30	907	567	1,701	2,154	2,268	1,134	8,730
31	937	586	1,757	2,226	2,343	1,172	9,021
32	967	605	1,814	2,298	2,419	1,209	9,312
33	998	624	1,871	2,370	2,494	1,247	9,603
34	1,028	642	1,927	2,441	2,570	1,285	9,894
35	1,058	661	1,984	2,513	2,645	1,323	10,185
36	1,088	680	2,041	2,585	2,721	1,361	10,476
37	1,119	699	2,097	2,657	2,797	1,398	10,767
38	1,149	718	2,154	2,729	2,872	1,436	11,058

39	1,179	737	2,211	2,800	2,948	1,474	11,349
40	1,209	756	2,268	2,872	3,023	1,512	11,640

Sub Watershed #62 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	48	30	90	114	119	60	460
2	96	60	179	227	239	119	920
3	143	90	269	341	358	179	1,380
4	191	119	358	454	478	239	1,840
5	239	149	448	568	597	299	2,300
6	287	179	538	681	717	358	2,760
7	335	209	627	795	836	418	3,220
8	382	239	717	908	956	478	3,680
9	430	269	807	1,022	1,075	538	4,140
10	478	299	896	1,135	1,195	597	4,601
11	526	329	986	1,249	1,314	657	5,061
12	574	358	1,075	1,362	1,434	717	5,521
13	621	388	1,165	1,476	1,553	777	5,981
14	669	418	1,255	1,589	1,673	836	6,441
15	717	448	1,344	1,703	1,792	896	6,901
16	765	478	1,434	1,816	1,912	956	7,361
17	813	508	1,524	1,930	2,031	1,016	7,821
18	860	538	1,613	2,043	2,151	1,075	8,281
19	908	568	1,703	2,157	2,270	1,135	8,741
20	956	597	1,792	2,270	2,390	1,195	9,201
21	1,004	627	1,882	2,384	2,509	1,255	9,661
22	1,052	657	1,972	2,497	2,629	1,314	10,121
23	1,099	687	2,061	2,611	2,748	1,374	10,581
24	1,147	717	2,151	2,724	2,868	1,434	11,041
25	1,195	747	2,241	2,838	2,987	1,494	11,501
26	1,243	777	2,330	2,951	3,107	1,553	11,961
27	1,291	807	2,420	3,065	3,226	1,613	12,421
28	1,338	836	2,509	3,179	3,346	1,673	12,881
29	1,386	866	2,599	3,292	3,465	1,733	13,341
30	1,434	896	2,689	3,406	3,585	1,792	13,802
31	1,482	926	2,778	3,519	3,704	1,852	14,262
32	1,530	956	2,868	3,633	3,824	1,912	14,722
33	1,577	986	2,957	3,746	3,943	1,972	15,182
34	1,625	1,016	3,047	3,860	4,063	2,031	15,642
35	1,673	1,046	3,137	3,973	4,182	2,091	16,102
36	1,721	1,075	3,226	4,087	4,302	2,151	16,562
37	1,769	1,105	3,316	4,200	4,421	2,211	17,022
38	1,816	1,135	3,406	4,314	4,541	2,270	17,482

39	1,864	1,165	3,495	4,427	4,660	2,330	17,942
40	1,912	1,195	3,585	4,541	4,780	2,390	18,402

Sub Watershed #66 Annual Phosphorous Reduction (lbs), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	55	34	103	131	138	69	530
2	110	69	207	262	275	138	1,060
3	165	103	310	392	413	207	1,590
4	220	138	413	523	551	275	2,120
5	275	172	516	654	688	344	2,650
6	330	207	620	785	826	413	3,181
7	386	241	723	916	964	482	3,711
8	441	275	826	1,046	1,101	551	4,241
9	496	310	929	1,177	1,239	620	4,771
10	551	344	1,033	1,308	1,377	688	5,301
11	606	379	1,136	1,439	1,515	757	5,831
12	661	413	1,239	1,570	1,652	826	6,361
13	716	447	1,342	1,700	1,790	895	6,891
14	771	482	1,446	1,831	1,928	964	7,421
15	826	516	1,549	1,962	2,065	1,033	7,951
16	881	551	1,652	2,093	2,203	1,101	8,482
17	936	585	1,756	2,224	2,341	1,170	9,012
18	991	620	1,859	2,354	2,478	1,239	9,542
19	1,046	654	1,962	2,485	2,616	1,308	10,072
20	1,101	688	2,065	2,616	2,754	1,377	10,602
21	1,157	723	2,169	2,747	2,891	1,446	11,132
22	1,212	757	2,272	2,878	3,029	1,515	11,662
23	1,267	792	2,375	3,008	3,167	1,583	12,192
24	1,322	826	2,478	3,139	3,304	1,652	12,722
25	1,377	861	2,582	3,270	3,442	1,721	13,252
26	1,432	895	2,685	3,401	3,580	1,790	13,783
27	1,487	929	2,788	3,532	3,718	1,859	14,313
28	1,542	964	2,891	3,662	3,855	1,928	14,843
29	1,597	998	2,995	3,793	3,993	1,996	15,373
30	1,652	1,033	3,098	3,924	4,131	2,065	15,903
31	1,707	1,067	3,201	4,055	4,268	2,134	16,433
32	1,762	1,101	3,304	4,186	4,406	2,203	16,963
33	1,817	1,136	3,408	4,316	4,544	2,272	17,493
34	1,873	1,170	3,511	4,447	4,681	2,341	18,023
35	1,928	1,205	3,614	4,578	4,819	2,410	18,553
36	1,983	1,239	3,718	4,709	4,957	2,478	19,083
37	2,038	1,274	3,821	4,840	5,094	2,547	19,614
38	2,093	1,308	3,924	4,971	5,232	2,616	20,144

39	2,148	1,342	4,027	5,101	5,370	2,685	20,674
40	2,203	1,377	4,131	5,232	5,507	2,754	21,204

Table 49 Sediment Reductions by Subbasin

Sub Watershed #35 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No- Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	58	19	58	74	78	72	359
2	116	39	116	148	155	144	718
3	175	58	175	221	233	215	1,077
4	233	78	233	295	311	287	1,437
5	291	97	291	369	388	359	1,796
6	349	116	349	443	466	431	2,155
7	408	136	408	516	544	503	2,514
8	466	155	466	590	621	575	2,873
9	524	175	524	664	699	646	3,232
10	582	194	582	738	777	718	3,592
11	641	214	641	812	854	790	3,951
12	699	233	699	885	932	862	4,310
13	757	252	757	959	1,010	934	4,669
14	815	272	815	1,033	1,087	1,006	5,028
15	874	291	874	1,107	1,165	1,077	5,387
16	932	311	932	1,180	1,243	1,149	5,747
17	990	330	990	1,254	1,320	1,221	6,106
18	1,048	349	1,048	1,328	1,398	1,293	6,465
19	1,107	369	1,107	1,402	1,475	1,365	6,824
20	1,165	388	1,165	1,475	1,553	1,437	7,183
21	1,223	408	1,223	1,549	1,631	1,508	7,542
22	1,281	427	1,281	1,623	1,708	1,580	7,902
23	1,340	447	1,340	1,697	1,786	1,652	8,261
24	1,398	466	1,398	1,771	1,864	1,724	8,620
25	1,456	485	1,456	1,844	1,941	1,796	8,979
26	1,514	505	1,514	1,918	2,019	1,868	9,338
27	1,573	524	1,573	1,992	2,097	1,939	9,697
28	1,631	544	1,631	2,066	2,174	2,011	10,057
29	1,689	563	1,689	2,139	2,252	2,083	10,416
30	1,747	582	1,747	2,213	2,330	2,155	10,775
31	1,806	602	1,806	2,287	2,407	2,227	11,134
32	1,864	621	1,864	2,361	2,485	2,299	11,493
33	1,922	641	1,922	2,435	2,563	2,370	11,852
34	1,980	660	1,980	2,508	2,640	2,442	12,211
35	2,038	679	2,038	2,582	2,718	2,514	12,571
36	2,097	699	2,097	2,656	2,796	2,586	12,930
37	2,155	718	2,155	2,730	2,873	2,658	13,289

38	2,213	738	2,213	2,803	2,951	2,730	13,648
39	2,271	757	2,271	2,877	3,029	2,801	14,007
40	2,330	777	2,330	2,951	3,106	2,873	14,366

Sub Watershed #42 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	85	28	85	107	113	104	521
2	169	56	169	214	225	209	1,043
3	254	85	254	321	338	313	1,564
4	338	113	338	428	451	417	2,086
5	423	141	423	536	564	521	2,607
6	507	169	507	643	676	626	3,129
7	592	197	592	750	789	730	3,650
8	676	225	676	857	902	834	4,171
9	761	254	761	964	1,015	939	4,693
10	846	282	846	1,071	1,127	1,043	5,214
11	930	310	930	1,178	1,240	1,147	5,736
12	1,015	338	1,015	1,285	1,353	1,251	6,257
13	1,099	366	1,099	1,392	1,466	1,356	6,779
14	1,184	395	1,184	1,499	1,578	1,460	7,300
15	1,268	423	1,268	1,607	1,691	1,564	7,822
16	1,353	451	1,353	1,714	1,804	1,669	8,343
17	1,437	479	1,437	1,821	1,917	1,773	8,864
18	1,522	507	1,522	1,928	2,029	1,877	9,386
19	1,607	536	1,607	2,035	2,142	1,981	9,907
20	1,691	564	1,691	2,142	2,255	2,086	10,429
21	1,776	592	1,776	2,249	2,368	2,190	10,950
22	1,860	620	1,860	2,356	2,480	2,294	11,472
23	1,945	648	1,945	2,463	2,593	2,399	11,993
24	2,029	676	2,029	2,571	2,706	2,503	12,514
25	2,114	705	2,114	2,678	2,819	2,607	13,036
26	2,198	733	2,198	2,785	2,931	2,711	13,557
27	2,283	761	2,283	2,892	3,044	2,816	14,079
28	2,368	789	2,368	2,999	3,157	2,920	14,600
29	2,452	817	2,452	3,106	3,270	3,024	15,122
30	2,537	846	2,537	3,213	3,382	3,129	15,643
31	2,621	874	2,621	3,320	3,495	3,233	16,164
32	2,706	902	2,706	3,427	3,608	3,337	16,686
33	2,790	930	2,790	3,534	3,720	3,441	17,207
34	2,875	958	2,875	3,642	3,833	3,546	17,729
35	2,959	986	2,959	3,749	3,946	3,650	18,250
36	3,044	1,015	3,044	3,856	4,059	3,754	18,772
37	3,129	1,043	3,129	3,963	4,171	3,859	19,293

38	3,213	1,071	3,213	4,070	4,284	3,963	19,814
39	3,298	1,099	3,298	4,177	4,397	4,067	20,336
40	3,382	1,127	3,382	4,284	4,510	4,171	20,857

Sub Watershed #46 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	71	24	71	89	94	87	436
2	141	47	141	179	188	174	871
3	212	71	212	268	283	261	1,307
4	283	94	283	358	377	348	1,742
5	353	118	353	447	471	436	2,178
6	424	141	424	537	565	523	2,613
7	494	165	494	626	659	610	3,049
8	565	188	565	716	753	697	3,484
9	636	212	636	805	848	784	3,920
10	706	235	706	895	942	871	4,355
11	777	259	777	984	1,036	958	4,791
12	848	283	848	1,074	1,130	1,045	5,226
13	918	306	918	1,163	1,224	1,132	5,662
14	989	330	989	1,252	1,318	1,219	6,097
15	1,059	353	1,059	1,342	1,413	1,307	6,533
16	1,130	377	1,130	1,431	1,507	1,394	6,969
17	1,201	400	1,201	1,521	1,601	1,481	7,404
18	1,271	424	1,271	1,610	1,695	1,568	7,840
19	1,342	447	1,342	1,700	1,789	1,655	8,275
20	1,413	471	1,413	1,789	1,883	1,742	8,711
21	1,483	494	1,483	1,879	1,978	1,829	9,146
22	1,554	518	1,554	1,968	2,072	1,916	9,582
23	1,624	541	1,624	2,058	2,166	2,003	10,017
24	1,695	565	1,695	2,147	2,260	2,091	10,453
25	1,766	589	1,766	2,237	2,354	2,178	10,888
26	1,836	612	1,836	2,326	2,448	2,265	11,324
27	1,907	636	1,907	2,415	2,543	2,352	11,759
28	1,978	659	1,978	2,505	2,637	2,439	12,195
29	2,048	683	2,048	2,594	2,731	2,526	12,630
30	2,119	706	2,119	2,684	2,825	2,613	13,066
31	2,189	730	2,189	2,773	2,919	2,700	13,502
32	2,260	753	2,260	2,863	3,013	2,787	13,937
33	2,331	777	2,331	2,952	3,108	2,875	14,373
34	2,401	800	2,401	3,042	3,202	2,962	14,808
35	2,472	824	2,472	3,131	3,296	3,049	15,244
36	2,543	848	2,543	3,221	3,390	3,136	15,679
37	2,613	871	2,613	3,310	3,484	3,223	16,115

38	2,684	895	2,684	3,400	3,578	3,310	16,550
39	2,754	918	2,754	3,489	3,673	3,397	16,986
40	2,825	942	2,825	3,578	3,767	3,484	17,421

Sub Watershed #47 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	71	24	71	90	95	88	439
2	142	47	142	180	190	176	879
3	214	71	214	271	285	264	1,318
4	285	95	285	361	380	351	1,757
5	356	119	356	451	475	439	2,196
6	427	142	427	541	570	527	2,636
7	499	166	499	632	665	615	3,075
8	570	190	570	722	760	703	3,514
9	641	214	641	812	855	791	3,953
10	712	237	712	902	950	879	4,393
11	784	261	784	992	1,045	966	4,832
12	855	285	855	1,083	1,140	1,054	5,271
13	926	309	926	1,173	1,235	1,142	5,710
14	997	332	997	1,263	1,330	1,230	6,150
15	1,068	356	1,068	1,353	1,425	1,318	6,589
16	1,140	380	1,140	1,444	1,520	1,406	7,028
17	1,211	404	1,211	1,534	1,615	1,493	7,467
18	1,282	427	1,282	1,624	1,710	1,581	7,907
19	1,353	451	1,353	1,714	1,805	1,669	8,346
20	1,425	475	1,425	1,805	1,899	1,757	8,785
21	1,496	499	1,496	1,895	1,994	1,845	9,224
22	1,567	522	1,567	1,985	2,089	1,933	9,664
23	1,638	546	1,638	2,075	2,184	2,021	10,103
24	1,710	570	1,710	2,165	2,279	2,108	10,542
25	1,781	594	1,781	2,256	2,374	2,196	10,981
26	1,852	617	1,852	2,346	2,469	2,284	11,421
27	1,923	641	1,923	2,436	2,564	2,372	11,860
28	1,994	665	1,994	2,526	2,659	2,460	12,299
29	2,066	689	2,066	2,617	2,754	2,548	12,738
30	2,137	712	2,137	2,707	2,849	2,636	13,178
31	2,208	736	2,208	2,797	2,944	2,723	13,617
32	2,279	760	2,279	2,887	3,039	2,811	14,056
33	2,351	784	2,351	2,977	3,134	2,899	14,495
34	2,422	807	2,422	3,068	3,229	2,987	14,935
35	2,493	831	2,493	3,158	3,324	3,075	15,374
36	2,564	855	2,564	3,248	3,419	3,163	15,813
37	2,636	879	2,636	3,338	3,514	3,251	16,253

38	2,707	902	2,707	3,429	3,609	3,338	16,692
39	2,778	926	2,778	3,519	3,704	3,426	17,131
40	2,849	950	2,849	3,609	3,799	3,514	17,570

Sub Watershed #50 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	57	19	57	72	76	70	350
2	114	38	114	144	151	140	701
3	170	57	170	216	227	210	1,051
4	227	76	227	288	303	280	1,401
5	284	95	284	360	379	350	1,752
6	341	114	341	432	454	420	2,102
7	398	133	398	504	530	490	2,452
8	454	151	454	576	606	560	2,802
9	511	170	511	648	682	631	3,153
10	568	189	568	720	757	701	3,503
11	625	208	625	791	833	771	3,853
12	682	227	682	863	909	841	4,204
13	738	246	738	935	985	911	4,554
14	795	265	795	1,007	1,060	981	4,904
15	852	284	852	1,079	1,136	1,051	5,255
16	909	303	909	1,151	1,212	1,121	5,605
17	966	322	966	1,223	1,288	1,191	5,955
18	1,023	341	1,023	1,295	1,363	1,261	6,305
19	1,079	360	1,079	1,367	1,439	1,331	6,656
20	1,136	379	1,136	1,439	1,515	1,401	7,006
21	1,193	398	1,193	1,511	1,591	1,471	7,356
22	1,250	417	1,250	1,583	1,666	1,541	7,707
23	1,307	436	1,307	1,655	1,742	1,611	8,057
24	1,363	454	1,363	1,727	1,818	1,681	8,407
25	1,420	473	1,420	1,799	1,894	1,752	8,758
26	1,477	492	1,477	1,871	1,969	1,822	9,108
27	1,534	511	1,534	1,943	2,045	1,892	9,458
28	1,591	530	1,591	2,015	2,121	1,962	9,808
29	1,647	549	1,647	2,087	2,196	2,032	10,159
30	1,704	568	1,704	2,159	2,272	2,102	10,509
31	1,761	587	1,761	2,231	2,348	2,172	10,859
32	1,818	606	1,818	2,303	2,424	2,242	11,210
33	1,875	625	1,875	2,374	2,499	2,312	11,560
34	1,931	644	1,931	2,446	2,575	2,382	11,910
35	1,988	663	1,988	2,518	2,651	2,452	12,261
36	2,045	682	2,045	2,590	2,727	2,522	12,611
37	2,102	701	2,102	2,662	2,802	2,592	12,961

38	2,159	720	2,159	2,734	2,878	2,662	13,312
39	2,215	738	2,215	2,806	2,954	2,732	13,662
40	2,272	757	2,272	2,878	3,030	2,802	14,012

Sub Watershed #53 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	53	18	53	67	71	66	329
2	107	36	107	135	142	131	657
3	160	53	160	202	213	197	986
4	213	71	213	270	284	263	1,314
5	266	89	266	337	355	329	1,643
6	320	107	320	405	426	394	1,971
7	373	124	373	472	497	460	2,300
8	426	142	426	540	568	526	2,628
9	479	160	479	607	639	591	2,957
10	533	178	533	675	710	657	3,285
11	586	195	586	742	781	723	3,614
12	639	213	639	810	852	788	3,942
13	693	231	693	877	923	854	4,271
14	746	249	746	945	994	920	4,599
15	799	266	799	1,012	1,065	986	4,928
16	852	284	852	1,080	1,136	1,051	5,256
17	906	302	906	1,147	1,207	1,117	5,585
18	959	320	959	1,215	1,278	1,183	5,913
19	1,012	337	1,012	1,282	1,350	1,248	6,242
20	1,065	355	1,065	1,350	1,421	1,314	6,570
21	1,119	373	1,119	1,417	1,492	1,380	6,899
22	1,172	391	1,172	1,484	1,563	1,445	7,227
23	1,225	408	1,225	1,552	1,634	1,511	7,556
24	1,278	426	1,278	1,619	1,705	1,577	7,884
25	1,332	444	1,332	1,687	1,776	1,643	8,213
26	1,385	462	1,385	1,754	1,847	1,708	8,541
27	1,438	479	1,438	1,822	1,918	1,774	8,870
28	1,492	497	1,492	1,889	1,989	1,840	9,198
29	1,545	515	1,545	1,957	2,060	1,905	9,527
30	1,598	533	1,598	2,024	2,131	1,971	9,855
31	1,651	550	1,651	2,092	2,202	2,037	10,184
32	1,705	568	1,705	2,159	2,273	2,102	10,512
33	1,758	586	1,758	2,227	2,344	2,168	10,841
34	1,811	604	1,811	2,294	2,415	2,234	11,169
35	1,864	621	1,864	2,362	2,486	2,300	11,498
36	1,918	639	1,918	2,429	2,557	2,365	11,826
37	1,971	657	1,971	2,497	2,628	2,431	12,155

38	2,024	675	2,024	2,564	2,699	2,497	12,483
39	2,078	693	2,078	2,632	2,770	2,562	12,812
40	2,131	710	2,131	2,699	2,841	2,628	13,140

Sub Watershed #54 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	113	38	113	144	151	140	699
2	227	76	227	287	302	280	1,398
3	340	113	340	431	454	419	2,097
4	454	151	454	574	605	559	2,797
5	567	189	567	718	756	699	3,496
6	680	227	680	862	907	839	4,195
7	794	265	794	1,005	1,058	979	4,894
8	907	302	907	1,149	1,209	1,119	5,593
9	1,020	340	1,020	1,293	1,361	1,258	6,292
10	1,134	378	1,134	1,436	1,512	1,398	6,992
11	1,247	416	1,247	1,580	1,663	1,538	7,691
12	1,361	454	1,361	1,723	1,814	1,678	8,390
13	1,474	491	1,474	1,867	1,965	1,818	9,089
14	1,587	529	1,587	2,011	2,116	1,958	9,788
15	1,701	567	1,701	2,154	2,268	2,097	10,487
16	1,814	605	1,814	2,298	2,419	2,237	11,187
17	1,927	642	1,927	2,441	2,570	2,377	11,886
18	2,041	680	2,041	2,585	2,721	2,517	12,585
19	2,154	718	2,154	2,729	2,872	2,657	13,284
20	2,268	756	2,268	2,872	3,023	2,797	13,983
21	2,381	794	2,381	3,016	3,175	2,936	14,682
22	2,494	831	2,494	3,159	3,326	3,076	15,382
23	2,608	869	2,608	3,303	3,477	3,216	16,081
24	2,721	907	2,721	3,447	3,628	3,356	16,780
25	2,834	945	2,834	3,590	3,779	3,496	17,479
26	2,948	983	2,948	3,734	3,930	3,636	18,178
27	3,061	1,020	3,061	3,878	4,082	3,775	18,877
28	3,175	1,058	3,175	4,021	4,233	3,915	19,577
29	3,288	1,096	3,288	4,165	4,384	4,055	20,276
30	3,401	1,134	3,401	4,308	4,535	4,195	20,975
31	3,515	1,172	3,515	4,452	4,686	4,335	21,674
32	3,628	1,209	3,628	4,596	4,837	4,475	22,373
33	3,741	1,247	3,741	4,739	4,989	4,614	23,072
34	3,855	1,285	3,855	4,883	5,140	4,754	23,772
35	3,968	1,323	3,968	5,026	5,291	4,894	24,471
36	4,082	1,361	4,082	5,170	5,442	5,034	25,170
37	4,195	1,398	4,195	5,314	5,593	5,174	25,869

38	4,308	1,436	4,308	5,457	5,744	5,314	26,568
39	4,422	1,474	4,422	5,601	5,896	5,453	27,267
40	4,535	1,512	4,535	5,744	6,047	5,593	27,967

Sub Watershed #62 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	156	52	156	198	208	193	963
2	312	104	312	395	416	385	1,925
3	468	156	468	593	624	578	2,888
4	624	208	624	791	833	770	3,851
5	781	260	781	989	1,041	963	4,813
6	937	312	937	1,186	1,249	1,155	5,776
7	1,093	364	1,093	1,384	1,457	1,348	6,739
8	1,249	416	1,249	1,582	1,665	1,540	7,702
9	1,405	468	1,405	1,780	1,873	1,733	8,664
10	1,561	520	1,561	1,977	2,082	1,925	9,627
11	1,717	572	1,717	2,175	2,290	2,118	10,590
12	1,873	624	1,873	2,373	2,498	2,310	11,552
13	2,029	676	2,029	2,571	2,706	2,503	12,515
14	2,186	729	2,186	2,768	2,914	2,696	13,478
15	2,342	781	2,342	2,966	3,122	2,888	14,440
16	2,498	833	2,498	3,164	3,330	3,081	15,403
17	2,654	885	2,654	3,362	3,539	3,273	16,366
18	2,810	937	2,810	3,559	3,747	3,466	17,329
19	2,966	989	2,966	3,757	3,955	3,658	18,291
20	3,122	1,041	3,122	3,955	4,163	3,851	19,254
21	3,278	1,093	3,278	4,153	4,371	4,043	20,217
22	3,434	1,145	3,434	4,350	4,579	4,236	21,179
23	3,591	1,197	3,591	4,548	4,787	4,428	22,142
24	3,747	1,249	3,747	4,746	4,996	4,621	23,105
25	3,903	1,301	3,903	4,944	5,204	4,813	24,067
26	4,059	1,353	4,059	5,141	5,412	5,006	25,030
27	4,215	1,405	4,215	5,339	5,620	5,199	25,993
28	4,371	1,457	4,371	5,537	5,828	5,391	26,956
29	4,527	1,509	4,527	5,735	6,036	5,584	27,918
30	4,683	1,561	4,683	5,932	6,245	5,776	28,881
31	4,840	1,613	4,840	6,130	6,453	5,969	29,844
32	4,996	1,665	4,996	6,328	6,661	6,161	30,806
33	5,152	1,717	5,152	6,526	6,869	6,354	31,769
34	5,308	1,769	5,308	6,723	7,077	6,546	32,732
35	5,464	1,821	5,464	6,921	7,285	6,739	33,694
36	5,620	1,873	5,620	7,119	7,493	6,931	34,657
37	5,776	1,925	5,776	7,316	7,702	7,124	35,620

38	5,932	1,977	5,932	7,514	7,910	7,316	36,582
39	6,088	2,029	6,088	7,712	8,118	7,509	37,545
40	6,245	2,082	6,245	7,910	8,326	7,702	38,508

Sub Watershed #66 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Reduction
1	191	64	191	242	255	236	1,180
2	383	128	383	485	510	472	2,360
3	574	191	574	727	765	708	3,540
4	765	255	765	969	1,021	944	4,720
5	957	319	957	1,212	1,276	1,180	5,900
6	1,148	383	1,148	1,454	1,531	1,416	7,080
7	1,339	446	1,339	1,697	1,786	1,652	8,260
8	1,531	510	1,531	1,939	2,041	1,888	9,440
9	1,722	574	1,722	2,181	2,296	2,124	10,620
10	1,913	638	1,913	2,424	2,551	2,360	11,800
11	2,105	702	2,105	2,666	2,806	2,596	12,980
12	2,296	765	2,296	2,908	3,062	2,832	14,160
13	2,487	829	2,487	3,151	3,317	3,068	15,339
14	2,679	893	2,679	3,393	3,572	3,304	16,519
15	2,870	957	2,870	3,636	3,827	3,540	17,699
16	3,062	1,021	3,062	3,878	4,082	3,776	18,879
17	3,253	1,084	3,253	4,120	4,337	4,012	20,059
18	3,444	1,148	3,444	4,363	4,592	4,248	21,239
19	3,636	1,212	3,636	4,605	4,847	4,484	22,419
20	3,827	1,276	3,827	4,847	5,103	4,720	23,599
21	4,018	1,339	4,018	5,090	5,358	4,956	24,779
22	4,210	1,403	4,210	5,332	5,613	5,192	25,959
23	4,401	1,467	4,401	5,575	5,868	5,428	27,139
24	4,592	1,531	4,592	5,817	6,123	5,664	28,319
25	4,784	1,595	4,784	6,059	6,378	5,900	29,499
26	4,975	1,658	4,975	6,302	6,633	6,136	30,679
27	5,166	1,722	5,166	6,544	6,888	6,372	31,859
28	5,358	1,786	5,358	6,786	7,144	6,608	33,039
29	5,549	1,850	5,549	7,029	7,399	6,844	34,219
30	5,740	1,913	5,740	7,271	7,654	7,080	35,399
31	5,932	1,977	5,932	7,513	7,909	7,316	36,579
32	6,123	2,041	6,123	7,756	8,164	7,552	37,759
33	6,314	2,105	6,314	7,998	8,419	7,788	38,939
34	6,506	2,169	6,506	8,241	8,674	8,024	40,119
35	6,697	2,232	6,697	8,483	8,929	8,260	41,299
36	6,888	2,296	6,888	8,725	9,185	8,496	42,479
37	7,080	2,360	7,080	8,968	9,440	8,732	43,659

38	7,271	2,424	7,271	9,210	9,695	8,968	44,838
39	7,462	2,487	7,462	9,452	9,950	9,204	46,018
40	7,654	2,551	7,654	9,695	10,205	9,440	47,198

13.3.1 Adoption Rates by Subbasin

Table 50 Adoption Rates by Subbasin

Sub Watershed #35 Annual Adoption (acres), Cropland BMPs							
Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	24	12	59	24	59	59	235
2	24	12	59	24	59	59	235
3	24	12	59	24	59	59	235
4	24	12	59	24	59	59	235
5	24	12	59	24	59	59	235
6	24	12	59	24	59	59	235
7	24	12	59	24	59	59	235
8	24	12	59	24	59	59	235
9	24	12	59	24	59	59	235
10	24	12	59	24	59	59	235
11	24	12	59	24	59	59	235
12	24	12	59	24	59	59	235
13	24	12	59	24	59	59	235
14	24	12	59	24	59	59	235
15	24	12	59	24	59	59	235
16	24	12	59	24	59	59	235
17	24	12	59	24	59	59	235
18	24	12	59	24	59	59	235
19	24	12	59	24	59	59	235
20	24	12	59	24	59	59	235
21	24	12	59	24	59	59	235
22	24	12	59	24	59	59	235
23	24	12	59	24	59	59	235
24	24	12	59	24	59	59	235
25	24	12	59	24	59	59	235
26	24	12	59	24	59	59	235
27	24	12	59	24	59	59	235
28	24	12	59	24	59	59	235
29	24	12	59	24	59	59	235
30	24	12	59	24	59	59	235
31	24	12	59	24	59	59	235
32	24	12	59	24	59	59	235
33	24	12	59	24	59	59	235

34	24	12	59	24	59	59	235
35	24	12	59	24	59	59	235
36	24	12	59	24	59	59	235
37	24	12	59	24	59	59	235
38	24	12	59	24	59	59	235
39	24	12	59	24	59	59	235
40	24	12	59	24	59	59	235

Sub Watershed #42 Annual Adoption (acres), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	27	14	69	27	69	69	275
2	27	14	69	27	69	69	275
3	27	14	69	27	69	69	275
4	27	14	69	27	69	69	275
5	27	14	69	27	69	69	275
6	27	14	69	27	69	69	275
7	27	14	69	27	69	69	275
8	27	14	69	27	69	69	275
9	27	14	69	27	69	69	275
10	27	14	69	27	69	69	275
11	27	14	69	27	69	69	275
12	27	14	69	27	69	69	275
13	27	14	69	27	69	69	275
14	27	14	69	27	69	69	275
15	27	14	69	27	69	69	275
16	27	14	69	27	69	69	275
17	27	14	69	27	69	69	275
18	27	14	69	27	69	69	275
19	27	14	69	27	69	69	275
20	27	14	69	27	69	69	275
21	27	14	69	27	69	69	275
22	27	14	69	27	69	69	275
23	27	14	69	27	69	69	275
24	27	14	69	27	69	69	275
25	27	14	69	27	69	69	275
26	27	14	69	27	69	69	275
27	27	14	69	27	69	69	275
28	27	14	69	27	69	69	275
29	27	14	69	27	69	69	275
30	27	14	69	27	69	69	275
31	27	14	69	27	69	69	275
32	27	14	69	27	69	69	275
33	27	14	69	27	69	69	275

34	27	14	69	27	69	69	275
35	27	14	69	27	69	69	275
36	27	14	69	27	69	69	275
37	27	14	69	27	69	69	275
38	27	14	69	27	69	69	275
39	27	14	69	27	69	69	275
40	27	14	69	27	69	69	275

Sub Watershed #46 Annual Adoption (acres), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	21	11	54	21	54	54	214
2	21	11	54	21	54	54	214
3	21	11	54	21	54	54	214
4	21	11	54	21	54	54	214
5	21	11	54	21	54	54	214
6	21	11	54	21	54	54	214
7	21	11	54	21	54	54	214
8	21	11	54	21	54	54	214
9	21	11	54	21	54	54	214
10	21	11	54	21	54	54	214
11	21	11	54	21	54	54	214
12	21	11	54	21	54	54	214
13	21	11	54	21	54	54	214
14	21	11	54	21	54	54	214
15	21	11	54	21	54	54	214
16	21	11	54	21	54	54	214
17	21	11	54	21	54	54	214
18	21	11	54	21	54	54	214
19	21	11	54	21	54	54	214
20	21	11	54	21	54	54	214
21	21	11	54	21	54	54	214
22	21	11	54	21	54	54	214
23	21	11	54	21	54	54	214
24	21	11	54	21	54	54	214
25	21	11	54	21	54	54	214
26	21	11	54	21	54	54	214
27	21	11	54	21	54	54	214
28	21	11	54	21	54	54	214
29	21	11	54	21	54	54	214
30	21	11	54	21	54	54	214
31	21	11	54	21	54	54	214
32	21	11	54	21	54	54	214
33	21	11	54	21	54	54	214

34	21	11	54	21	54	54	214
35	21	11	54	21	54	54	214
36	21	11	54	21	54	54	214
37	21	11	54	21	54	54	214
38	21	11	54	21	54	54	214
39	21	11	54	21	54	54	214
40	21	11	54	21	54	54	214

Sub Watershed #47 Annual Adoption (acres), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	23	12	58	23	58	58	232
2	23	12	58	23	58	58	232
3	23	12	58	23	58	58	232
4	23	12	58	23	58	58	232
5	23	12	58	23	58	58	232
6	23	12	58	23	58	58	232
7	23	12	58	23	58	58	232
8	23	12	58	23	58	58	232
9	23	12	58	23	58	58	232
10	23	12	58	23	58	58	232
11	23	12	58	23	58	58	232
12	23	12	58	23	58	58	232
13	23	12	58	23	58	58	232
14	23	12	58	23	58	58	232
15	23	12	58	23	58	58	232
16	23	12	58	23	58	58	232
17	23	12	58	23	58	58	232
18	23	12	58	23	58	58	232
19	23	12	58	23	58	58	232
20	23	12	58	23	58	58	232
21	23	12	58	23	58	58	232
22	23	12	58	23	58	58	232
23	23	12	58	23	58	58	232
24	23	12	58	23	58	58	232
25	23	12	58	23	58	58	232
26	23	12	58	23	58	58	232
27	23	12	58	23	58	58	232
28	23	12	58	23	58	58	232
29	23	12	58	23	58	58	232
30	23	12	58	23	58	58	232
31	23	12	58	23	58	58	232
32	23	12	58	23	58	58	232
33	23	12	58	23	58	58	232

34	23	12	58	23	58	58	232
35	23	12	58	23	58	58	232
36	23	12	58	23	58	58	232
37	23	12	58	23	58	58	232
38	23	12	58	23	58	58	232
39	23	12	58	23	58	58	232
40	23	12	58	23	58	58	232

Sub Watershed #50 Annual Adoption (acres), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	20	10	51	20	51	51	205
2	20	10	51	20	51	51	205
3	20	10	51	20	51	51	205
4	20	10	51	20	51	51	205
5	20	10	51	20	51	51	205
6	20	10	51	20	51	51	205
7	20	10	51	20	51	51	205
8	20	10	51	20	51	51	205
9	20	10	51	20	51	51	205
10	20	10	51	20	51	51	205
11	20	10	51	20	51	51	205
12	20	10	51	20	51	51	205
13	20	10	51	20	51	51	205
14	20	10	51	20	51	51	205
15	20	10	51	20	51	51	205
16	20	10	51	20	51	51	205
17	20	10	51	20	51	51	205
18	20	10	51	20	51	51	205
19	20	10	51	20	51	51	205
20	20	10	51	20	51	51	205
21	20	10	51	20	51	51	205
22	20	10	51	20	51	51	205
23	20	10	51	20	51	51	205
24	20	10	51	20	51	51	205
25	20	10	51	20	51	51	205
26	20	10	51	20	51	51	205
27	20	10	51	20	51	51	205
28	20	10	51	20	51	51	205
29	20	10	51	20	51	51	205
30	20	10	51	20	51	51	205
31	20	10	51	20	51	51	205
32	20	10	51	20	51	51	205
33	20	10	51	20	51	51	205

34	20	10	51	20	51	51	205
35	20	10	51	20	51	51	205
36	20	10	51	20	51	51	205
37	20	10	51	20	51	51	205
38	20	10	51	20	51	51	205
39	20	10	51	20	51	51	205
40	20	10	51	20	51	51	205

Sub Watershed #53 Annual Adoption (acres), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	15	8	38	15	38	38	151
2	15	8	38	15	38	38	151
3	15	8	38	15	38	38	151
4	15	8	38	15	38	38	151
5	15	8	38	15	38	38	151
6	15	8	38	15	38	38	151
7	15	8	38	15	38	38	151
8	15	8	38	15	38	38	151
9	15	8	38	15	38	38	151
10	15	8	38	15	38	38	151
11	15	8	38	15	38	38	151
12	15	8	38	15	38	38	151
13	15	8	38	15	38	38	151
14	15	8	38	15	38	38	151
15	15	8	38	15	38	38	151
16	15	8	38	15	38	38	151
17	15	8	38	15	38	38	151
18	15	8	38	15	38	38	151
19	15	8	38	15	38	38	151
20	15	8	38	15	38	38	151
21	15	8	38	15	38	38	151
22	15	8	38	15	38	38	151
23	15	8	38	15	38	38	151
24	15	8	38	15	38	38	151
25	15	8	38	15	38	38	151
26	15	8	38	15	38	38	151
27	15	8	38	15	38	38	151
28	15	8	38	15	38	38	151
29	15	8	38	15	38	38	151
30	15	8	38	15	38	38	151
31	15	8	38	15	38	38	151
32	15	8	38	15	38	38	151
33	15	8	38	15	38	38	151

34	15	8	38	15	38	38	151
35	15	8	38	15	38	38	151
36	15	8	38	15	38	38	151
37	15	8	38	15	38	38	151
38	15	8	38	15	38	38	151
39	15	8	38	15	38	38	151
40	15	8	38	15	38	38	151

Sub Watershed #54 Annual Adoption (acres), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	24	12	59	24	59	59	236
2	24	12	59	24	59	59	236
3	24	12	59	24	59	59	236
4	24	12	59	24	59	59	236
5	24	12	59	24	59	59	236
6	24	12	59	24	59	59	236
7	24	12	59	24	59	59	236
8	24	12	59	24	59	59	236
9	24	12	59	24	59	59	236
10	24	12	59	24	59	59	236
11	24	12	59	24	59	59	236
12	24	12	59	24	59	59	236
13	24	12	59	24	59	59	236
14	24	12	59	24	59	59	236
15	24	12	59	24	59	59	236
16	24	12	59	24	59	59	236
17	24	12	59	24	59	59	236
18	24	12	59	24	59	59	236
19	24	12	59	24	59	59	236
20	24	12	59	24	59	59	236
21	24	12	59	24	59	59	236
22	24	12	59	24	59	59	236
23	24	12	59	24	59	59	236
24	24	12	59	24	59	59	236
25	24	12	59	24	59	59	236
26	24	12	59	24	59	59	236
27	24	12	59	24	59	59	236
28	24	12	59	24	59	59	236
29	24	12	59	24	59	59	236
30	24	12	59	24	59	59	236
31	24	12	59	24	59	59	236
32	24	12	59	24	59	59	236
33	24	12	59	24	59	59	236

34	24	12	59	24	59	59	236
35	24	12	59	24	59	59	236
36	24	12	59	24	59	59	236
37	24	12	59	24	59	59	236
38	24	12	59	24	59	59	236
39	24	12	59	24	59	59	236
40	24	12	59	24	59	59	236

Sub Watershed #62 Annual Adoption (acres), Cropland BMPs

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	39	19	96	39	96	96	385
2	39	19	96	39	96	96	385
3	39	19	96	39	96	96	385
4	39	19	96	39	96	96	385
5	39	19	96	39	96	96	385
6	39	19	96	39	96	96	385
7	39	19	96	39	96	96	385
8	39	19	96	39	96	96	385
9	39	19	96	39	96	96	385
10	39	19	96	39	96	96	385
11	39	19	96	39	96	96	385
12	39	19	96	39	96	96	385
13	39	19	96	39	96	96	385
14	39	19	96	39	96	96	385
15	39	19	96	39	96	96	385
16	39	19	96	39	96	96	385
17	39	19	96	39	96	96	385
18	39	19	96	39	96	96	385
19	39	19	96	39	96	96	385
20	39	19	96	39	96	96	385
21	39	19	96	39	96	96	385
22	39	19	96	39	96	96	385
23	39	19	96	39	96	96	385
24	39	19	96	39	96	96	385
25	39	19	96	39	96	96	385
26	39	19	96	39	96	96	385
27	39	19	96	39	96	96	385
28	39	19	96	39	96	96	385
29	39	19	96	39	96	96	385
30	39	19	96	39	96	96	385
31	39	19	96	39	96	96	385
32	39	19	96	39	96	96	385
33	39	19	96	39	96	96	385

34	39	19	96	39	96	96	385
35	39	19	96	39	96	96	385
36	39	19	96	39	96	96	385
37	39	19	96	39	96	96	385
38	39	19	96	39	96	96	385
39	39	19	96	39	96	96	385
40	39	19	96	39	96	96	385

Sub Watershed #66 Annual Adoption (acres), Cropland BMPs

Year	No- Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Acres
1	40	20	101	40	101	101	405
2	40	20	101	40	101	101	405
3	40	20	101	40	101	101	405
4	40	20	101	40	101	101	405
5	40	20	101	40	101	101	405
6	40	20	101	40	101	101	405
7	40	20	101	40	101	101	405
8	40	20	101	40	101	101	405
9	40	20	101	40	101	101	405
10	40	20	101	40	101	101	405
11	40	20	101	40	101	101	405
12	40	20	101	40	101	101	405
13	40	20	101	40	101	101	405
14	40	20	101	40	101	101	405
15	40	20	101	40	101	101	405
16	40	20	101	40	101	101	405
17	40	20	101	40	101	101	405
18	40	20	101	40	101	101	405
19	40	20	101	40	101	101	405
20	40	20	101	40	101	101	405
21	40	20	101	40	101	101	405
22	40	20	101	40	101	101	405
23	40	20	101	40	101	101	405
24	40	20	101	40	101	101	405
25	40	20	101	40	101	101	405
26	40	20	101	40	101	101	405
27	40	20	101	40	101	101	405
28	40	20	101	40	101	101	405
29	40	20	101	40	101	101	405
30	40	20	101	40	101	101	405
31	40	20	101	40	101	101	405
32	40	20	101	40	101	101	405
33	40	20	101	40	101	101	405

34	40	20	101	40	101	101	405
35	40	20	101	40	101	101	405
36	40	20	101	40	101	101	405
37	40	20	101	40	101	101	405
38	40	20	101	40	101	101	405
39	40	20	101	40	101	101	405
40	40	20	101	40	101	101	405

Table 51 Short, Medium and Long Term Goals by Subbasin

Sub Watershed #35 Annual Adoption (acres), Cropland BMPs								
	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	24	12	59	24	59	59	235
	2	24	12	59	24	59	59	235
	3	24	12	59	24	59	59	235
	4	24	12	59	24	59	59	235
	5	24	12	59	24	59	59	235
Total		118	59	294	118	294	294	1,177
Medium-Term	6	24	12	59	24	59	59	235
	7	24	12	59	24	59	59	235
	8	24	12	59	24	59	59	235
	9	24	12	59	24	59	59	235
	10	24	12	59	24	59	59	235
Total		235	118	588	235	588	588	2,353
Long-Term	11	24	12	59	24	59	59	235
	12	24	12	59	24	59	59	235
	13	24	12	59	24	59	59	235
	14	24	12	59	24	59	59	235
	15	24	12	59	24	59	59	235
	16	24	12	59	24	59	59	235
	17	24	12	59	24	59	59	235
	18	24	12	59	24	59	59	235
	19	24	12	59	24	59	59	235
	20	24	12	59	24	59	59	235
	21	24	12	59	24	59	59	235
	22	24	12	59	24	59	59	235
	23	24	12	59	24	59	59	235
	24	24	12	59	24	59	59	235
	25	24	12	59	24	59	59	235
	26	24	12	59	24	59	59	235
	27	24	12	59	24	59	59	235
	28	24	12	59	24	59	59	235
	29	24	12	59	24	59	59	235

	30	24	12	59	24	59	59	235
	31	24	12	59	24	59	59	235
	32	24	12	59	24	59	59	235
	33	24	12	59	24	59	59	235
	34	24	12	59	24	59	59	235
	35	24	12	59	24	59	59	235
	36	24	12	59	24	59	59	235
	37	24	12	59	24	59	59	235
	38	24	12	59	24	59	59	235
	39	24	12	59	24	59	59	235
	40	24	12	59	24	59	59	235
<i>Total</i>		941	471	2,353	941	2,353	2,353	9,413

Sub Watershed #42 Annual Adoption (acres), Cropland BMPs

	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	27	14	69	27	69	69	275
	2	27	14	69	27	69	69	275
	3	27	14	69	27	69	69	275
	4	27	14	69	27	69	69	275
	5	27	14	69	27	69	69	275
<i>Total</i>		137	69	344	137	344	344	1,375
Medium-Term	6	27	14	69	27	69	69	275
	7	27	14	69	27	69	69	275
	8	27	14	69	27	69	69	275
	9	27	14	69	27	69	69	275
	10	27	14	69	27	69	69	275
<i>Total</i>		275	137	687	275	687	687	2,750
Long-Term	11	27	14	69	27	69	69	275
	12	27	14	69	27	69	69	275
	13	27	14	69	27	69	69	275
	14	27	14	69	27	69	69	275
	15	27	14	69	27	69	69	275
	16	27	14	69	27	69	69	275
	17	27	14	69	27	69	69	275
	18	27	14	69	27	69	69	275
	19	27	14	69	27	69	69	275
	20	27	14	69	27	69	69	275
	21	27	14	69	27	69	69	275
	22	27	14	69	27	69	69	275
	23	27	14	69	27	69	69	275
	24	27	14	69	27	69	69	275
	25	27	14	69	27	69	69	275

	26	27	14	69	27	69	69	275
	27	27	14	69	27	69	69	275
	28	27	14	69	27	69	69	275
	29	27	14	69	27	69	69	275
	30	27	14	69	27	69	69	275
	31	27	14	69	27	69	69	275
	32	27	14	69	27	69	69	275
	33	27	14	69	27	69	69	275
	34	27	14	69	27	69	69	275
	35	27	14	69	27	69	69	275
	36	27	14	69	27	69	69	275
	37	27	14	69	27	69	69	275
	38	27	14	69	27	69	69	275
	39	27	14	69	27	69	69	275
	40	27	14	69	27	69	69	275
<i>Total</i>		1,100	550	2,750	1,100	2,750	2,750	10,999

Sub Watershed #46 Annual Adoption (acres), Cropland BMPs

	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	21	11	54	21	54	54	214
	2	21	11	54	21	54	54	214
	3	21	11	54	21	54	54	214
	4	21	11	54	21	54	54	214
	5	21	11	54	21	54	54	214
<i>Total</i>		107	54	268	107	268	268	1,070
Medium-Term	6	21	11	54	21	54	54	214
	7	21	11	54	21	54	54	214
	8	21	11	54	21	54	54	214
	9	21	11	54	21	54	54	214
	10	21	11	54	21	54	54	214
<i>Total</i>		214	107	535	214	535	535	2,140
Long-Term	11	21	11	54	21	54	54	214
	12	21	11	54	21	54	54	214
	13	21	11	54	21	54	54	214
	14	21	11	54	21	54	54	214
	15	21	11	54	21	54	54	214
	16	21	11	54	21	54	54	214
	17	21	11	54	21	54	54	214
	18	21	11	54	21	54	54	214
	19	21	11	54	21	54	54	214
	20	21	11	54	21	54	54	214
	21	21	11	54	21	54	54	214

	22	21	11	54	21	54	54	214
	23	21	11	54	21	54	54	214
	24	21	11	54	21	54	54	214
	25	21	11	54	21	54	54	214
	26	21	11	54	21	54	54	214
	27	21	11	54	21	54	54	214
	28	21	11	54	21	54	54	214
	29	21	11	54	21	54	54	214
	30	21	11	54	21	54	54	214
	31	21	11	54	21	54	54	214
	32	21	11	54	21	54	54	214
	33	21	11	54	21	54	54	214
	34	21	11	54	21	54	54	214
	35	21	11	54	21	54	54	214
	36	21	11	54	21	54	54	214
	37	21	11	54	21	54	54	214
	38	21	11	54	21	54	54	214
	39	21	11	54	21	54	54	214
	40	21	11	54	21	54	54	214
<i>Total</i>		856	428	2,140	856	2,140	2,140	8,561

Sub Watershed #47 Annual Adoption (acres), Cropland BMPs

	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	23	12	58	23	58	58	232
	2	23	12	58	23	58	58	232
	3	23	12	58	23	58	58	232
	4	23	12	58	23	58	58	232
	5	23	12	58	23	58	58	232
<i>Total</i>		116	58	290	116	290	290	1,158
Medium-Term	6	23	12	58	23	58	58	232
	7	23	12	58	23	58	58	232
	8	23	12	58	23	58	58	232
	9	23	12	58	23	58	58	232
	10	23	12	58	23	58	58	232
<i>Total</i>		232	116	579	232	579	579	2,316
Long-Term	11	23	12	58	23	58	58	232
	12	23	12	58	23	58	58	232
	13	23	12	58	23	58	58	232
	14	23	12	58	23	58	58	232
	15	23	12	58	23	58	58	232
	16	23	12	58	23	58	58	232
	17	23	12	58	23	58	58	232

	18	23	12	58	23	58	58	232
	19	23	12	58	23	58	58	232
	20	23	12	58	23	58	58	232
	21	23	12	58	23	58	58	232
	22	23	12	58	23	58	58	232
	23	23	12	58	23	58	58	232
	24	23	12	58	23	58	58	232
	25	23	12	58	23	58	58	232
	26	23	12	58	23	58	58	232
	27	23	12	58	23	58	58	232
	28	23	12	58	23	58	58	232
	29	23	12	58	23	58	58	232
	30	23	12	58	23	58	58	232
	31	23	12	58	23	58	58	232
	32	23	12	58	23	58	58	232
	33	23	12	58	23	58	58	232
	34	23	12	58	23	58	58	232
	35	23	12	58	23	58	58	232
	36	23	12	58	23	58	58	232
	37	23	12	58	23	58	58	232
	38	23	12	58	23	58	58	232
	39	23	12	58	23	58	58	232
	40	23	12	58	23	58	58	232
<i>Total</i>		927	463	2,316	927	2,316	2,316	9,266

Sub Watershed #50 Annual Adoption (acres), Cropland BMPs

	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	20	10	51	20	51	51	205
	2	20	10	51	20	51	51	205
	3	20	10	51	20	51	51	205
	4	20	10	51	20	51	51	205
	5	20	10	51	20	51	51	205
<i>Total</i>		102	51	256	102	256	256	1,024
Medium-Term	6	20	10	51	20	51	51	205
	7	20	10	51	20	51	51	205
	8	20	10	51	20	51	51	205
	9	20	10	51	20	51	51	205
	10	20	10	51	20	51	51	205
<i>Total</i>		205	102	512	205	512	512	2,047
Long-Term	11	20	10	51	20	51	51	205
	12	20	10	51	20	51	51	205
	13	20	10	51	20	51	51	205

	14	20	10	51	20	51	51	205
	15	20	10	51	20	51	51	205
	16	20	10	51	20	51	51	205
	17	20	10	51	20	51	51	205
	18	20	10	51	20	51	51	205
	19	20	10	51	20	51	51	205
	20	20	10	51	20	51	51	205
	21	20	10	51	20	51	51	205
	22	20	10	51	20	51	51	205
	23	20	10	51	20	51	51	205
	24	20	10	51	20	51	51	205
	25	20	10	51	20	51	51	205
	26	20	10	51	20	51	51	205
	27	20	10	51	20	51	51	205
	28	20	10	51	20	51	51	205
	29	20	10	51	20	51	51	205
	30	20	10	51	20	51	51	205
	31	20	10	51	20	51	51	205
	32	20	10	51	20	51	51	205
	33	20	10	51	20	51	51	205
	34	20	10	51	20	51	51	205
	35	20	10	51	20	51	51	205
	36	20	10	51	20	51	51	205
	37	20	10	51	20	51	51	205
	38	20	10	51	20	51	51	205
	39	20	10	51	20	51	51	205
	40	20	10	51	20	51	51	205
<i>Total</i>		819	409	2,047	819	2,047	2,047	8,188

Sub Watershed #53 Annual Adoption (acres), Cropland BMPs

	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	15	8	38	15	38	38	151
	2	15	8	38	15	38	38	151
	3	15	8	38	15	38	38	151
	4	15	8	38	15	38	38	151
	5	15	8	38	15	38	38	151
<i>Total</i>		76	38	189	76	189	189	756
Medium-Term	6	15	8	38	15	38	38	151
	7	15	8	38	15	38	38	151
	8	15	8	38	15	38	38	151
	9	15	8	38	15	38	38	151
	10	15	8	38	15	38	38	151

<i>Total</i>		<i>151</i>	<i>76</i>	<i>378</i>		<i>151</i>	<i>378</i>	<i>378</i>	<i>1,511</i>
Long-Term	11	15	8	38		15	38	38	151
	12	15	8	38		15	38	38	151
	13	15	8	38		15	38	38	151
	14	15	8	38		15	38	38	151
	15	15	8	38		15	38	38	151
	16	15	8	38		15	38	38	151
	17	15	8	38		15	38	38	151
	18	15	8	38		15	38	38	151
	19	15	8	38		15	38	38	151
	20	15	8	38		15	38	38	151
	21	15	8	38		15	38	38	151
	22	15	8	38		15	38	38	151
	23	15	8	38		15	38	38	151
	24	15	8	38		15	38	38	151
	25	15	8	38		15	38	38	151
	26	15	8	38		15	38	38	151
	27	15	8	38		15	38	38	151
	28	15	8	38		15	38	38	151
	29	15	8	38		15	38	38	151
	30	15	8	38		15	38	38	151
	31	15	8	38		15	38	38	151
	32	15	8	38		15	38	38	151
	33	15	8	38		15	38	38	151
	34	15	8	38		15	38	38	151
	35	15	8	38		15	38	38	151
	36	15	8	38		15	38	38	151
	37	15	8	38		15	38	38	151
	38	15	8	38		15	38	38	151
	39	15	8	38		15	38	38	151
	40	15	8	38		15	38	38	151
<i>Total</i>		<i>604</i>	<i>302</i>	<i>1,511</i>		<i>604</i>	<i>1,511</i>	<i>1,511</i>	<i>6,045</i>

Sub Watershed #54 Annual Adoption (acres), Cropland BMPs

	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	24	12	59	24	59	59	236
	2	24	12	59	24	59	59	236
	3	24	12	59	24	59	59	236
	4	24	12	59	24	59	59	236
	5	24	12	59	24	59	59	236
<i>Total</i>		<i>118</i>	<i>59</i>	<i>295</i>	<i>118</i>	<i>295</i>	<i>295</i>	<i>1,181</i>
Medium-Term	6	24	12	59	24	59	59	236

	7	24	12	59	24	59	59	236
	8	24	12	59	24	59	59	236
	9	24	12	59	24	59	59	236
	10	24	12	59	24	59	59	236
<i>Total</i>		<i>236</i>	<i>118</i>	<i>591</i>	<i>236</i>	<i>591</i>	<i>591</i>	<i>2,362</i>
Long-Term	11	24	12	59	24	59	59	236
	12	24	12	59	24	59	59	236
	13	24	12	59	24	59	59	236
	14	24	12	59	24	59	59	236
	15	24	12	59	24	59	59	236
	16	24	12	59	24	59	59	236
	17	24	12	59	24	59	59	236
	18	24	12	59	24	59	59	236
	19	24	12	59	24	59	59	236
	20	24	12	59	24	59	59	236
	21	24	12	59	24	59	59	236
	22	24	12	59	24	59	59	236
	23	24	12	59	24	59	59	236
	24	24	12	59	24	59	59	236
	25	24	12	59	24	59	59	236
	26	24	12	59	24	59	59	236
	27	24	12	59	24	59	59	236
	28	24	12	59	24	59	59	236
	29	24	12	59	24	59	59	236
	30	24	12	59	24	59	59	236
	31	24	12	59	24	59	59	236
	32	24	12	59	24	59	59	236
	33	24	12	59	24	59	59	236
	34	24	12	59	24	59	59	236
	35	24	12	59	24	59	59	236
	36	24	12	59	24	59	59	236
	37	24	12	59	24	59	59	236
	38	24	12	59	24	59	59	236
	39	24	12	59	24	59	59	236
	40	24	12	59	24	59	59	236
<i>Total</i>		<i>945</i>	<i>472</i>	<i>2,362</i>	<i>945</i>	<i>2,362</i>	<i>2,362</i>	<i>9,448</i>

Sub Watershed #62 Annual Adoption (acres), Cropland BMPs

	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	39	19	96	39	96	96	385
	2	39	19	96	39	96	96	385
	3	39	19	96	39	96	96	385

	4	39	19	96	39	96	96	385
	5	39	19	96	39	96	96	385
<i>Total</i>		<i>193</i>	<i>96</i>	<i>482</i>	<i>193</i>	<i>482</i>	<i>482</i>	<i>1,927</i>
Medium-Term	6	39	19	96	39	96	96	385
	7	39	19	96	39	96	96	385
	8	39	19	96	39	96	96	385
	9	39	19	96	39	96	96	385
	10	39	19	96	39	96	96	385
<i>Total</i>		<i>385</i>	<i>193</i>	<i>964</i>	<i>385</i>	<i>964</i>	<i>964</i>	<i>3,855</i>
Long-Term	11	39	19	96	39	96	96	385
	12	39	19	96	39	96	96	385
	13	39	19	96	39	96	96	385
	14	39	19	96	39	96	96	385
	15	39	19	96	39	96	96	385
	16	39	19	96	39	96	96	385
	17	39	19	96	39	96	96	385
	18	39	19	96	39	96	96	385
	19	39	19	96	39	96	96	385
	20	39	19	96	39	96	96	385
	21	39	19	96	39	96	96	385
	22	39	19	96	39	96	96	385
	23	39	19	96	39	96	96	385
	24	39	19	96	39	96	96	385
	25	39	19	96	39	96	96	385
	26	39	19	96	39	96	96	385
	27	39	19	96	39	96	96	385
	28	39	19	96	39	96	96	385
	29	39	19	96	39	96	96	385
	30	39	19	96	39	96	96	385
	31	39	19	96	39	96	96	385
	32	39	19	96	39	96	96	385
	33	39	19	96	39	96	96	385
	34	39	19	96	39	96	96	385
	35	39	19	96	39	96	96	385
	36	39	19	96	39	96	96	385
	37	39	19	96	39	96	96	385
	38	39	19	96	39	96	96	385
	39	39	19	96	39	96	96	385
	40	39	19	96	39	96	96	385
<i>Total</i>		<i>1,542</i>	<i>771</i>	<i>3,855</i>	<i>1,542</i>	<i>3,855</i>	<i>3,855</i>	<i>15,419</i>

Sub Watershed #66 Annual Adoption (acres), Cropland BMPs

	Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total
Short-Term	1	40	20	101	40	101	101	405
	2	40	20	101	40	101	101	405
	3	40	20	101	40	101	101	405
	4	40	20	101	40	101	101	405
	5	40	20	101	40	101	101	405
Total		202	101	506	202	506	506	2,025
Medium-Term	6	40	20	101	40	101	101	405
	7	40	20	101	40	101	101	405
	8	40	20	101	40	101	101	405
	9	40	20	101	40	101	101	405
	10	40	20	101	40	101	101	405
Total		405	202	1,012	405	1,012	1,012	4,050
Long-Term	11	40	20	101	40	101	101	405
	12	40	20	101	40	101	101	405
	13	40	20	101	40	101	101	405
	14	40	20	101	40	101	101	405
	15	40	20	101	40	101	101	405
	16	40	20	101	40	101	101	405
	17	40	20	101	40	101	101	405
	18	40	20	101	40	101	101	405
	19	40	20	101	40	101	101	405
	20	40	20	101	40	101	101	405
	21	40	20	101	40	101	101	405
	22	40	20	101	40	101	101	405
	23	40	20	101	40	101	101	405
	24	40	20	101	40	101	101	405
	25	40	20	101	40	101	101	405
	26	40	20	101	40	101	101	405
	27	40	20	101	40	101	101	405
	28	40	20	101	40	101	101	405
	29	40	20	101	40	101	101	405
	30	40	20	101	40	101	101	405
	31	40	20	101	40	101	101	405
	32	40	20	101	40	101	101	405
	33	40	20	101	40	101	101	405
	34	40	20	101	40	101	101	405
	35	40	20	101	40	101	101	405
	36	40	20	101	40	101	101	405
	37	40	20	101	40	101	101	405
	38	40	20	101	40	101	101	405

	39	40	20	101	40	101	101	405
	40	40	20	101	40	101	101	405
<i>Total</i>	<i>1,620</i>	<i>810</i>	<i>4,050</i>	<i>1,620</i>	<i>4,050</i>	<i>4,050</i>	<i>16,199</i>	

13.3.3 Costs of Implementing BMPs by Subbasin

Table 52 Total Costs Before Cost Share by Subbasin

Sub-Watershed #35 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,828	\$11,766	\$5,883	\$3,530	\$47,065	\$2,285	\$72,357
2	\$1,883	\$12,119	\$6,060	\$3,636	\$48,477	\$2,354	\$74,528
3	\$1,940	\$12,483	\$6,241	\$3,745	\$49,931	\$2,424	\$76,764
4	\$1,998	\$12,857	\$6,429	\$3,857	\$51,429	\$2,497	\$79,067
5	\$2,058	\$13,243	\$6,621	\$3,973	\$52,972	\$2,572	\$81,439
6	\$2,119	\$13,640	\$6,820	\$4,092	\$54,561	\$2,649	\$83,882
7	\$2,183	\$14,049	\$7,025	\$4,215	\$56,198	\$2,729	\$86,398
8	\$2,248	\$14,471	\$7,235	\$4,341	\$57,883	\$2,811	\$88,990
9	\$2,316	\$14,905	\$7,452	\$4,471	\$59,620	\$2,895	\$91,660
10	\$2,385	\$15,352	\$7,676	\$4,606	\$61,409	\$2,982	\$94,410
11	\$2,457	\$15,813	\$7,906	\$4,744	\$63,251	\$3,071	\$97,242
12	\$2,531	\$16,287	\$8,144	\$4,886	\$65,148	\$3,163	\$100,159
13	\$2,607	\$16,776	\$8,388	\$5,033	\$67,103	\$3,258	\$103,164
14	\$2,685	\$17,279	\$8,639	\$5,184	\$69,116	\$3,356	\$106,259
15	\$2,765	\$17,797	\$8,899	\$5,339	\$71,189	\$3,457	\$109,447
16	\$2,848	\$18,331	\$9,166	\$5,499	\$73,325	\$3,560	\$112,730
17	\$2,934	\$18,881	\$9,441	\$5,664	\$75,525	\$3,667	\$116,112
18	\$3,022	\$19,448	\$9,724	\$5,834	\$77,791	\$3,777	\$119,595
19	\$3,112	\$20,031	\$10,016	\$6,009	\$80,124	\$3,891	\$123,183
20	\$3,206	\$20,632	\$10,316	\$6,190	\$82,528	\$4,007	\$126,879
21	\$3,302	\$21,251	\$10,625	\$6,375	\$85,004	\$4,127	\$130,685
22	\$3,401	\$21,888	\$10,944	\$6,567	\$87,554	\$4,251	\$134,606
23	\$3,503	\$22,545	\$11,273	\$6,764	\$90,181	\$4,379	\$138,644
24	\$3,608	\$23,222	\$11,611	\$6,966	\$92,886	\$4,510	\$142,803
25	\$3,716	\$23,918	\$11,959	\$7,175	\$95,673	\$4,646	\$147,087
26	\$3,828	\$24,636	\$12,318	\$7,391	\$98,543	\$4,785	\$151,500
27	\$3,943	\$25,375	\$12,687	\$7,612	\$101,499	\$4,928	\$156,045
28	\$4,061	\$26,136	\$13,068	\$7,841	\$104,544	\$5,076	\$160,726
29	\$4,183	\$26,920	\$13,460	\$8,076	\$107,680	\$5,229	\$165,548
30	\$4,308	\$27,728	\$13,864	\$8,318	\$110,911	\$5,385	\$170,514
31	\$4,438	\$28,560	\$14,280	\$8,568	\$114,238	\$5,547	\$175,630
32	\$4,571	\$29,416	\$14,708	\$8,825	\$117,665	\$5,713	\$180,899
33	\$4,708	\$30,299	\$15,149	\$9,090	\$121,195	\$5,885	\$186,326
34	\$4,849	\$31,208	\$15,604	\$9,362	\$124,831	\$6,061	\$191,915

35	\$4,995	\$32,144	\$16,072	\$9,643	\$128,576	\$6,243	\$197,673
36	\$5,144	\$33,108	\$16,554	\$9,932	\$132,433	\$6,430	\$203,603
37	\$5,299	\$34,102	\$17,051	\$10,230	\$136,406	\$6,623	\$209,711
38	\$5,458	\$35,125	\$17,562	\$10,537	\$140,498	\$6,822	\$216,002
39	\$5,621	\$36,178	\$18,089	\$10,854	\$144,713	\$7,027	\$222,483
40	\$5,790	\$37,264	\$18,632	\$11,179	\$149,055	\$7,238	\$229,157

3 percent Annual Cost Inflation

Sub-Watershed #42 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$2,136	\$13,749	\$6,875	\$4,125	\$54,996	\$2,670	\$84,551
2	\$2,200	\$14,162	\$7,081	\$4,248	\$56,646	\$2,751	\$87,088
3	\$2,266	\$14,586	\$7,293	\$4,376	\$58,346	\$2,833	\$89,701
4	\$2,334	\$15,024	\$7,512	\$4,507	\$60,096	\$2,918	\$92,392
5	\$2,404	\$15,475	\$7,737	\$4,642	\$61,899	\$3,006	\$95,163
6	\$2,477	\$15,939	\$7,969	\$4,782	\$63,756	\$3,096	\$98,018
7	\$2,551	\$16,417	\$8,209	\$4,925	\$65,668	\$3,189	\$100,959
8	\$2,627	\$16,910	\$8,455	\$5,073	\$67,639	\$3,284	\$103,988
9	\$2,706	\$17,417	\$8,708	\$5,225	\$69,668	\$3,383	\$107,107
10	\$2,787	\$17,939	\$8,970	\$5,382	\$71,758	\$3,484	\$110,320
11	\$2,871	\$18,478	\$9,239	\$5,543	\$73,910	\$3,589	\$113,630
12	\$2,957	\$19,032	\$9,516	\$5,710	\$76,128	\$3,696	\$117,039
13	\$3,046	\$19,603	\$9,801	\$5,881	\$78,412	\$3,807	\$120,550
14	\$3,137	\$20,191	\$10,095	\$6,057	\$80,764	\$3,922	\$124,167
15	\$3,231	\$20,797	\$10,398	\$6,239	\$83,187	\$4,039	\$127,892
16	\$3,328	\$21,421	\$10,710	\$6,426	\$85,682	\$4,160	\$131,728
17	\$3,428	\$22,063	\$11,032	\$6,619	\$88,253	\$4,285	\$135,680
18	\$3,531	\$22,725	\$11,363	\$6,818	\$90,901	\$4,414	\$139,751
19	\$3,637	\$23,407	\$11,703	\$7,022	\$93,628	\$4,546	\$143,943
20	\$3,746	\$24,109	\$12,055	\$7,233	\$96,436	\$4,683	\$148,261
21	\$3,858	\$24,832	\$12,416	\$7,450	\$99,329	\$4,823	\$152,709
22	\$3,974	\$25,577	\$12,789	\$7,673	\$102,309	\$4,968	\$157,290
23	\$4,093	\$26,345	\$13,172	\$7,903	\$105,379	\$5,117	\$162,009
24	\$4,216	\$27,135	\$13,567	\$8,140	\$108,540	\$5,270	\$166,869
25	\$4,343	\$27,949	\$13,975	\$8,385	\$111,796	\$5,428	\$171,876
26	\$4,473	\$28,788	\$14,394	\$8,636	\$115,150	\$5,591	\$177,032
27	\$4,607	\$29,651	\$14,826	\$8,895	\$118,605	\$5,759	\$182,343
28	\$4,745	\$30,541	\$15,270	\$9,162	\$122,163	\$5,932	\$187,813
29	\$4,888	\$31,457	\$15,728	\$9,437	\$125,828	\$6,110	\$193,447
30	\$5,034	\$32,401	\$16,200	\$9,720	\$129,602	\$6,293	\$199,251
31	\$5,185	\$33,373	\$16,686	\$10,012	\$133,490	\$6,482	\$205,228
32	\$5,341	\$34,374	\$17,187	\$10,312	\$137,495	\$6,676	\$211,385
33	\$5,501	\$35,405	\$17,703	\$10,622	\$141,620	\$6,877	\$217,727
34	\$5,666	\$36,467	\$18,234	\$10,940	\$145,869	\$7,083	\$224,259

35	\$5,836	\$37,561	\$18,781	\$11,268	\$150,245	\$7,295	\$230,986
36	\$6,011	\$38,688	\$19,344	\$11,606	\$154,752	\$7,514	\$237,916
37	\$6,192	\$39,849	\$19,924	\$11,955	\$159,395	\$7,740	\$245,053
38	\$6,377	\$41,044	\$20,522	\$12,313	\$164,176	\$7,972	\$252,405
39	\$6,569	\$42,275	\$21,138	\$12,683	\$169,102	\$8,211	\$259,977
40	\$6,766	\$43,544	\$21,772	\$13,063	\$174,175	\$8,457	\$267,777

3 Percent Annual Cost Inflation

Sub-Watershed #46 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,663	\$10,701	\$5,351	\$3,210	\$42,804	\$2,078	\$65,807
2	\$1,713	\$11,022	\$5,511	\$3,307	\$44,088	\$2,141	\$67,782
3	\$1,764	\$11,353	\$5,676	\$3,406	\$45,411	\$2,205	\$69,815
4	\$1,817	\$11,693	\$5,847	\$3,508	\$46,773	\$2,271	\$71,910
5	\$1,871	\$12,044	\$6,022	\$3,613	\$48,177	\$2,339	\$74,067
6	\$1,928	\$12,405	\$6,203	\$3,722	\$49,622	\$2,409	\$76,289
7	\$1,985	\$12,778	\$6,389	\$3,833	\$51,111	\$2,482	\$78,577
8	\$2,045	\$13,161	\$6,580	\$3,948	\$52,644	\$2,556	\$80,935
9	\$2,106	\$13,556	\$6,778	\$4,067	\$54,223	\$2,633	\$83,363
10	\$2,169	\$13,962	\$6,981	\$4,189	\$55,850	\$2,712	\$85,864
11	\$2,235	\$14,381	\$7,191	\$4,314	\$57,525	\$2,793	\$88,440
12	\$2,302	\$14,813	\$7,406	\$4,444	\$59,251	\$2,877	\$91,093
13	\$2,371	\$15,257	\$7,629	\$4,577	\$61,029	\$2,963	\$93,826
14	\$2,442	\$15,715	\$7,857	\$4,714	\$62,860	\$3,052	\$96,640
15	\$2,515	\$16,186	\$8,093	\$4,856	\$64,745	\$3,144	\$99,540
16	\$2,590	\$16,672	\$8,336	\$5,002	\$66,688	\$3,238	\$102,526
17	\$2,668	\$17,172	\$8,586	\$5,152	\$68,688	\$3,335	\$105,602
18	\$2,748	\$17,687	\$8,844	\$5,306	\$70,749	\$3,435	\$108,770
19	\$2,831	\$18,218	\$9,109	\$5,465	\$72,871	\$3,538	\$112,033
20	\$2,916	\$18,764	\$9,382	\$5,629	\$75,058	\$3,645	\$115,394
21	\$3,003	\$19,327	\$9,664	\$5,798	\$77,309	\$3,754	\$118,855
22	\$3,093	\$19,907	\$9,954	\$5,972	\$79,629	\$3,866	\$122,421
23	\$3,186	\$20,504	\$10,252	\$6,151	\$82,017	\$3,982	\$126,094
24	\$3,282	\$21,119	\$10,560	\$6,336	\$84,478	\$4,102	\$129,877
25	\$3,380	\$21,753	\$10,877	\$6,526	\$87,012	\$4,225	\$133,773
26	\$3,481	\$22,406	\$11,203	\$6,722	\$89,623	\$4,352	\$137,786
27	\$3,586	\$23,078	\$11,539	\$6,923	\$92,311	\$4,482	\$141,920
28	\$3,693	\$23,770	\$11,885	\$7,131	\$95,081	\$4,617	\$146,177
29	\$3,804	\$24,483	\$12,242	\$7,345	\$97,933	\$4,755	\$150,563
30	\$3,918	\$25,218	\$12,609	\$7,565	\$100,871	\$4,898	\$155,079
31	\$4,036	\$25,974	\$12,987	\$7,792	\$103,897	\$5,045	\$159,732
32	\$4,157	\$26,754	\$13,377	\$8,026	\$107,014	\$5,196	\$164,524
33	\$4,282	\$27,556	\$13,778	\$8,267	\$110,225	\$5,352	\$169,459
34	\$4,410	\$28,383	\$14,191	\$8,515	\$113,531	\$5,513	\$174,543

35	\$4,542	\$29,234	\$14,617	\$8,770	\$116,937	\$5,678	\$179,780
36	\$4,679	\$30,111	\$15,056	\$9,033	\$120,445	\$5,848	\$185,173
37	\$4,819	\$31,015	\$15,507	\$9,304	\$124,059	\$6,024	\$190,728
38	\$4,964	\$31,945	\$15,973	\$9,584	\$127,781	\$6,205	\$196,450
39	\$5,113	\$32,903	\$16,452	\$9,871	\$131,614	\$6,391	\$202,343
40	\$5,266	\$33,891	\$16,945	\$10,167	\$135,562	\$6,582	\$208,414

3 Percent Annual Cost Inflation

Sub-Watershed #47 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,800	\$11,582	\$5,791	\$3,475	\$46,329	\$2,250	\$71,226
2	\$1,854	\$11,930	\$5,965	\$3,579	\$47,719	\$2,317	\$73,363
3	\$1,909	\$12,288	\$6,144	\$3,686	\$49,150	\$2,387	\$75,564
4	\$1,967	\$12,656	\$6,328	\$3,797	\$50,625	\$2,458	\$77,831
5	\$2,026	\$13,036	\$6,518	\$3,911	\$52,144	\$2,532	\$80,166
6	\$2,086	\$13,427	\$6,714	\$4,028	\$53,708	\$2,608	\$82,571
7	\$2,149	\$13,830	\$6,915	\$4,149	\$55,319	\$2,686	\$85,048
8	\$2,213	\$14,245	\$7,122	\$4,273	\$56,979	\$2,767	\$87,599
9	\$2,280	\$14,672	\$7,336	\$4,402	\$58,688	\$2,850	\$90,227
10	\$2,348	\$15,112	\$7,556	\$4,534	\$60,449	\$2,935	\$92,934
11	\$2,419	\$15,566	\$7,783	\$4,670	\$62,262	\$3,023	\$95,722
12	\$2,491	\$16,033	\$8,016	\$4,810	\$64,130	\$3,114	\$98,594
13	\$2,566	\$16,514	\$8,257	\$4,954	\$66,054	\$3,207	\$101,552
14	\$2,643	\$17,009	\$8,504	\$5,103	\$68,036	\$3,304	\$104,598
15	\$2,722	\$17,519	\$8,760	\$5,256	\$70,077	\$3,403	\$107,736
16	\$2,804	\$18,045	\$9,022	\$5,413	\$72,179	\$3,505	\$110,968
17	\$2,888	\$18,586	\$9,293	\$5,576	\$74,345	\$3,610	\$114,297
18	\$2,975	\$19,144	\$9,572	\$5,743	\$76,575	\$3,718	\$117,726
19	\$3,064	\$19,718	\$9,859	\$5,915	\$78,872	\$3,830	\$121,258
20	\$3,156	\$20,310	\$10,155	\$6,093	\$81,238	\$3,945	\$124,896
21	\$3,250	\$20,919	\$10,459	\$6,276	\$83,675	\$4,063	\$128,643
22	\$3,348	\$21,546	\$10,773	\$6,464	\$86,186	\$4,185	\$132,502
23	\$3,448	\$22,193	\$11,096	\$6,658	\$88,771	\$4,310	\$136,477
24	\$3,552	\$22,859	\$11,429	\$6,858	\$91,434	\$4,440	\$140,571
25	\$3,658	\$23,544	\$11,772	\$7,063	\$94,177	\$4,573	\$144,788
26	\$3,768	\$24,251	\$12,125	\$7,275	\$97,003	\$4,710	\$149,132
27	\$3,881	\$24,978	\$12,489	\$7,493	\$99,913	\$4,851	\$153,606
28	\$3,998	\$25,728	\$12,864	\$7,718	\$102,910	\$4,997	\$158,214
29	\$4,117	\$26,499	\$13,250	\$7,950	\$105,998	\$5,147	\$162,961
30	\$4,241	\$27,294	\$13,647	\$8,188	\$109,177	\$5,301	\$167,850
31	\$4,368	\$28,113	\$14,057	\$8,434	\$112,453	\$5,460	\$172,885
32	\$4,499	\$28,957	\$14,478	\$8,687	\$115,826	\$5,624	\$178,072
33	\$4,634	\$29,825	\$14,913	\$8,948	\$119,301	\$5,793	\$183,414
34	\$4,773	\$30,720	\$15,360	\$9,216	\$122,880	\$5,967	\$188,916

35	\$4,916	\$31,642	\$15,821	\$9,492	\$126,567	\$6,146	\$194,584
36	\$5,064	\$32,591	\$16,295	\$9,777	\$130,364	\$6,330	\$200,421
37	\$5,216	\$33,569	\$16,784	\$10,071	\$134,274	\$6,520	\$206,434
38	\$5,372	\$34,576	\$17,288	\$10,373	\$138,303	\$6,715	\$212,627
39	\$5,534	\$35,613	\$17,806	\$10,684	\$142,452	\$6,917	\$219,006
40	\$5,700	\$36,681	\$18,341	\$11,004	\$146,725	\$7,124	\$225,576

3 Percent Annual Cost Inflation

Sub-Watershed #50 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,590	\$10,235	\$5,118	\$3,071	\$40,941	\$1,988	\$62,943
2	\$1,638	\$10,542	\$5,271	\$3,163	\$42,169	\$2,048	\$64,831
3	\$1,687	\$10,859	\$5,429	\$3,258	\$43,434	\$2,109	\$66,776
4	\$1,738	\$11,184	\$5,592	\$3,355	\$44,738	\$2,172	\$68,780
5	\$1,790	\$11,520	\$5,760	\$3,456	\$46,080	\$2,237	\$70,843
6	\$1,844	\$11,866	\$5,933	\$3,560	\$47,462	\$2,305	\$72,968
7	\$1,899	\$12,221	\$6,111	\$3,666	\$48,886	\$2,374	\$75,157
8	\$1,956	\$12,588	\$6,294	\$3,776	\$50,352	\$2,445	\$77,412
9	\$2,015	\$12,966	\$6,483	\$3,890	\$51,863	\$2,518	\$79,734
10	\$2,075	\$13,355	\$6,677	\$4,006	\$53,419	\$2,594	\$82,126
11	\$2,137	\$13,755	\$6,878	\$4,127	\$55,021	\$2,672	\$84,590
12	\$2,201	\$14,168	\$7,084	\$4,250	\$56,672	\$2,752	\$87,128
13	\$2,267	\$14,593	\$7,297	\$4,378	\$58,372	\$2,834	\$89,742
14	\$2,335	\$15,031	\$7,515	\$4,509	\$60,123	\$2,919	\$92,434
15	\$2,406	\$15,482	\$7,741	\$4,645	\$61,927	\$3,007	\$95,207
16	\$2,478	\$15,946	\$7,973	\$4,784	\$63,785	\$3,097	\$98,063
17	\$2,552	\$16,425	\$8,212	\$4,927	\$65,699	\$3,190	\$101,005
18	\$2,629	\$16,917	\$8,459	\$5,075	\$67,669	\$3,286	\$104,035
19	\$2,707	\$17,425	\$8,712	\$5,227	\$69,700	\$3,384	\$107,156
20	\$2,789	\$17,948	\$8,974	\$5,384	\$71,791	\$3,486	\$110,371
21	\$2,872	\$18,486	\$9,243	\$5,546	\$73,944	\$3,590	\$113,682
22	\$2,959	\$19,041	\$9,520	\$5,712	\$76,163	\$3,698	\$117,092
23	\$3,047	\$19,612	\$9,806	\$5,884	\$78,447	\$3,809	\$120,605
24	\$3,139	\$20,200	\$10,100	\$6,060	\$80,801	\$3,923	\$124,223
25	\$3,233	\$20,806	\$10,403	\$6,242	\$83,225	\$4,041	\$127,950
26	\$3,330	\$21,430	\$10,715	\$6,429	\$85,722	\$4,162	\$131,789
27	\$3,430	\$22,073	\$11,037	\$6,622	\$88,293	\$4,287	\$135,742
28	\$3,533	\$22,736	\$11,368	\$6,821	\$90,942	\$4,416	\$139,815
29	\$3,639	\$23,418	\$11,709	\$7,025	\$93,670	\$4,548	\$144,009
30	\$3,748	\$24,120	\$12,060	\$7,236	\$96,481	\$4,685	\$148,329
31	\$3,860	\$24,844	\$12,422	\$7,453	\$99,375	\$4,825	\$152,779
32	\$3,976	\$25,589	\$12,795	\$7,677	\$102,356	\$4,970	\$157,363
33	\$4,095	\$26,357	\$13,178	\$7,907	\$105,427	\$5,119	\$162,083
34	\$4,218	\$27,147	\$13,574	\$8,144	\$108,590	\$5,273	\$166,946

35	\$4,345	\$27,962	\$13,981	\$8,389	\$111,847	\$5,431	\$171,954
36	\$4,475	\$28,801	\$14,400	\$8,640	\$115,203	\$5,594	\$177,113
37	\$4,609	\$29,665	\$14,832	\$8,899	\$118,659	\$5,762	\$182,426
38	\$4,748	\$30,555	\$15,277	\$9,166	\$122,219	\$5,934	\$187,899
39	\$4,890	\$31,471	\$15,736	\$9,441	\$125,885	\$6,113	\$193,536
40	\$5,037	\$32,415	\$16,208	\$9,725	\$129,662	\$6,296	\$199,342

3 Percent Annual Cost Inflation

Sub-Watershed #53 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,174	\$7,556	\$3,778	\$2,267	\$30,224	\$1,468	\$46,467
2	\$1,209	\$7,783	\$3,891	\$2,335	\$31,131	\$1,512	\$47,861
3	\$1,246	\$8,016	\$4,008	\$2,405	\$32,065	\$1,557	\$49,297
4	\$1,283	\$8,257	\$4,128	\$2,477	\$33,027	\$1,604	\$50,776
5	\$1,321	\$8,504	\$4,252	\$2,551	\$34,018	\$1,652	\$52,299
6	\$1,361	\$8,760	\$4,380	\$2,628	\$35,038	\$1,701	\$53,868
7	\$1,402	\$9,022	\$4,511	\$2,707	\$36,089	\$1,752	\$55,484
8	\$1,444	\$9,293	\$4,647	\$2,788	\$37,172	\$1,805	\$57,148
9	\$1,487	\$9,572	\$4,786	\$2,872	\$38,287	\$1,859	\$58,863
10	\$1,532	\$9,859	\$4,929	\$2,958	\$39,436	\$1,915	\$60,629
11	\$1,578	\$10,155	\$5,077	\$3,046	\$40,619	\$1,972	\$62,448
12	\$1,625	\$10,459	\$5,230	\$3,138	\$41,838	\$2,031	\$64,321
13	\$1,674	\$10,773	\$5,387	\$3,232	\$43,093	\$2,092	\$66,251
14	\$1,724	\$11,096	\$5,548	\$3,329	\$44,385	\$2,155	\$68,238
15	\$1,776	\$11,429	\$5,715	\$3,429	\$45,717	\$2,220	\$70,285
16	\$1,829	\$11,772	\$5,886	\$3,532	\$47,088	\$2,286	\$72,394
17	\$1,884	\$12,125	\$6,063	\$3,638	\$48,501	\$2,355	\$74,566
18	\$1,941	\$12,489	\$6,245	\$3,747	\$49,956	\$2,426	\$76,803
19	\$1,999	\$12,864	\$6,432	\$3,859	\$51,455	\$2,498	\$79,107
20	\$2,059	\$13,250	\$6,625	\$3,975	\$52,999	\$2,573	\$81,480
21	\$2,120	\$13,647	\$6,824	\$4,094	\$54,588	\$2,651	\$83,924
22	\$2,184	\$14,057	\$7,028	\$4,217	\$56,226	\$2,730	\$86,442
23	\$2,250	\$14,478	\$7,239	\$4,343	\$57,913	\$2,812	\$89,035
24	\$2,317	\$14,913	\$7,456	\$4,474	\$59,650	\$2,896	\$91,706
25	\$2,387	\$15,360	\$7,680	\$4,608	\$61,440	\$2,983	\$94,458
26	\$2,458	\$15,821	\$7,910	\$4,746	\$63,283	\$3,073	\$97,291
27	\$2,532	\$16,295	\$8,148	\$4,889	\$65,181	\$3,165	\$100,210
28	\$2,608	\$16,784	\$8,392	\$5,035	\$67,137	\$3,260	\$103,216
29	\$2,686	\$17,288	\$8,644	\$5,186	\$69,151	\$3,358	\$106,313
30	\$2,767	\$17,806	\$8,903	\$5,342	\$71,226	\$3,458	\$109,502
31	\$2,850	\$18,341	\$9,170	\$5,502	\$73,362	\$3,562	\$112,787
32	\$2,935	\$18,891	\$9,445	\$5,667	\$75,563	\$3,669	\$116,171
33	\$3,023	\$19,458	\$9,729	\$5,837	\$77,830	\$3,779	\$119,656
34	\$3,114	\$20,041	\$10,021	\$6,012	\$80,165	\$3,893	\$123,246

35	\$3,207	\$20,642	\$10,321	\$6,193	\$82,570	\$4,009	\$126,943
36	\$3,304	\$21,262	\$10,631	\$6,379	\$85,047	\$4,130	\$130,751
37	\$3,403	\$21,900	\$10,950	\$6,570	\$87,598	\$4,253	\$134,674
38	\$3,505	\$22,557	\$11,278	\$6,767	\$90,226	\$4,381	\$138,714
39	\$3,610	\$23,233	\$11,617	\$6,970	\$92,933	\$4,512	\$142,876
40	\$3,718	\$23,930	\$11,965	\$7,179	\$95,721	\$4,648	\$147,162

3 Percent Annual Cost Inflation

Sub-Watershed #54 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,835	\$11,810	\$5,905	\$3,543	\$47,241	\$2,294	\$72,628
2	\$1,890	\$12,164	\$6,082	\$3,649	\$48,658	\$2,363	\$74,807
3	\$1,947	\$12,529	\$6,265	\$3,759	\$50,118	\$2,434	\$77,051
4	\$2,005	\$12,905	\$6,453	\$3,872	\$51,621	\$2,507	\$79,363
5	\$2,065	\$13,292	\$6,646	\$3,988	\$53,170	\$2,582	\$81,743
6	\$2,127	\$13,691	\$6,846	\$4,107	\$54,765	\$2,659	\$84,196
7	\$2,191	\$14,102	\$7,051	\$4,231	\$56,408	\$2,739	\$86,722
8	\$2,257	\$14,525	\$7,263	\$4,358	\$58,100	\$2,821	\$89,323
9	\$2,325	\$14,961	\$7,480	\$4,488	\$59,843	\$2,906	\$92,003
10	\$2,394	\$15,410	\$7,705	\$4,623	\$61,638	\$2,993	\$94,763
11	\$2,466	\$15,872	\$7,936	\$4,762	\$63,488	\$3,083	\$97,606
12	\$2,540	\$16,348	\$8,174	\$4,904	\$65,392	\$3,175	\$100,534
13	\$2,616	\$16,839	\$8,419	\$5,052	\$67,354	\$3,270	\$103,550
14	\$2,695	\$17,344	\$8,672	\$5,203	\$69,375	\$3,369	\$106,657
15	\$2,776	\$17,864	\$8,932	\$5,359	\$71,456	\$3,470	\$109,856
16	\$2,859	\$18,400	\$9,200	\$5,520	\$73,600	\$3,574	\$113,152
17	\$2,945	\$18,952	\$9,476	\$5,686	\$75,808	\$3,681	\$116,547
18	\$3,033	\$19,520	\$9,760	\$5,856	\$78,082	\$3,791	\$120,043
19	\$3,124	\$20,106	\$10,053	\$6,032	\$80,424	\$3,905	\$123,644
20	\$3,218	\$20,709	\$10,355	\$6,213	\$82,837	\$4,022	\$127,354
21	\$3,314	\$21,331	\$10,665	\$6,399	\$85,322	\$4,143	\$131,174
22	\$3,414	\$21,970	\$10,985	\$6,591	\$87,882	\$4,267	\$135,109
23	\$3,516	\$22,630	\$11,315	\$6,789	\$90,518	\$4,395	\$139,163
24	\$3,622	\$23,308	\$11,654	\$6,993	\$93,234	\$4,527	\$143,338
25	\$3,730	\$24,008	\$12,004	\$7,202	\$96,031	\$4,663	\$147,638
26	\$3,842	\$24,728	\$12,364	\$7,418	\$98,912	\$4,803	\$152,067
27	\$3,957	\$25,470	\$12,735	\$7,641	\$101,879	\$4,947	\$156,629
28	\$4,076	\$26,234	\$13,117	\$7,870	\$104,935	\$5,095	\$161,328
29	\$4,199	\$27,021	\$13,510	\$8,106	\$108,083	\$5,248	\$166,168
30	\$4,324	\$27,831	\$13,916	\$8,349	\$111,326	\$5,406	\$171,153
31	\$4,454	\$28,666	\$14,333	\$8,600	\$114,666	\$5,568	\$176,287
32	\$4,588	\$29,526	\$14,763	\$8,858	\$118,106	\$5,735	\$181,576
33	\$4,725	\$30,412	\$15,206	\$9,124	\$121,649	\$5,907	\$187,023
34	\$4,867	\$31,325	\$15,662	\$9,397	\$125,298	\$6,084	\$192,634

35	\$5,013	\$32,264	\$16,132	\$9,679	\$129,057	\$6,267	\$198,413
36	\$5,164	\$33,232	\$16,616	\$9,970	\$132,929	\$6,455	\$204,365
37	\$5,319	\$34,229	\$17,115	\$10,269	\$136,917	\$6,648	\$210,496
38	\$5,478	\$35,256	\$17,628	\$10,577	\$141,024	\$6,848	\$216,811
39	\$5,642	\$36,314	\$18,157	\$10,894	\$145,255	\$7,053	\$223,315
40	\$5,812	\$37,403	\$18,702	\$11,221	\$149,613	\$7,265	\$230,015

3 Percent Annual Cost Inflation

Sub-Watershed #62 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$2,995	\$19,273	\$9,637	\$5,782	\$77,093	\$3,743	\$118,523
2	\$3,085	\$19,851	\$9,926	\$5,955	\$79,406	\$3,856	\$122,078
3	\$3,177	\$20,447	\$10,223	\$6,134	\$81,788	\$3,971	\$125,741
4	\$3,272	\$21,060	\$10,530	\$6,318	\$84,241	\$4,090	\$129,513
5	\$3,371	\$21,692	\$10,846	\$6,508	\$86,769	\$4,213	\$133,398
6	\$3,472	\$22,343	\$11,171	\$6,703	\$89,372	\$4,340	\$137,400
7	\$3,576	\$23,013	\$11,507	\$6,904	\$92,053	\$4,470	\$141,522
8	\$3,683	\$23,704	\$11,852	\$7,111	\$94,814	\$4,604	\$145,768
9	\$3,794	\$24,415	\$12,207	\$7,324	\$97,659	\$4,742	\$150,141
10	\$3,907	\$25,147	\$12,574	\$7,544	\$100,589	\$4,884	\$154,645
11	\$4,025	\$25,902	\$12,951	\$7,770	\$103,606	\$5,031	\$159,285
12	\$4,145	\$26,679	\$13,339	\$8,004	\$106,715	\$5,182	\$164,063
13	\$4,270	\$27,479	\$13,739	\$8,244	\$109,916	\$5,337	\$168,985
14	\$4,398	\$28,303	\$14,152	\$8,491	\$113,213	\$5,497	\$174,054
15	\$4,530	\$29,152	\$14,576	\$8,746	\$116,610	\$5,662	\$179,276
16	\$4,666	\$30,027	\$15,014	\$9,008	\$120,108	\$5,832	\$184,654
17	\$4,806	\$30,928	\$15,464	\$9,278	\$123,711	\$6,007	\$190,194
18	\$4,950	\$31,856	\$15,928	\$9,557	\$127,423	\$6,187	\$195,900
19	\$5,098	\$32,811	\$16,406	\$9,843	\$131,245	\$6,373	\$201,777
20	\$5,251	\$33,796	\$16,898	\$10,139	\$135,183	\$6,564	\$207,830
21	\$5,409	\$34,810	\$17,405	\$10,443	\$139,238	\$6,761	\$214,065
22	\$5,571	\$35,854	\$17,927	\$10,756	\$143,415	\$6,964	\$220,487
23	\$5,738	\$36,929	\$18,465	\$11,079	\$147,718	\$7,173	\$227,102
24	\$5,910	\$38,037	\$19,019	\$11,411	\$152,149	\$7,388	\$233,915
25	\$6,088	\$39,178	\$19,589	\$11,754	\$156,714	\$7,609	\$240,932
26	\$6,270	\$40,354	\$20,177	\$12,106	\$161,415	\$7,838	\$248,160
27	\$6,458	\$41,564	\$20,782	\$12,469	\$166,258	\$8,073	\$255,605
28	\$6,652	\$42,811	\$21,406	\$12,843	\$171,245	\$8,315	\$263,273
29	\$6,852	\$44,096	\$22,048	\$13,229	\$176,383	\$8,564	\$271,171
30	\$7,057	\$45,419	\$22,709	\$13,626	\$181,674	\$8,821	\$279,306
31	\$7,269	\$46,781	\$23,391	\$14,034	\$187,125	\$9,086	\$287,686
32	\$7,487	\$48,185	\$24,092	\$14,455	\$192,738	\$9,359	\$296,316
33	\$7,712	\$49,630	\$24,815	\$14,889	\$198,520	\$9,639	\$305,206
34	\$7,943	\$51,119	\$25,560	\$15,336	\$204,476	\$9,929	\$314,362

35	\$8,181	\$52,653	\$26,326	\$15,796	\$210,610	\$10,226	\$323,793
36	\$8,427	\$54,232	\$27,116	\$16,270	\$216,929	\$10,533	\$333,506
37	\$8,679	\$55,859	\$27,930	\$16,758	\$223,437	\$10,849	\$343,512
38	\$8,940	\$57,535	\$28,767	\$17,260	\$230,140	\$11,175	\$353,817
39	\$9,208	\$59,261	\$29,630	\$17,778	\$237,044	\$11,510	\$364,431
40	\$9,484	\$61,039	\$30,519	\$18,312	\$244,155	\$11,855	\$375,364

3 Percent Annual Cost Inflation

Sub-Watershed #66 Annual Cost Before Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$3,146	\$20,248	\$10,124	\$6,074	\$80,993	\$3,933	\$124,518
2	\$3,241	\$20,856	\$10,428	\$6,257	\$83,422	\$4,051	\$128,254
3	\$3,338	\$21,481	\$10,741	\$6,444	\$85,925	\$4,172	\$132,101
4	\$3,438	\$22,126	\$11,063	\$6,638	\$88,503	\$4,297	\$136,064
5	\$3,541	\$22,789	\$11,395	\$6,837	\$91,158	\$4,426	\$140,146
6	\$3,647	\$23,473	\$11,737	\$7,042	\$93,893	\$4,559	\$144,351
7	\$3,757	\$24,177	\$12,089	\$7,253	\$96,709	\$4,696	\$148,681
8	\$3,869	\$24,903	\$12,451	\$7,471	\$99,611	\$4,837	\$153,142
9	\$3,985	\$25,650	\$12,825	\$7,695	\$102,599	\$4,982	\$157,736
10	\$4,105	\$26,419	\$13,210	\$7,926	\$105,677	\$5,131	\$162,468
11	\$4,228	\$27,212	\$13,606	\$8,164	\$108,847	\$5,285	\$167,342
12	\$4,355	\$28,028	\$14,014	\$8,408	\$112,113	\$5,444	\$172,362
13	\$4,486	\$28,869	\$14,435	\$8,661	\$115,476	\$5,607	\$177,533
14	\$4,620	\$29,735	\$14,868	\$8,921	\$118,940	\$5,775	\$182,859
15	\$4,759	\$30,627	\$15,314	\$9,188	\$122,509	\$5,949	\$188,345
16	\$4,902	\$31,546	\$15,773	\$9,464	\$126,184	\$6,127	\$193,995
17	\$5,049	\$32,492	\$16,246	\$9,748	\$129,969	\$6,311	\$199,815
18	\$5,200	\$33,467	\$16,734	\$10,040	\$133,868	\$6,500	\$205,809
19	\$5,356	\$34,471	\$17,236	\$10,341	\$137,884	\$6,695	\$211,984
20	\$5,517	\$35,505	\$17,753	\$10,652	\$142,021	\$6,896	\$218,343
21	\$5,682	\$36,570	\$18,285	\$10,971	\$146,282	\$7,103	\$224,893
22	\$5,853	\$37,668	\$18,834	\$11,300	\$150,670	\$7,316	\$231,640
23	\$6,028	\$38,798	\$19,399	\$11,639	\$155,190	\$7,535	\$238,589
24	\$6,209	\$39,961	\$19,981	\$11,988	\$159,846	\$7,762	\$245,747
25	\$6,395	\$41,160	\$20,580	\$12,348	\$164,641	\$7,994	\$253,120
26	\$6,587	\$42,395	\$21,198	\$12,719	\$169,580	\$8,234	\$260,713
27	\$6,785	\$43,667	\$21,833	\$13,100	\$174,668	\$8,481	\$268,535
28	\$6,989	\$44,977	\$22,488	\$13,493	\$179,908	\$8,736	\$276,591
29	\$7,198	\$46,326	\$23,163	\$13,898	\$185,305	\$8,998	\$284,888
30	\$7,414	\$47,716	\$23,858	\$14,315	\$190,864	\$9,268	\$293,435
31	\$7,637	\$49,148	\$24,574	\$14,744	\$196,590	\$9,546	\$302,238
32	\$7,866	\$50,622	\$25,311	\$15,187	\$202,488	\$9,832	\$311,305
33	\$8,102	\$52,141	\$26,070	\$15,642	\$208,563	\$10,127	\$320,644
34	\$8,345	\$53,705	\$26,852	\$16,111	\$214,819	\$10,431	\$330,264

35	\$8,595	\$55,316	\$27,658	\$16,595	\$221,264	\$10,744	\$340,172
36	\$8,853	\$56,975	\$28,488	\$17,093	\$227,902	\$11,066	\$350,377
37	\$9,118	\$58,685	\$29,342	\$17,605	\$234,739	\$11,398	\$360,888
38	\$9,392	\$60,445	\$30,223	\$18,134	\$241,781	\$11,740	\$371,715
39	\$9,674	\$62,259	\$31,129	\$18,678	\$249,035	\$12,092	\$382,866
40	\$9,964	\$64,126	\$32,063	\$19,238	\$256,506	\$12,455	\$394,352

3 Percent Annual Cost Inflation

Table 53 Total Costs After Cost Share by Subbasin

Sub-Watershed #35 Annual Cost After Cost-Share							
Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,115	\$1,177	\$2,942	\$1,765	\$23,532	\$2,285	\$32,816
2	\$1,149	\$1,212	\$3,030	\$1,818	\$24,238	\$2,354	\$33,800
3	\$1,183	\$1,248	\$3,121	\$1,872	\$24,965	\$2,424	\$34,814
4	\$1,219	\$1,286	\$3,214	\$1,929	\$25,714	\$2,497	\$35,859
5	\$1,255	\$1,324	\$3,311	\$1,986	\$26,486	\$2,572	\$36,935
6	\$1,293	\$1,364	\$3,410	\$2,046	\$27,280	\$2,649	\$38,043
7	\$1,332	\$1,405	\$3,512	\$2,107	\$28,099	\$2,729	\$39,184
8	\$1,372	\$1,447	\$3,618	\$2,171	\$28,942	\$2,811	\$40,359
9	\$1,413	\$1,490	\$3,726	\$2,236	\$29,810	\$2,895	\$41,570
10	\$1,455	\$1,535	\$3,838	\$2,303	\$30,704	\$2,982	\$42,817
11	\$1,499	\$1,581	\$3,953	\$2,372	\$31,625	\$3,071	\$44,102
12	\$1,544	\$1,629	\$4,072	\$2,443	\$32,574	\$3,163	\$45,425
13	\$1,590	\$1,678	\$4,194	\$2,516	\$33,551	\$3,258	\$46,788
14	\$1,638	\$1,728	\$4,320	\$2,592	\$34,558	\$3,356	\$48,191
15	\$1,687	\$1,780	\$4,449	\$2,670	\$35,595	\$3,457	\$49,637
16	\$1,737	\$1,833	\$4,583	\$2,750	\$36,663	\$3,560	\$51,126
17	\$1,790	\$1,888	\$4,720	\$2,832	\$37,762	\$3,667	\$52,660
18	\$1,843	\$1,945	\$4,862	\$2,917	\$38,895	\$3,777	\$54,240
19	\$1,899	\$2,003	\$5,008	\$3,005	\$40,062	\$3,891	\$55,867
20	\$1,956	\$2,063	\$5,158	\$3,095	\$41,264	\$4,007	\$57,543
21	\$2,014	\$2,125	\$5,313	\$3,188	\$42,502	\$4,127	\$59,269
22	\$2,075	\$2,189	\$5,472	\$3,283	\$43,777	\$4,251	\$61,047
23	\$2,137	\$2,255	\$5,636	\$3,382	\$45,090	\$4,379	\$62,879
24	\$2,201	\$2,322	\$5,805	\$3,483	\$46,443	\$4,510	\$64,765
25	\$2,267	\$2,392	\$5,980	\$3,588	\$47,836	\$4,646	\$66,708
26	\$2,335	\$2,464	\$6,159	\$3,695	\$49,271	\$4,785	\$68,709
27	\$2,405	\$2,537	\$6,344	\$3,806	\$50,750	\$4,928	\$70,770
28	\$2,477	\$2,614	\$6,534	\$3,920	\$52,272	\$5,076	\$72,894
29	\$2,552	\$2,692	\$6,730	\$4,038	\$53,840	\$5,229	\$75,080
30	\$2,628	\$2,773	\$6,932	\$4,159	\$55,455	\$5,385	\$77,333
31	\$2,707	\$2,856	\$7,140	\$4,284	\$57,119	\$5,547	\$79,653
32	\$2,788	\$2,942	\$7,354	\$4,412	\$58,833	\$5,713	\$82,042
33	\$2,872	\$3,030	\$7,575	\$4,545	\$60,598	\$5,885	\$84,504

34	\$2,958	\$3,121	\$7,802	\$4,681	\$62,416	\$6,061	\$87,039
35	\$3,047	\$3,214	\$8,036	\$4,822	\$64,288	\$6,243	\$89,650
36	\$3,138	\$3,311	\$8,277	\$4,966	\$66,217	\$6,430	\$92,339
37	\$3,232	\$3,410	\$8,525	\$5,115	\$68,203	\$6,623	\$95,109
38	\$3,329	\$3,512	\$8,781	\$5,269	\$70,249	\$6,822	\$97,963
39	\$3,429	\$3,618	\$9,045	\$5,427	\$72,357	\$7,027	\$100,902
40	\$3,532	\$3,726	\$9,316	\$5,590	\$74,527	\$7,238	\$103,929

3 Percent Annual Cost
Inflation

Sub-Watershed #42 Annual Cost After Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$2,136	\$13,749	\$6,875	\$4,125	\$54,996	\$2,670	\$84,551
2	\$2,200	\$14,162	\$7,081	\$4,248	\$56,646	\$2,751	\$87,088
3	\$2,266	\$14,586	\$7,293	\$4,376	\$58,346	\$2,833	\$89,701
4	\$2,334	\$15,024	\$7,512	\$4,507	\$60,096	\$2,918	\$92,392
5	\$2,404	\$15,475	\$7,737	\$4,642	\$61,899	\$3,006	\$95,163
6	\$2,477	\$15,939	\$7,969	\$4,782	\$63,756	\$3,096	\$98,018
7	\$2,551	\$16,417	\$8,209	\$4,925	\$65,668	\$3,189	\$100,959
8	\$2,627	\$16,910	\$8,455	\$5,073	\$67,639	\$3,284	\$103,988
9	\$2,706	\$17,417	\$8,708	\$5,225	\$69,668	\$3,383	\$107,107
10	\$2,787	\$17,939	\$8,970	\$5,382	\$71,758	\$3,484	\$110,320
11	\$2,871	\$18,478	\$9,239	\$5,543	\$73,910	\$3,589	\$113,630
12	\$2,957	\$19,032	\$9,516	\$5,710	\$76,128	\$3,696	\$117,039
13	\$3,046	\$19,603	\$9,801	\$5,881	\$78,412	\$3,807	\$120,550
14	\$3,137	\$20,191	\$10,095	\$6,057	\$80,764	\$3,922	\$124,167
15	\$3,231	\$20,797	\$10,398	\$6,239	\$83,187	\$4,039	\$127,892
16	\$3,328	\$21,421	\$10,710	\$6,426	\$85,682	\$4,160	\$131,728
17	\$3,428	\$22,063	\$11,032	\$6,619	\$88,253	\$4,285	\$135,680
18	\$3,531	\$22,725	\$11,363	\$6,818	\$90,901	\$4,414	\$139,751
19	\$3,637	\$23,407	\$11,703	\$7,022	\$93,628	\$4,546	\$143,943
20	\$3,746	\$24,109	\$12,055	\$7,233	\$96,436	\$4,683	\$148,261
21	\$3,858	\$24,832	\$12,416	\$7,450	\$99,329	\$4,823	\$152,709
22	\$3,974	\$25,577	\$12,789	\$7,673	\$102,309	\$4,968	\$157,290
23	\$4,093	\$26,345	\$13,172	\$7,903	\$105,379	\$5,117	\$162,009
24	\$4,216	\$27,135	\$13,567	\$8,140	\$108,540	\$5,270	\$166,869
25	\$4,343	\$27,949	\$13,975	\$8,385	\$111,796	\$5,428	\$171,876
26	\$4,473	\$28,788	\$14,394	\$8,636	\$115,150	\$5,591	\$177,032
27	\$4,607	\$29,651	\$14,826	\$8,895	\$118,605	\$5,759	\$182,343
28	\$4,745	\$30,541	\$15,270	\$9,162	\$122,163	\$5,932	\$187,813
29	\$4,888	\$31,457	\$15,728	\$9,437	\$125,828	\$6,110	\$193,447
30	\$5,034	\$32,401	\$16,200	\$9,720	\$129,602	\$6,293	\$199,251
31	\$5,185	\$33,373	\$16,686	\$10,012	\$133,490	\$6,482	\$205,228
32	\$5,341	\$34,374	\$17,187	\$10,312	\$137,495	\$6,676	\$211,385

33	\$5,501	\$35,405	\$17,703	\$10,622	\$141,620	\$6,877	\$217,727
34	\$5,666	\$36,467	\$18,234	\$10,940	\$145,869	\$7,083	\$224,259
35	\$5,836	\$37,561	\$18,781	\$11,268	\$150,245	\$7,295	\$230,986
36	\$6,011	\$38,688	\$19,344	\$11,606	\$154,752	\$7,514	\$237,916
37	\$6,192	\$39,849	\$19,924	\$11,955	\$159,395	\$7,740	\$245,053
38	\$6,377	\$41,044	\$20,522	\$12,313	\$164,176	\$7,972	\$252,405
39	\$6,569	\$42,275	\$21,138	\$12,683	\$169,102	\$8,211	\$259,977
40	\$6,766	\$43,544	\$21,772	\$13,063	\$174,175	\$8,457	\$267,777

3 Percent Annual Cost
Inflation

Sub-Watershed #46 Annual Cost After Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,663	\$10,701	\$5,351	\$3,210	\$42,804	\$2,078	\$65,807
2	\$1,713	\$11,022	\$5,511	\$3,307	\$44,088	\$2,141	\$67,782
3	\$1,764	\$11,353	\$5,676	\$3,406	\$45,411	\$2,205	\$69,815
4	\$1,817	\$11,693	\$5,847	\$3,508	\$46,773	\$2,271	\$71,910
5	\$1,871	\$12,044	\$6,022	\$3,613	\$48,177	\$2,339	\$74,067
6	\$1,928	\$12,405	\$6,203	\$3,722	\$49,622	\$2,409	\$76,289
7	\$1,985	\$12,778	\$6,389	\$3,833	\$51,111	\$2,482	\$78,577
8	\$2,045	\$13,161	\$6,580	\$3,948	\$52,644	\$2,556	\$80,935
9	\$2,106	\$13,556	\$6,778	\$4,067	\$54,223	\$2,633	\$83,363
10	\$2,169	\$13,962	\$6,981	\$4,189	\$55,850	\$2,712	\$85,864
11	\$2,235	\$14,381	\$7,191	\$4,314	\$57,525	\$2,793	\$88,440
12	\$2,302	\$14,813	\$7,406	\$4,444	\$59,251	\$2,877	\$91,093
13	\$2,371	\$15,257	\$7,629	\$4,577	\$61,029	\$2,963	\$93,826
14	\$2,442	\$15,715	\$7,857	\$4,714	\$62,860	\$3,052	\$96,640
15	\$2,515	\$16,186	\$8,093	\$4,856	\$64,745	\$3,144	\$99,540
16	\$2,590	\$16,672	\$8,336	\$5,002	\$66,688	\$3,238	\$102,526
17	\$2,668	\$17,172	\$8,586	\$5,152	\$68,688	\$3,335	\$105,602
18	\$2,748	\$17,687	\$8,844	\$5,306	\$70,749	\$3,435	\$108,770
19	\$2,831	\$18,218	\$9,109	\$5,465	\$72,871	\$3,538	\$112,033
20	\$2,916	\$18,764	\$9,382	\$5,629	\$75,058	\$3,645	\$115,394
21	\$3,003	\$19,327	\$9,664	\$5,798	\$77,309	\$3,754	\$118,855
22	\$3,093	\$19,907	\$9,954	\$5,972	\$79,629	\$3,866	\$122,421
23	\$3,186	\$20,504	\$10,252	\$6,151	\$82,017	\$3,982	\$126,094
24	\$3,282	\$21,119	\$10,560	\$6,336	\$84,478	\$4,102	\$129,877
25	\$3,380	\$21,753	\$10,877	\$6,526	\$87,012	\$4,225	\$133,773
26	\$3,481	\$22,406	\$11,203	\$6,722	\$89,623	\$4,352	\$137,786
27	\$3,586	\$23,078	\$11,539	\$6,923	\$92,311	\$4,482	\$141,920
28	\$3,693	\$23,770	\$11,885	\$7,131	\$95,081	\$4,617	\$146,177
29	\$3,804	\$24,483	\$12,242	\$7,345	\$97,933	\$4,755	\$150,563
30	\$3,918	\$25,218	\$12,609	\$7,565	\$100,871	\$4,898	\$155,079
31	\$4,036	\$25,974	\$12,987	\$7,792	\$103,897	\$5,045	\$159,732

32	\$4,157	\$26,754	\$13,377	\$8,026	\$107,014	\$5,196	\$164,524
33	\$4,282	\$27,556	\$13,778	\$8,267	\$110,225	\$5,352	\$169,459
34	\$4,410	\$28,383	\$14,191	\$8,515	\$113,531	\$5,513	\$174,543
35	\$4,542	\$29,234	\$14,617	\$8,770	\$116,937	\$5,678	\$179,780
36	\$4,679	\$30,111	\$15,056	\$9,033	\$120,445	\$5,848	\$185,173
37	\$4,819	\$31,015	\$15,507	\$9,304	\$124,059	\$6,024	\$190,728
38	\$4,964	\$31,945	\$15,973	\$9,584	\$127,781	\$6,205	\$196,450
39	\$5,113	\$32,903	\$16,452	\$9,871	\$131,614	\$6,391	\$202,343
40	\$5,266	\$33,891	\$16,945	\$10,167	\$135,562	\$6,582	\$208,414

3 Percent Annual Cost
Inflation

Sub-Watershed #47 Annual Cost After Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,800	\$11,582	\$5,791	\$3,475	\$46,329	\$2,250	\$71,226
2	\$1,854	\$11,930	\$5,965	\$3,579	\$47,719	\$2,317	\$73,363
3	\$1,909	\$12,288	\$6,144	\$3,686	\$49,150	\$2,387	\$75,564
4	\$1,967	\$12,656	\$6,328	\$3,797	\$50,625	\$2,458	\$77,831
5	\$2,026	\$13,036	\$6,518	\$3,911	\$52,144	\$2,532	\$80,166
6	\$2,086	\$13,427	\$6,714	\$4,028	\$53,708	\$2,608	\$82,571
7	\$2,149	\$13,830	\$6,915	\$4,149	\$55,319	\$2,686	\$85,048
8	\$2,213	\$14,245	\$7,122	\$4,273	\$56,979	\$2,767	\$87,599
9	\$2,280	\$14,672	\$7,336	\$4,402	\$58,688	\$2,850	\$90,227
10	\$2,348	\$15,112	\$7,556	\$4,534	\$60,449	\$2,935	\$92,934
11	\$2,419	\$15,566	\$7,783	\$4,670	\$62,262	\$3,023	\$95,722
12	\$2,491	\$16,033	\$8,016	\$4,810	\$64,130	\$3,114	\$98,594
13	\$2,566	\$16,514	\$8,257	\$4,954	\$66,054	\$3,207	\$101,552
14	\$2,643	\$17,009	\$8,504	\$5,103	\$68,036	\$3,304	\$104,598
15	\$2,722	\$17,519	\$8,760	\$5,256	\$70,077	\$3,403	\$107,736
16	\$2,804	\$18,045	\$9,022	\$5,413	\$72,179	\$3,505	\$110,968
17	\$2,888	\$18,586	\$9,293	\$5,576	\$74,345	\$3,610	\$114,297
18	\$2,975	\$19,144	\$9,572	\$5,743	\$76,575	\$3,718	\$117,726
19	\$3,064	\$19,718	\$9,859	\$5,915	\$78,872	\$3,830	\$121,258
20	\$3,156	\$20,310	\$10,155	\$6,093	\$81,238	\$3,945	\$124,896
21	\$3,250	\$20,919	\$10,459	\$6,276	\$83,675	\$4,063	\$128,643
22	\$3,348	\$21,546	\$10,773	\$6,464	\$86,186	\$4,185	\$132,502
23	\$3,448	\$22,193	\$11,096	\$6,658	\$88,771	\$4,310	\$136,477
24	\$3,552	\$22,859	\$11,429	\$6,858	\$91,434	\$4,440	\$140,571
25	\$3,658	\$23,544	\$11,772	\$7,063	\$94,177	\$4,573	\$144,788
26	\$3,768	\$24,251	\$12,125	\$7,275	\$97,003	\$4,710	\$149,132
27	\$3,881	\$24,978	\$12,489	\$7,493	\$99,913	\$4,851	\$153,606
28	\$3,998	\$25,728	\$12,864	\$7,718	\$102,910	\$4,997	\$158,214
29	\$4,117	\$26,499	\$13,250	\$7,950	\$105,998	\$5,147	\$162,961
30	\$4,241	\$27,294	\$13,647	\$8,188	\$109,177	\$5,301	\$167,850

31	\$4,368	\$28,113	\$14,057	\$8,434	\$112,453	\$5,460	\$172,885
32	\$4,499	\$28,957	\$14,478	\$8,687	\$115,826	\$5,624	\$178,072
33	\$4,634	\$29,825	\$14,913	\$8,948	\$119,301	\$5,793	\$183,414
34	\$4,773	\$30,720	\$15,360	\$9,216	\$122,880	\$5,967	\$188,916
35	\$4,916	\$31,642	\$15,821	\$9,492	\$126,567	\$6,146	\$194,584
36	\$5,064	\$32,591	\$16,295	\$9,777	\$130,364	\$6,330	\$200,421
37	\$5,216	\$33,569	\$16,784	\$10,071	\$134,274	\$6,520	\$206,434
38	\$5,372	\$34,576	\$17,288	\$10,373	\$138,303	\$6,715	\$212,627
39	\$5,534	\$35,613	\$17,806	\$10,684	\$142,452	\$6,917	\$219,006
40	\$5,700	\$36,681	\$18,341	\$11,004	\$146,725	\$7,124	\$225,576

3 Percent Annual Cost
Inflation

Sub-Watershed #50 Annual Cost After Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,590	\$10,235	\$5,118	\$3,071	\$40,941	\$1,988	\$62,943
2	\$1,638	\$10,542	\$5,271	\$3,163	\$42,169	\$2,048	\$64,831
3	\$1,687	\$10,859	\$5,429	\$3,258	\$43,434	\$2,109	\$66,776
4	\$1,738	\$11,184	\$5,592	\$3,355	\$44,738	\$2,172	\$68,780
5	\$1,790	\$11,520	\$5,760	\$3,456	\$46,080	\$2,237	\$70,843
6	\$1,844	\$11,866	\$5,933	\$3,560	\$47,462	\$2,305	\$72,968
7	\$1,899	\$12,221	\$6,111	\$3,666	\$48,886	\$2,374	\$75,157
8	\$1,956	\$12,588	\$6,294	\$3,776	\$50,352	\$2,445	\$77,412
9	\$2,015	\$12,966	\$6,483	\$3,890	\$51,863	\$2,518	\$79,734
10	\$2,075	\$13,355	\$6,677	\$4,006	\$53,419	\$2,594	\$82,126
11	\$2,137	\$13,755	\$6,878	\$4,127	\$55,021	\$2,672	\$84,590
12	\$2,201	\$14,168	\$7,084	\$4,250	\$56,672	\$2,752	\$87,128
13	\$2,267	\$14,593	\$7,297	\$4,378	\$58,372	\$2,834	\$89,742
14	\$2,335	\$15,031	\$7,515	\$4,509	\$60,123	\$2,919	\$92,434
15	\$2,406	\$15,482	\$7,741	\$4,645	\$61,927	\$3,007	\$95,207
16	\$2,478	\$15,946	\$7,973	\$4,784	\$63,785	\$3,097	\$98,063
17	\$2,552	\$16,425	\$8,212	\$4,927	\$65,699	\$3,190	\$101,005
18	\$2,629	\$16,917	\$8,459	\$5,075	\$67,669	\$3,286	\$104,035
19	\$2,707	\$17,425	\$8,712	\$5,227	\$69,700	\$3,384	\$107,156
20	\$2,789	\$17,948	\$8,974	\$5,384	\$71,791	\$3,486	\$110,371
21	\$2,872	\$18,486	\$9,243	\$5,546	\$73,944	\$3,590	\$113,682
22	\$2,959	\$19,041	\$9,520	\$5,712	\$76,163	\$3,698	\$117,092
23	\$3,047	\$19,612	\$9,806	\$5,884	\$78,447	\$3,809	\$120,605
24	\$3,139	\$20,200	\$10,100	\$6,060	\$80,801	\$3,923	\$124,223
25	\$3,233	\$20,806	\$10,403	\$6,242	\$83,225	\$4,041	\$127,950
26	\$3,330	\$21,430	\$10,715	\$6,429	\$85,722	\$4,162	\$131,789
27	\$3,430	\$22,073	\$11,037	\$6,622	\$88,293	\$4,287	\$135,742
28	\$3,533	\$22,736	\$11,368	\$6,821	\$90,942	\$4,416	\$139,815
29	\$3,639	\$23,418	\$11,709	\$7,025	\$93,670	\$4,548	\$144,009

30	\$3,748	\$24,120	\$12,060	\$7,236	\$96,481	\$4,685	\$148,329
31	\$3,860	\$24,844	\$12,422	\$7,453	\$99,375	\$4,825	\$152,779
32	\$3,976	\$25,589	\$12,795	\$7,677	\$102,356	\$4,970	\$157,363
33	\$4,095	\$26,357	\$13,178	\$7,907	\$105,427	\$5,119	\$162,083
34	\$4,218	\$27,147	\$13,574	\$8,144	\$108,590	\$5,273	\$166,946
35	\$4,345	\$27,962	\$13,981	\$8,389	\$111,847	\$5,431	\$171,954
36	\$4,475	\$28,801	\$14,400	\$8,640	\$115,203	\$5,594	\$177,113
37	\$4,609	\$29,665	\$14,832	\$8,899	\$118,659	\$5,762	\$182,426
38	\$4,748	\$30,555	\$15,277	\$9,166	\$122,219	\$5,934	\$187,899
39	\$4,890	\$31,471	\$15,736	\$9,441	\$125,885	\$6,113	\$193,536
40	\$5,037	\$32,415	\$16,208	\$9,725	\$129,662	\$6,296	\$199,342

3 Percent Annual Cost

Inflation

Sub-Watershed #53 Annual Cost After Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,174	\$7,556	\$3,778	\$2,267	\$30,224	\$1,468	\$46,467
2	\$1,209	\$7,783	\$3,891	\$2,335	\$31,131	\$1,512	\$47,861
3	\$1,246	\$8,016	\$4,008	\$2,405	\$32,065	\$1,557	\$49,297
4	\$1,283	\$8,257	\$4,128	\$2,477	\$33,027	\$1,604	\$50,776
5	\$1,321	\$8,504	\$4,252	\$2,551	\$34,018	\$1,652	\$52,299
6	\$1,361	\$8,760	\$4,380	\$2,628	\$35,038	\$1,701	\$53,868
7	\$1,402	\$9,022	\$4,511	\$2,707	\$36,089	\$1,752	\$55,484
8	\$1,444	\$9,293	\$4,647	\$2,788	\$37,172	\$1,805	\$57,148
9	\$1,487	\$9,572	\$4,786	\$2,872	\$38,287	\$1,859	\$58,863
10	\$1,532	\$9,859	\$4,929	\$2,958	\$39,436	\$1,915	\$60,629
11	\$1,578	\$10,155	\$5,077	\$3,046	\$40,619	\$1,972	\$62,448
12	\$1,625	\$10,459	\$5,230	\$3,138	\$41,838	\$2,031	\$64,321
13	\$1,674	\$10,773	\$5,387	\$3,232	\$43,093	\$2,092	\$66,251
14	\$1,724	\$11,096	\$5,548	\$3,329	\$44,385	\$2,155	\$68,238
15	\$1,776	\$11,429	\$5,715	\$3,429	\$45,717	\$2,220	\$70,285
16	\$1,829	\$11,772	\$5,886	\$3,532	\$47,088	\$2,286	\$72,394
17	\$1,884	\$12,125	\$6,063	\$3,638	\$48,501	\$2,355	\$74,566
18	\$1,941	\$12,489	\$6,245	\$3,747	\$49,956	\$2,426	\$76,803
19	\$1,999	\$12,864	\$6,432	\$3,859	\$51,455	\$2,498	\$79,107
20	\$2,059	\$13,250	\$6,625	\$3,975	\$52,999	\$2,573	\$81,480
21	\$2,120	\$13,647	\$6,824	\$4,094	\$54,588	\$2,651	\$83,924
22	\$2,184	\$14,057	\$7,028	\$4,217	\$56,226	\$2,730	\$86,442
23	\$2,250	\$14,478	\$7,239	\$4,343	\$57,913	\$2,812	\$89,035
24	\$2,317	\$14,913	\$7,456	\$4,474	\$59,650	\$2,896	\$91,706
25	\$2,387	\$15,360	\$7,680	\$4,608	\$61,440	\$2,983	\$94,458
26	\$2,458	\$15,821	\$7,910	\$4,746	\$63,283	\$3,073	\$97,291
27	\$2,532	\$16,295	\$8,148	\$4,889	\$65,181	\$3,165	\$100,210
28	\$2,608	\$16,784	\$8,392	\$5,035	\$67,137	\$3,260	\$103,216

29	\$2,686	\$17,288	\$8,644	\$5,186	\$69,151	\$3,358	\$106,313
30	\$2,767	\$17,806	\$8,903	\$5,342	\$71,226	\$3,458	\$109,502
31	\$2,850	\$18,341	\$9,170	\$5,502	\$73,362	\$3,562	\$112,787
32	\$2,935	\$18,891	\$9,445	\$5,667	\$75,563	\$3,669	\$116,171
33	\$3,023	\$19,458	\$9,729	\$5,837	\$77,830	\$3,779	\$119,656
34	\$3,114	\$20,041	\$10,021	\$6,012	\$80,165	\$3,893	\$123,246
35	\$3,207	\$20,642	\$10,321	\$6,193	\$82,570	\$4,009	\$126,943
36	\$3,304	\$21,262	\$10,631	\$6,379	\$85,047	\$4,130	\$130,751
37	\$3,403	\$21,900	\$10,950	\$6,570	\$87,598	\$4,253	\$134,674
38	\$3,505	\$22,557	\$11,278	\$6,767	\$90,226	\$4,381	\$138,714
39	\$3,610	\$23,233	\$11,617	\$6,970	\$92,933	\$4,512	\$142,876
40	\$3,718	\$23,930	\$11,965	\$7,179	\$95,721	\$4,648	\$147,162

3 Percent Annual Cost
Inflation

Sub-Watershed #54 Annual Cost After Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$1,835	\$11,810	\$5,905	\$3,543	\$47,241	\$2,294	\$72,628
2	\$1,890	\$12,164	\$6,082	\$3,649	\$48,658	\$2,363	\$74,807
3	\$1,947	\$12,529	\$6,265	\$3,759	\$50,118	\$2,434	\$77,051
4	\$2,005	\$12,905	\$6,453	\$3,872	\$51,621	\$2,507	\$79,363
5	\$2,065	\$13,292	\$6,646	\$3,988	\$53,170	\$2,582	\$81,743
6	\$2,127	\$13,691	\$6,846	\$4,107	\$54,765	\$2,659	\$84,196
7	\$2,191	\$14,102	\$7,051	\$4,231	\$56,408	\$2,739	\$86,722
8	\$2,257	\$14,525	\$7,263	\$4,358	\$58,100	\$2,821	\$89,323
9	\$2,325	\$14,961	\$7,480	\$4,488	\$59,843	\$2,906	\$92,003
10	\$2,394	\$15,410	\$7,705	\$4,623	\$61,638	\$2,993	\$94,763
11	\$2,466	\$15,872	\$7,936	\$4,762	\$63,488	\$3,083	\$97,606
12	\$2,540	\$16,348	\$8,174	\$4,904	\$65,392	\$3,175	\$100,534
13	\$2,616	\$16,839	\$8,419	\$5,052	\$67,354	\$3,270	\$103,550
14	\$2,695	\$17,344	\$8,672	\$5,203	\$69,375	\$3,369	\$106,657
15	\$2,776	\$17,864	\$8,932	\$5,359	\$71,456	\$3,470	\$109,856
16	\$2,859	\$18,400	\$9,200	\$5,520	\$73,600	\$3,574	\$113,152
17	\$2,945	\$18,952	\$9,476	\$5,686	\$75,808	\$3,681	\$116,547
18	\$3,033	\$19,520	\$9,760	\$5,856	\$78,082	\$3,791	\$120,043
19	\$3,124	\$20,106	\$10,053	\$6,032	\$80,424	\$3,905	\$123,644
20	\$3,218	\$20,709	\$10,355	\$6,213	\$82,837	\$4,022	\$127,354
21	\$3,314	\$21,331	\$10,665	\$6,399	\$85,322	\$4,143	\$131,174
22	\$3,414	\$21,970	\$10,985	\$6,591	\$87,882	\$4,267	\$135,109
23	\$3,516	\$22,630	\$11,315	\$6,789	\$90,518	\$4,395	\$139,163
24	\$3,622	\$23,308	\$11,654	\$6,993	\$93,234	\$4,527	\$143,338
25	\$3,730	\$24,008	\$12,004	\$7,202	\$96,031	\$4,663	\$147,638
26	\$3,842	\$24,728	\$12,364	\$7,418	\$98,912	\$4,803	\$152,067
27	\$3,957	\$25,470	\$12,735	\$7,641	\$101,879	\$4,947	\$156,629

28	\$4,076	\$26,234	\$13,117	\$7,870	\$104,935	\$5,095	\$161,328
29	\$4,199	\$27,021	\$13,510	\$8,106	\$108,083	\$5,248	\$166,168
30	\$4,324	\$27,831	\$13,916	\$8,349	\$111,326	\$5,406	\$171,153
31	\$4,454	\$28,666	\$14,333	\$8,600	\$114,666	\$5,568	\$176,287
32	\$4,588	\$29,526	\$14,763	\$8,858	\$118,106	\$5,735	\$181,576
33	\$4,725	\$30,412	\$15,206	\$9,124	\$121,649	\$5,907	\$187,023
34	\$4,867	\$31,325	\$15,662	\$9,397	\$125,298	\$6,084	\$192,634
35	\$5,013	\$32,264	\$16,132	\$9,679	\$129,057	\$6,267	\$198,413
36	\$5,164	\$33,232	\$16,616	\$9,970	\$132,929	\$6,455	\$204,365
37	\$5,319	\$34,229	\$17,115	\$10,269	\$136,917	\$6,648	\$210,496
38	\$5,478	\$35,256	\$17,628	\$10,577	\$141,024	\$6,848	\$216,811
39	\$5,642	\$36,314	\$18,157	\$10,894	\$145,255	\$7,053	\$223,315
40	\$5,812	\$37,403	\$18,702	\$11,221	\$149,613	\$7,265	\$230,015

3 Percent Annual Cost
Inflation

Sub-Watershed #62 Annual Cost After Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$2,995	\$19,273	\$9,637	\$5,782	\$77,093	\$3,743	\$118,523
2	\$3,085	\$19,851	\$9,926	\$5,955	\$79,406	\$3,856	\$122,078
3	\$3,177	\$20,447	\$10,223	\$6,134	\$81,788	\$3,971	\$125,741
4	\$3,272	\$21,060	\$10,530	\$6,318	\$84,241	\$4,090	\$129,513
5	\$3,371	\$21,692	\$10,846	\$6,508	\$86,769	\$4,213	\$133,398
6	\$3,472	\$22,343	\$11,171	\$6,703	\$89,372	\$4,340	\$137,400
7	\$3,576	\$23,013	\$11,507	\$6,904	\$92,053	\$4,470	\$141,522
8	\$3,683	\$23,704	\$11,852	\$7,111	\$94,814	\$4,604	\$145,768
9	\$3,794	\$24,415	\$12,207	\$7,324	\$97,659	\$4,742	\$150,141
10	\$3,907	\$25,147	\$12,574	\$7,544	\$100,589	\$4,884	\$154,645
11	\$4,025	\$25,902	\$12,951	\$7,770	\$103,606	\$5,031	\$159,285
12	\$4,145	\$26,679	\$13,339	\$8,004	\$106,715	\$5,182	\$164,063
13	\$4,270	\$27,479	\$13,739	\$8,244	\$109,916	\$5,337	\$168,985
14	\$4,398	\$28,303	\$14,152	\$8,491	\$113,213	\$5,497	\$174,054
15	\$4,530	\$29,152	\$14,576	\$8,746	\$116,610	\$5,662	\$179,276
16	\$4,666	\$30,027	\$15,014	\$9,008	\$120,108	\$5,832	\$184,654
17	\$4,806	\$30,928	\$15,464	\$9,278	\$123,711	\$6,007	\$190,194
18	\$4,950	\$31,856	\$15,928	\$9,557	\$127,423	\$6,187	\$195,900
19	\$5,098	\$32,811	\$16,406	\$9,843	\$131,245	\$6,373	\$201,777
20	\$5,251	\$33,796	\$16,898	\$10,139	\$135,183	\$6,564	\$207,830
21	\$5,409	\$34,810	\$17,405	\$10,443	\$139,238	\$6,761	\$214,065
22	\$5,571	\$35,854	\$17,927	\$10,756	\$143,415	\$6,964	\$220,487
23	\$5,738	\$36,929	\$18,465	\$11,079	\$147,718	\$7,173	\$227,102
24	\$5,910	\$38,037	\$19,019	\$11,411	\$152,149	\$7,388	\$233,915
25	\$6,088	\$39,178	\$19,589	\$11,754	\$156,714	\$7,609	\$240,932
26	\$6,270	\$40,354	\$20,177	\$12,106	\$161,415	\$7,838	\$248,160

27	\$6,458	\$41,564	\$20,782	\$12,469	\$166,258	\$8,073	\$255,605
28	\$6,652	\$42,811	\$21,406	\$12,843	\$171,245	\$8,315	\$263,273
29	\$6,852	\$44,096	\$22,048	\$13,229	\$176,383	\$8,564	\$271,171
30	\$7,057	\$45,419	\$22,709	\$13,626	\$181,674	\$8,821	\$279,306
31	\$7,269	\$46,781	\$23,391	\$14,034	\$187,125	\$9,086	\$287,686
32	\$7,487	\$48,185	\$24,092	\$14,455	\$192,738	\$9,359	\$296,316
33	\$7,712	\$49,630	\$24,815	\$14,889	\$198,520	\$9,639	\$305,206
34	\$7,943	\$51,119	\$25,560	\$15,336	\$204,476	\$9,929	\$314,362
35	\$8,181	\$52,653	\$26,326	\$15,796	\$210,610	\$10,226	\$323,793
36	\$8,427	\$54,232	\$27,116	\$16,270	\$216,929	\$10,533	\$333,506
37	\$8,679	\$55,859	\$27,930	\$16,758	\$223,437	\$10,849	\$343,512
38	\$8,940	\$57,535	\$28,767	\$17,260	\$230,140	\$11,175	\$353,817
39	\$9,208	\$59,261	\$29,630	\$17,778	\$237,044	\$11,510	\$364,431
40	\$9,484	\$61,039	\$30,519	\$18,312	\$244,155	\$11,855	\$375,364

3 Percent Annual Cost
Inflation

Sub-Watershed #66 Annual Cost After Cost-Share

Year	No-Till	Buffers	Terraces	Perm Vegetation	Waterways	Min. Till	Total Cost
1	\$3,146	\$20,248	\$10,124	\$6,074	\$80,993	\$3,933	\$124,518
2	\$3,241	\$20,856	\$10,428	\$6,257	\$83,422	\$4,051	\$128,254
3	\$3,338	\$21,481	\$10,741	\$6,444	\$85,925	\$4,172	\$132,101
4	\$3,438	\$22,126	\$11,063	\$6,638	\$88,503	\$4,297	\$136,064
5	\$3,541	\$22,789	\$11,395	\$6,837	\$91,158	\$4,426	\$140,146
6	\$3,647	\$23,473	\$11,737	\$7,042	\$93,893	\$4,559	\$144,351
7	\$3,757	\$24,177	\$12,089	\$7,253	\$96,709	\$4,696	\$148,681
8	\$3,869	\$24,903	\$12,451	\$7,471	\$99,611	\$4,837	\$153,142
9	\$3,985	\$25,650	\$12,825	\$7,695	\$102,599	\$4,982	\$157,736
10	\$4,105	\$26,419	\$13,210	\$7,926	\$105,677	\$5,131	\$162,468
11	\$4,228	\$27,212	\$13,606	\$8,164	\$108,847	\$5,285	\$167,342
12	\$4,355	\$28,028	\$14,014	\$8,408	\$112,113	\$5,444	\$172,362
13	\$4,486	\$28,869	\$14,435	\$8,661	\$115,476	\$5,607	\$177,533
14	\$4,620	\$29,735	\$14,868	\$8,921	\$118,940	\$5,775	\$182,859
15	\$4,759	\$30,627	\$15,314	\$9,188	\$122,509	\$5,949	\$188,345
16	\$4,902	\$31,546	\$15,773	\$9,464	\$126,184	\$6,127	\$193,995
17	\$5,049	\$32,492	\$16,246	\$9,748	\$129,969	\$6,311	\$199,815
18	\$5,200	\$33,467	\$16,734	\$10,040	\$133,868	\$6,500	\$205,809
19	\$5,356	\$34,471	\$17,236	\$10,341	\$137,884	\$6,695	\$211,984
20	\$5,517	\$35,505	\$17,753	\$10,652	\$142,021	\$6,896	\$218,343
21	\$5,682	\$36,570	\$18,285	\$10,971	\$146,282	\$7,103	\$224,893
22	\$5,853	\$37,668	\$18,834	\$11,300	\$150,670	\$7,316	\$231,640
23	\$6,028	\$38,798	\$19,399	\$11,639	\$155,190	\$7,535	\$238,589
24	\$6,209	\$39,961	\$19,981	\$11,988	\$159,846	\$7,762	\$245,747
25	\$6,395	\$41,160	\$20,580	\$12,348	\$164,641	\$7,994	\$253,120

26	\$6,587	\$42,395	\$21,198	\$12,719	\$169,580	\$8,234	\$260,713
27	\$6,785	\$43,667	\$21,833	\$13,100	\$174,668	\$8,481	\$268,535
28	\$6,989	\$44,977	\$22,488	\$13,493	\$179,908	\$8,736	\$276,591
29	\$7,198	\$46,326	\$23,163	\$13,898	\$185,305	\$8,998	\$284,888
30	\$7,414	\$47,716	\$23,858	\$14,315	\$190,864	\$9,268	\$293,435
31	\$7,637	\$49,148	\$24,574	\$14,744	\$196,590	\$9,546	\$302,238
32	\$7,866	\$50,622	\$25,311	\$15,187	\$202,488	\$9,832	\$311,305
33	\$8,102	\$52,141	\$26,070	\$15,642	\$208,563	\$10,127	\$320,644
34	\$8,345	\$53,705	\$26,852	\$16,111	\$214,819	\$10,431	\$330,264
35	\$8,595	\$55,316	\$27,658	\$16,595	\$221,264	\$10,744	\$340,172
36	\$8,853	\$56,975	\$28,488	\$17,093	\$227,902	\$11,066	\$350,377
37	\$9,118	\$58,685	\$29,342	\$17,605	\$234,739	\$11,398	\$360,888
38	\$9,392	\$60,445	\$30,223	\$18,134	\$241,781	\$11,740	\$371,715
39	\$9,674	\$62,259	\$31,129	\$18,678	\$249,035	\$12,092	\$382,866
40	\$9,964	\$64,126	\$32,063	\$19,238	\$256,506	\$12,455	\$394,352

*3 Percent Annual Cost
Inflation*

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