Photo provided by Gary May.

MILFORD RESERVOIR

Watershed Restoration and Protection Strategy

Lower Republican Watershed

Final Draft Plan August 21, 2019

Kansas Alliance for Wetlands and Streams

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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.

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. Contained in 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.

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

Sedimentation: Deposition of slit, 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 Load (TMDL): Maximum amount of pollutant that a specific body of water can receive without violating the surface water-quality standards, resulting in failure to support their designated uses.

Total Suspended Solids (TSS): Measure of the suspended organic and inorganic solids in water. Used as an indicator of sediment or silt.

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 pollutant

1.0 Preface

The purpose of this Watershed Restoration and Protection Strategy (WRAPS) for the Lower Republican 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, 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 water quality standards, 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. Improvement in soil health conditions is also important to sustain long term soil productivity and restore watershed hydrology. 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 Lower Republican Watershed.

Five Year Update Summary

The most significant change that has occurred since development of this plan in 2011 is approval of Total Maximum Daily Loads (TMDLs) in 2014 for eutrophication and dissolved oxygen in Milford Reservoir. Since 2011 the reservoir has developed Harmful Algae Blooms (HABs) each summer, resulting in closures to parts of the lake and some beaches due to health concerns and significant taste and odor problems in the water and surrounding residential and commercial areas. To evaluate the need for closures, the lake has been divided into three zones: inflow, middle and lower. Because many of the HABs originate and concentrate in the upper end of the lake, sometimes only that area and the associated beaches are closed. Economic impacts are affecting the community and new and increased efforts are necessary to restore the reservoir to a less eutrophic condition that will not result in closures and economic impacts resulting from HABs.

Significant increases in necessary reduction of nutrient loads are indicated in the TMDL. Phosphorus loads originating in Kansas need to be reduced by 617,204 lbs../yr. and Nitrogen loads originating in Kansas need to be reduced by 2,341,263 lbs../yr. The sediment load reduction goal remains the same at 32,999 tons/year.

To address this, the Stakeholder Leadership Team (SLT) is recommending additional cropland and livestock Best Management Practices (BMPs) be added to those available for cost share assistance. The new BMPs emphasize improved soil health to reduce soil erosion and nutrient loss. Additional BMPs for nutrient management have also been added.

Several new high priority target areas for BMP implementation have been added based on recommendations from KDHE and the SLT. Aerial assessments of priority areas have been completed to locate potential pollution sources and ground truthing of these assessments is underway to further focus BMP placement.

A detailed streambank assessment of the streams has been completed, the most severe erosion areas identified and recommendations for streambank improvement practices have been developed.

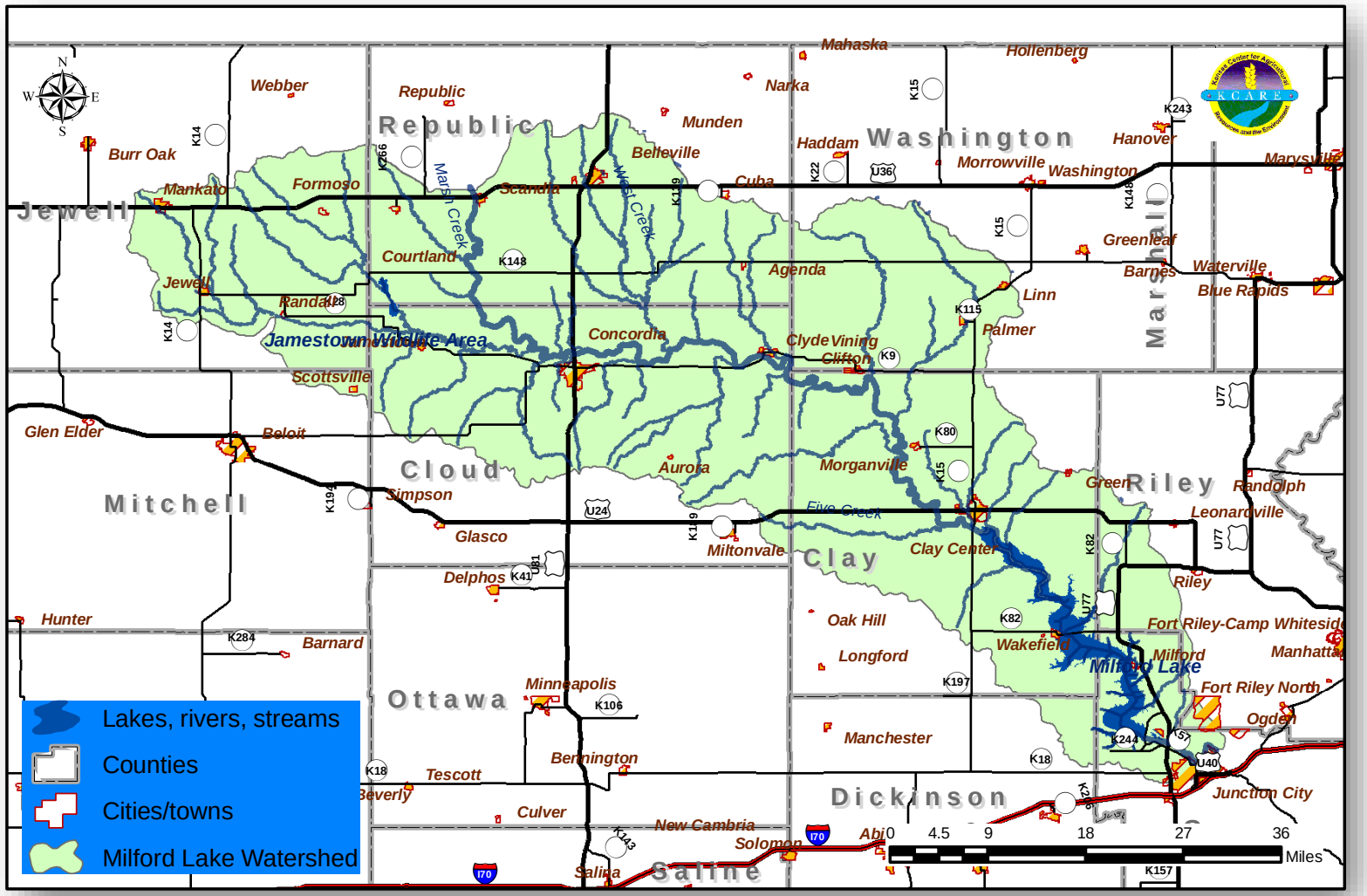
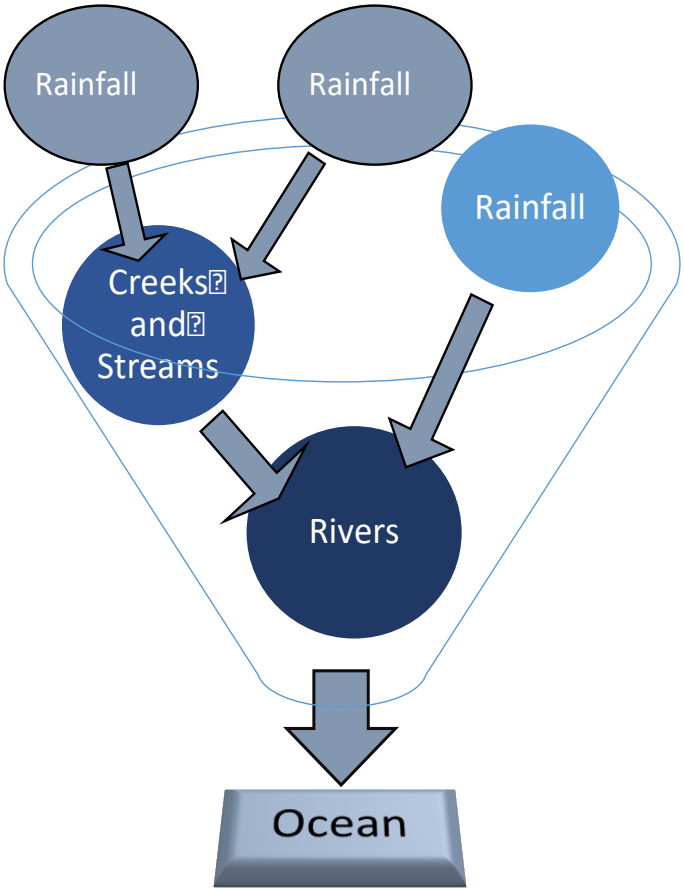


Figure 1. Map of Lower Republican Watershed and Milford Reservoir drainage area

2.0 Background Information

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 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.



Land elevation defines the watershed boundaries. The upper boundary of the Lower Republican Watershed has an elevation of 1,300 feet and the lowest point of the watershed, which is the confluence of the Republican and Kansas Rivers, has an elevation of 826 feet above sea level. The dam impounding Milford Reservoir is located just above the confluence of the two rivers.

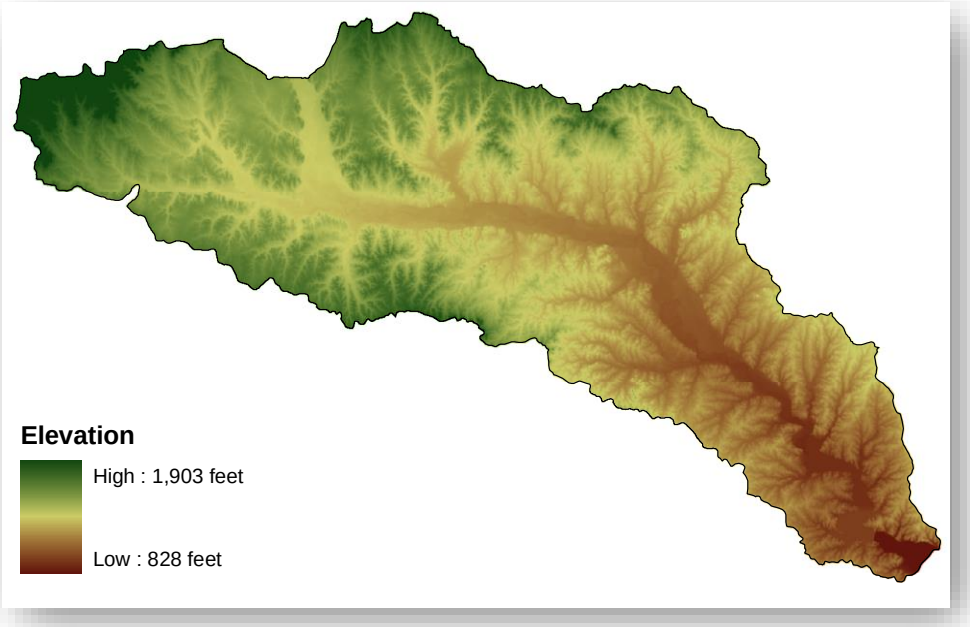


Figure 2 Relief Map of the Lower Republican Watershed [1] change high point to read 1300 to be consistent with KWO Reservoir Fact sheet

2.2 Where is the Milford Watershed?

The Republican River originates in eastern Colorado, enters northwestern Kansas, then flows north into Nebraska and re-enters enters Kansas in Jewell County, south of Harlan Reservoir in Nebraska, where it becomes the Lower Republican drainage, the focus of this plan.

The entire Lower Republican basin drains to the Kansas River and then into the Missouri River, which drains to the Mississippi River, which eventually empties into the Gulf of Mexico. The extent of the WRAPS area is the Lower Republican River and its tributaries upstream of and including Milford Reservoir in Kansas. The confluence of the Republican River and the Kansas River downstream from the dam at Milford Reservoir is the geographical endpoint of this WRAPS project.

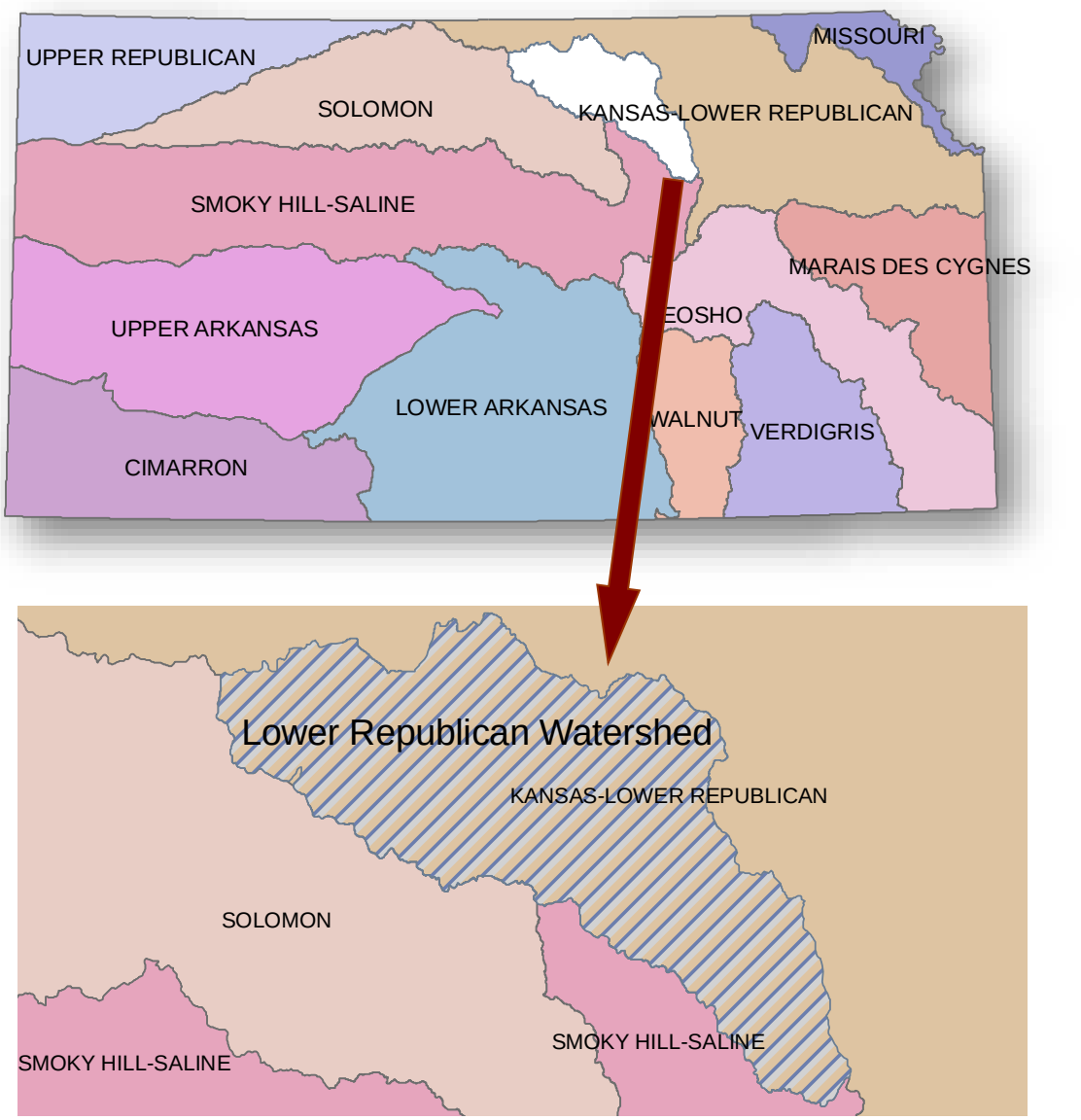


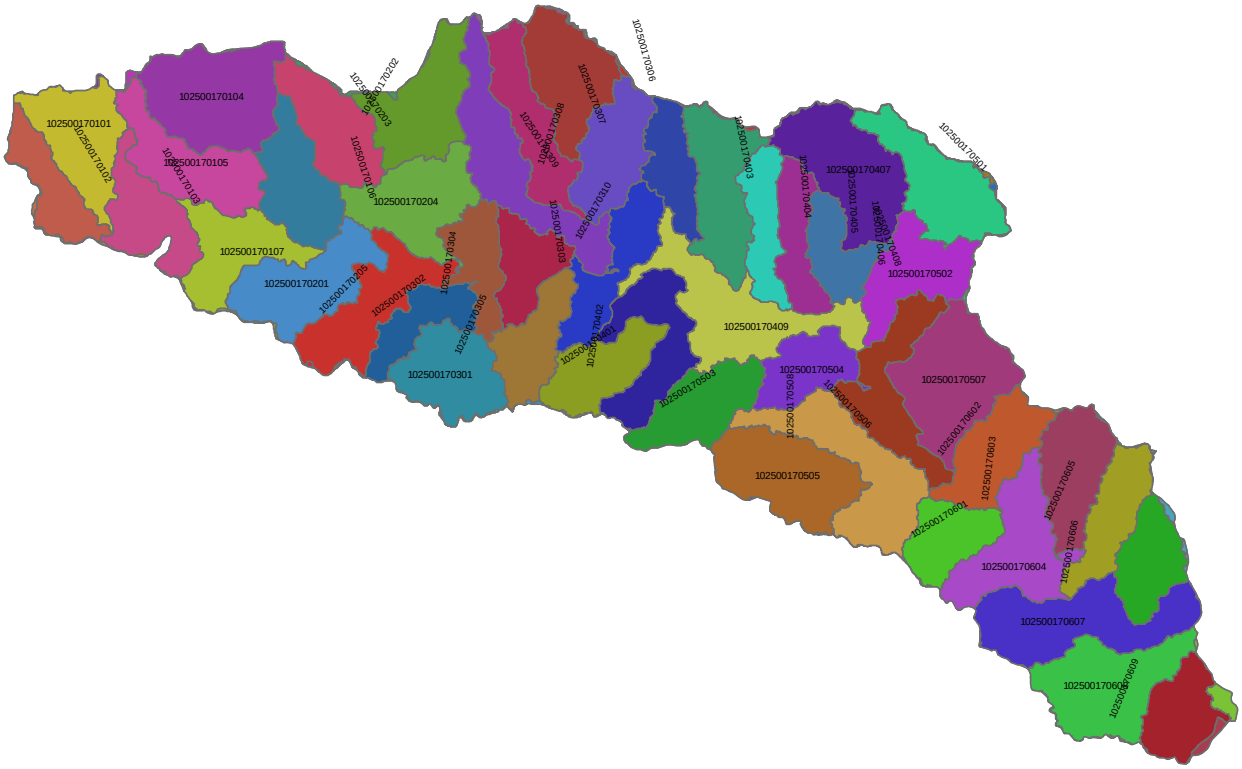
Figure 3 Milford Watershed in Kansas

2.4 What is a HUC?

HUC is an acronym for **H**ydrologic **U**nit **C**odes and is an identification system for watersheds. Each watershed has a unique HUC number in addition to a common name. The Lower Republican Watershed is classified as a HUC 8, meaning it has an eight-digit identifying HUC code: 10250017. The first two numbers in the code refer to the drainage region, the second two digits refer to the drainage sub-region, the third two digits refer to the accounting unit and the fourth set of digits is the cataloging unit. As watersheds become smaller, the HUC number becomes larger. HUC 8s are further divided into smaller watersheds with HUC 10 and HUC 12 delineations. The Lower Republican Watershed is divided into 53 HUC 12 delineations.

The Lower Republican Watershed categories are as follows:
10250017 = Drainage of the Missouri River basin
10**25**0017= Drainage of the Republican River basin in Colorado, Kansas and Nebraska
1025**00**17 = Drainage of the Republican River basin
102500**17**= Drainage of the section of the Republican River named the Lower Republican

Figure 4 HUC 12 Delineations of the Lower Republican Watershed



3.0 Watershed History

3.1 Stakeholder Leadership Team (SLT) History

In 2008 a group of concerned citizens in the Lower Republican River watershed began meeting out of concern for the health and lifespan of Milford Reservoir, the geographic endpoint of this Watershed plan. They formed two Stakeholder Leadership Teams (SLT) under the guidance of Kansas State Research and Extension (KSRE) personnel. These two teams were located in the Upper Milford and the Lower Milford watersheds. Size of the watershed and convenience to the members of the SLT prompted having two meeting places. Over time, the two SLTs consolidated into one SLT and developed BMPs for the entire drainage basin. They continue to alternate meeting places between the upper and lower basins.

In 2016, the coordinator for the SLT changed from KSRE to the Kansas Alliance for Wetlands and Streams (KAWS). The SLT has updated the Best Management Practices (BMPs) and redefined the priority areas in which BMPs can be utilized.

3.2 Milford Reservoir and Watershed History

Construction of the dam for Milford Reservoir began in 1962 by the US Army Corps of Engineers (USACE) and the multipurpose pool was filled in 1967. The surface area of the reservoir is approximately 15,500 acres with a maximum depth of 18 meters and an average depth of 7.4 meters. In 1962, the reservoir had a storage capacity of 415,403 acre feet. The capacity of the latest survey year (2009) is 373,152 acre feet. Estimated current capacity is 370,133 acre feet. This represents a loss of 11% due to sediment that has entered the reservoir from the watershed with a calculated sedimentation rate of 1007 acre feet per year (KWO Reservoir Fact Sheet 2011). The design sedimentation rate is 1,730 acre feet/year so the measured rate is less than the design rate. Milford Reservoir is ranked tenth of all Kansas reservoirs in percentage of capacity loss. See figure below.

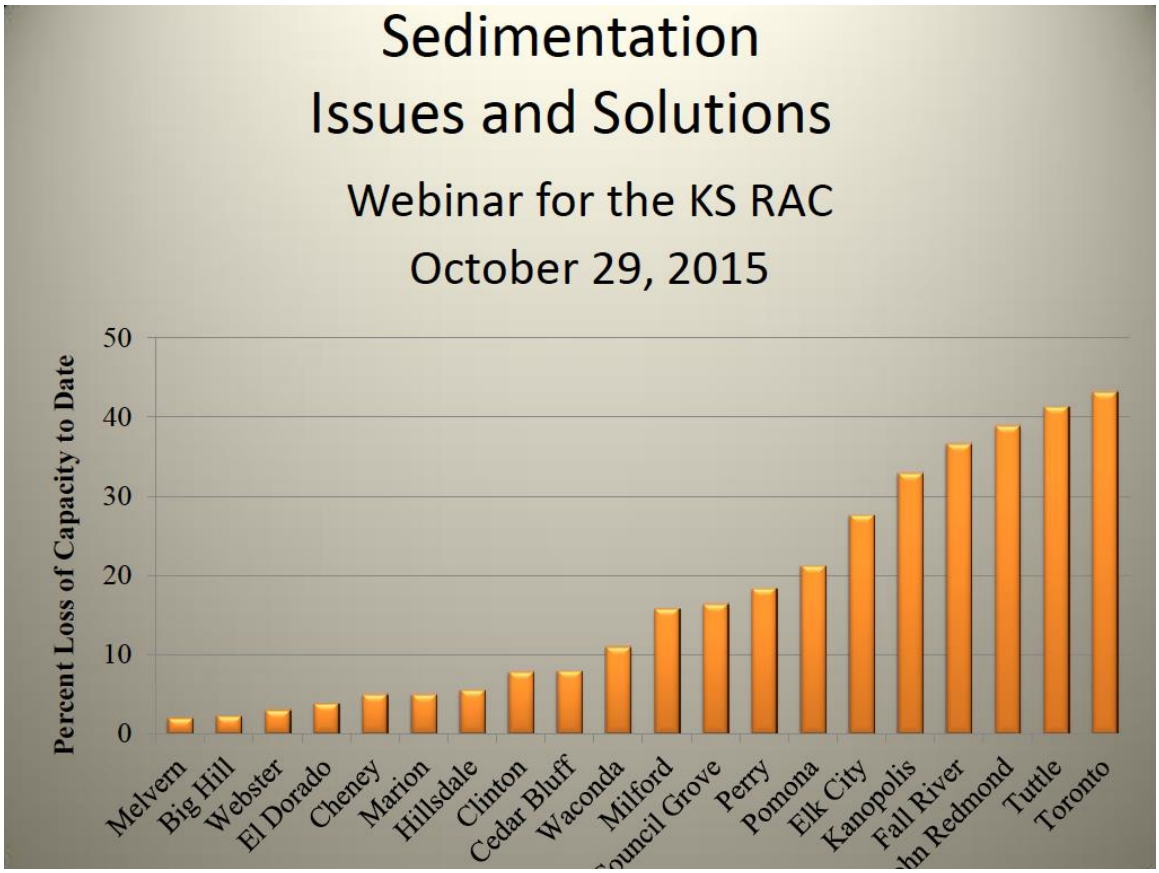


Figure 5 Percent of Reservoir Loss Due to Sedimentation (2015, KWO)

3.3 Watershed Overview

In1999 the Lower Republican Watershed was designated as a Category I watershed indicating that it is in need of restoration as defined by the Kansas Unified Watershed Assessment submitted to the Environmental Protection Agency (EPA) by the Kansas Department of Health and Environment (KDHE) and the United States Department of Agriculture (USDA)[2]. A Category I watershed does not meet water quality standards or fails to achieve aquatic system goals related to habitat and ecosystem health. Category I watersheds are also assigned a priority for restoration. The Lower Republican was ranked eleventh in priority out of ninety-two watersheds in the state in this assessment.

In 2014, KDHE developed a priority schedule for addressing nutrient issues in Kansas watersheds, as directed by the EPA. The Lower Republican watershed was included in the top 16 watersheds to receive priority for nutrient Total Maximum Daily Load (TMDL) development over the next ten years. Within these 16 watersheds, development of a nutrient TMDL for Milford Reservoir eutrophication and dissolved oxygen impairments were ranked number 1 and 2. These TMDLs were approved in 2014.

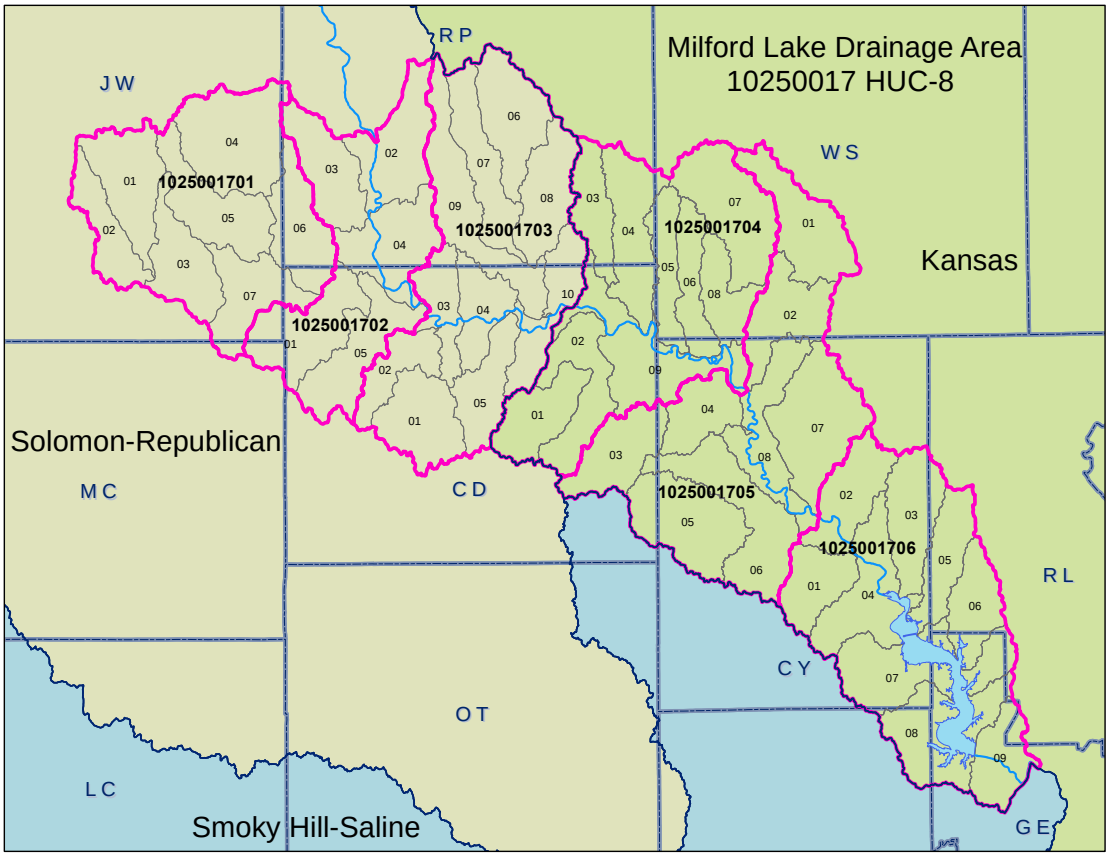
The Lower Republican Watershed in Kansas covers approximately 1,266,400 acres with 891 stream miles. There are numerous towns and cities in this watershed in addition

to developed areas surrounding Milford Reservoir, the largest and only federal reservoir in the watershed.

The entire extent of the Republican River provides water to three states (Colorado, Nebraska and Kansas). It was set up to be governed in 1943 by an interstate compact called the **Republican River Compact** that determines and allocates allowable consumptive use for each state**.** Compact compliance has been the subject of significant legal activity since the late 1990's. In 2000, the Supreme Court ruled that groundwater pumping for irrigation should not have an effect on river flow. Each state is required to keep its water usage within its allotment.

3.1 Recent Watershed Activities

There are twelve major river basins in Kansas. Historically, the Kansas Water Office (KWO), the state's water planning agency, has used river basins as the geographic boundaries to define water planning areas. Recently, based on a revised approach that considers regional water issues in addition to river basin boundaries, planning areas have been revised and do not necessarily follow river basin boundaries. These revisions resulted in parts of the Lower Republican drainage being moved from the Kansas-Lower Republican basin into the Solomon basin, forming a new planning unit, the Solomon-Republican. The old Kansas-Lower Republican basin has been revised to include only the lower portions of the Milford drainage in the newly designated Kansas River basin planning area. As a result, the Milford watershed drainage now occurs in two KWO planning areas. The map below shows the boundaries of the new planning areas and how they divide the Lower Republican basin. The scope of this WRAPS project includes both a portion of the Kansas basin and the Solomon-Republic planning areas in north-east Kansas.



In 2015, Regional Advisory Committees (RAC) were established in each planning area to develop broad goals to guide activities to improve water quality and quantity in their areas. Two goals articulated in the Kansas River RAC that complement the WRAPS process and goals are provided below:

Kansas RAC Goals:

1. Reduce the cumulative sediment rate of federal reservoirs and other water supply lakes by 10% in the Kansas region every 10 years through implementation of watershed best management practices.
2. After 2020, reduce duration and frequency of harmful algae blooms disrupting recreation in lakes such that blooms last under a week and do not occur until after Labor Day.

Implementation of this watershed plan will assist in achieving these RAC goals for Milford Reservoir.

The Kansas Department of Wildlife, Parks and Tourism (KDWPT) prepares and implements the State Wildlife Action Plan (SWAP). Updated in 2016, the SWAP defines Ecological Focus Areas (EFAs) in each ecoregion that are in particular need of attention

due to threats to wildlife and habitat. The Lower Republican basin is within the Aquatic EFA of the Central Mixed Grass Prairie Conservation Region. The SWAP (http://ksoutdoors.com/Services/Kansas-SWAP) provides detailed information about current conditions, threats to wildlife, recommended preventive and corrective actions and lists of priority species. Many actions taken by the Milford SLT to address nutrient and sediment issues will also address and complement goals for the EFA. In addition, funding may be available from KDWPT to supplement WRAPS funding for some projects. The SLT should work with the area KDWPT Wildlife Biologist to determine the potential for partnerships on projects.

The entire Lower Republican drainage area occurs in a priority region for the Kansas Forest Service (KFS) Regional Conservation Partnership Program (RCPP). This program is focused on improving forest stands and tree health through assistance of state foresters and other service providers to evaluate current conditions and recommend improvements. Improvement in forest stands and tree health will support water quality improvement. Additional funding through the RCPP, especially in riparian areas, is available to supplement specific WRAPS projects in the watershed. Some areas may also be eligible for streambank stabilization funding.

In 2018, an RCPP for the Milford basin was submitted by KWO and approved for funding by the Natural Resources Conservation Service (NRCS). The focus of the KWO RCPP is phosphorus reduction in the watershed to reduce the occurrence of Harmful Algae Blooms in Milford Reservoir. This brings significant additional funding for Best Management Practices (BMPs) to the Milford watershed. The first sign up period for practice implementation will be in Fall 2018 and the project has a five-year implementation timeline. The RCPP will prioritize projects in the same targeted watersheds as this 9-Element Plan to achieve the best results for nutrient reduction. The RCPP designates additional target areas in riparian corridors adjacent to stream reaches. Riparian areas will be high priority areas for BMPs due to the potential for reduction of nutrient transport and delivery to Milford Reservoir.

The Kansas Biological Survey prepared a wetland map of the watershed based on their Topographic Wetland Identification Process (TWIP). The TWIP map shows areas of the watershed that are both “likely” wetland areas and “potential” wetland areas. This map can be consulted when BMP decisions are being made to ensure that wetlands are restored or preserved. Wetlands provide numerous pollution reduction services to improve water quality.

In February 2015, the U.S. Supreme Court made a ruling following Kansas' lawsuit over noncompliance in 2005 and 2006. Kansas had originally requested appointment of a river master that would make regulatory decisions, the permanent shutdown of 300,000-500,000 irrigated acres in Nebraska, and $80 million in compensation for reduced water coming into the state. The court ruled against a river master, did not impose an irrigation shutdown, and ruled Kansas should receive approximately seven

percent of its damages and unjust enrichment request, or approximately $5.5 million. The high court agreed with Nebraska that it had been improperly charged with the consumption of water that seeps into the Republican Basin from the Platte Basin. The crediting change could reduce Nebraska's Compact obligations by approximately 10,000 acre feet annually. Had such a credit been in place from 2013-2015, it would have reduced the Compact demands on Nebraska by approximately 70%. (KWO 2016)

3.4 Issues and Goals of the Watershed

The SLT has created a plan of restoration and protection measures for the watershed. This update includes specific measures for restoration and protection of Milford Reservoir as defined in the 2014 TMDL. The SLT has had speakers and discussions to review and study watershed issues. Based on this, the SLT has set **priority watershed issues and concerns.**

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

- Cropland erosion,
- Rangeland or pasture erosion,
- Sedimentation and eutrophication in Milford Reservoir and its impacts on drinking water, recreation and storage capacity. Annually, since 2011, significant harmful algae bloom (HAB) issues have occurred in the reservoir, impacting water supply and recreational uses. (Soil and Water Conservation Society of Metro Halifax, 2007; KDHE TMDL 2016). Several communities in close proximity to the reservoir are experiencing aesthetic issues associated with odors caused by HABs, and are concerned about the impacts on recreation and visitation to local businesses and the economy.

This plan incorporates BMPs recommended to focus on nutrient reduction and preventing or reducing future blooms resulting from:

- Storm water runoff,
- Streambank erosion and riparian area degradation,
- Manure management at small (non-permitted) livestock operations,
- Failing septic systems

In order to address the watershed issues, the SLT has set **watershed restoration and protection goals** as (in no particular order):

- Protection of long-term water storage capacity, water quality and recreational uses at Milford Reservoir (also a RAC goal),
- Protection of water quality in the Republican River and tributary streams (also a RAC goal),

- Protection of water quality in Jamestown Wildlife Area, Lake Jewell, Belleville City Lake and Salt Creek,
- Restoration and protection of streambanks and riparian areas along the Republican River and tributary streams, and
- Protection of public drinking water supplies.

The purpose of this watershed 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

4.1 Land Cover/Land Uses

Land use activities have a significant impact on the types and quantity of pollutants in a watershed. The major land use for the entire Lower Republican Watershed is cropland (50%) which can contribute sediment and nutrients into the watershed. Sources of sediment originating from cropland can originate from overland flow across conventional tilled crop fields lacking cover crops and ephemeral gullies that are plowed through each year. Cropland nutrients can originate from application of fertilizers prior to a rainfall event or over application of fertilizers and manure when used as fertilizer. The second major land use is grassland (38%), which can be a source of sediment and nutrients from livestock waste and overgrazing and allowing livestock access to streams. Failing and sloughing streambanks with undercuts will contribute to sediment loading. The remaining land use in the watershed are woodlands (5%), low density residential (4%), water (2%) and other (6%).

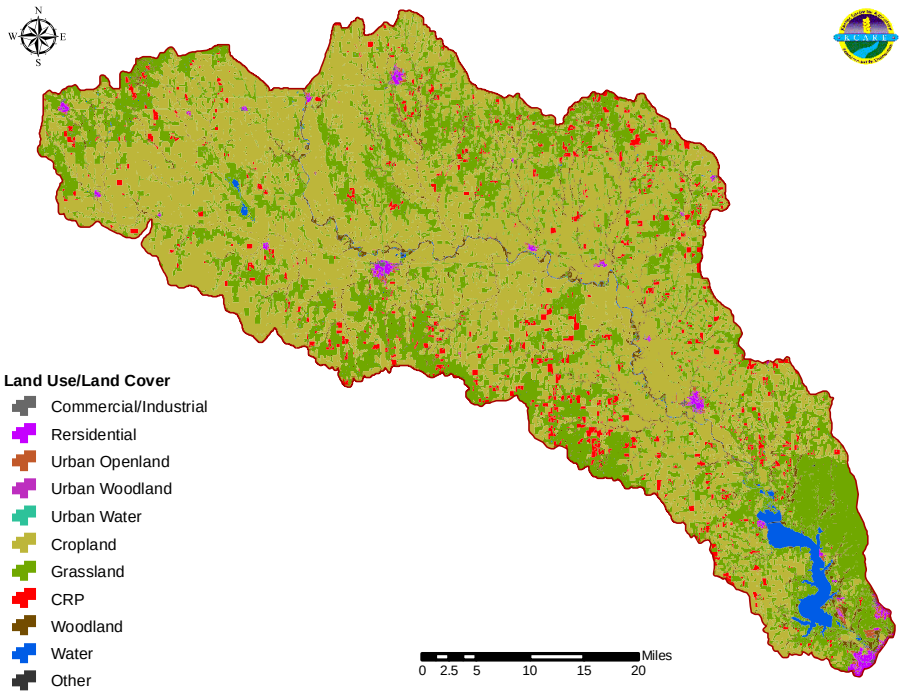


Figure 6 Land Cover of the Watershed, 2005 [iii]. Kansas Applied Remote Sensing Program, Kansas Geospatial Community Commons.

Table **1** Land Use Calculations, 2001 **Error! Bookmark not defined. Calculated from Kansas Applied Remote Sensing program, Kansas Geospatial Community Commons**

Lower Republican Watershed		
Land Use	***Acres***	***Percentage***
Agricultural Crops	629,000	50
Range-Grasses	463,000	38
Forest-Deciduous	60,000	5
Residential-Low	52,000	4
Water	26,000	2
Residential-Medium	12,000	<1
Hay	10,000	<1
Wetlands-Forested	8,000	<1
Wetlands-Non-Forested	2,000	<1
Residential-High	2,000	<1
Forest-Mixed	1000	<1
Industrial	600	<1
Forest-Evergreen	600	<1
Southwestern	100	<1
Range-Brush	100	<1
Total	**1,266,400**	**100**

4.2 Designated Uses

All surface waters in this watershed are generally used for aquatic life support (fish), human health purposes, domestic water supply, recreation (fishing, boating, and swimming), groundwater recharge, industrial water supply, irrigation or livestock watering. These are commonly referred to as "designated uses" as stated in the Kansas Surface Water Register, 2014, issued by KDHE.

Table 2 Designated Water Uses for the Lower Republican River Watershed [iv] Kansas Surface Water Register, 2014, KDHE.

Designated Uses Table								
Stream Name	**AL**	**CR**	**DS**	**FP**	**GR**	**IW**	**IR**	**LW**
Beaver Cr, Buffalo Cr seg.29, Elk Cr, W.Fk, Marsh Cr E, Marsh Cr W, Mulberry Cr, Riley Cr, Salt Cr W, Whites Cr,	E	b		X				
Buffalo Cr seg.37, Buffalo Cr Middle, Elk Cr, Elm Cr, Salt Cr, Wolf Cr	E	C		X				
Buffalo Cr E, Cheyenne Cr, Coal Cr, Cool Cr, Dry Cr, East Cr, Elm Cr E Br, Elm Cr W Br, Finney Cr, Five Cr, Hay Cr, Lincoln Cr, Mud Cr, Oak Cr, Parsons Cr, Peats Cr, Rush Cr, Spring Cr, Turkey Cr, Upton Cr	E	b						
Fourmile Cr, Otter Cr	E	C						
Huntress Cr	E	B						

Designated Uses Table, Cont.								
Stream Name	**AL**	**CR**	**DS**	**FP**	**GR**	**IW**	**IR**	**LW**
Marsh Cr,	E	A		X				
Timber Cr	E	C	X					
Republican River	S	C	X	X	X	X	X	X
Belleville City Lake	E	B		X				
Jamestown WA	E		X					
Milford Reservoir	E	A	X	X		X		
Milford WA	E			X				
Rimrock Park Lake*	E	B	O	X		O	O	O

*Rimrock Park Lake is below the Milford Reservoir dam.

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 recreation lakes that have a posted public swimming area
B=Primary contact recreation stream segment is by law or written permission of the landowner open to and accessible by the public
b=Secondary contact recreation stream segment is not open to and accessible by the public under Kansas law
C=Primary contact recreation lakes that are 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 is assigned the indicated designated use
O = Referenced stream segment does not support the indicated beneficial use
Blank=Capacity of the referenced stream segment to support the indicated

All designated uses of Milford reservoir are currently impaired due to eutrophication and expected aquatic life support is impaired due to dissolved oxygen (DO) deficiencies in the water column. During the sampling period covering 1996 – 2012, Milford was fully eutrophic and as of 2012 sampling data indicate it had progressed to hypereutrophic. Mass balance calculations show only 27% of the load reaching sample site SC503, just above the inflow of the Republican River to the reservoir, comes from inflow from Nebraska with the remaining load (63%) attributed to the drainage area in Kansas. (KDHE 2014).

4.3 Special Aquatic Life Use Waters and Exceptional State 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". The Lower Republican Watershed has a special aquatic life use designation in the Republican River. **Exceptional state waters** are waters that are defined as "any of the surface waters or

surface water segments that are of remarkable quality or of significant recreational or ecological value". The Jamestown Wildlife Area has an exceptional state waters designation.

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, nutrient or pesticide related. Sediment in the Republican River would destroy habitat for mussels and fish. Fertilizer or manure in the streams would concentrate nutrients and alter dissolved oxygen concentrations, pH, and phosphorus concentrations.

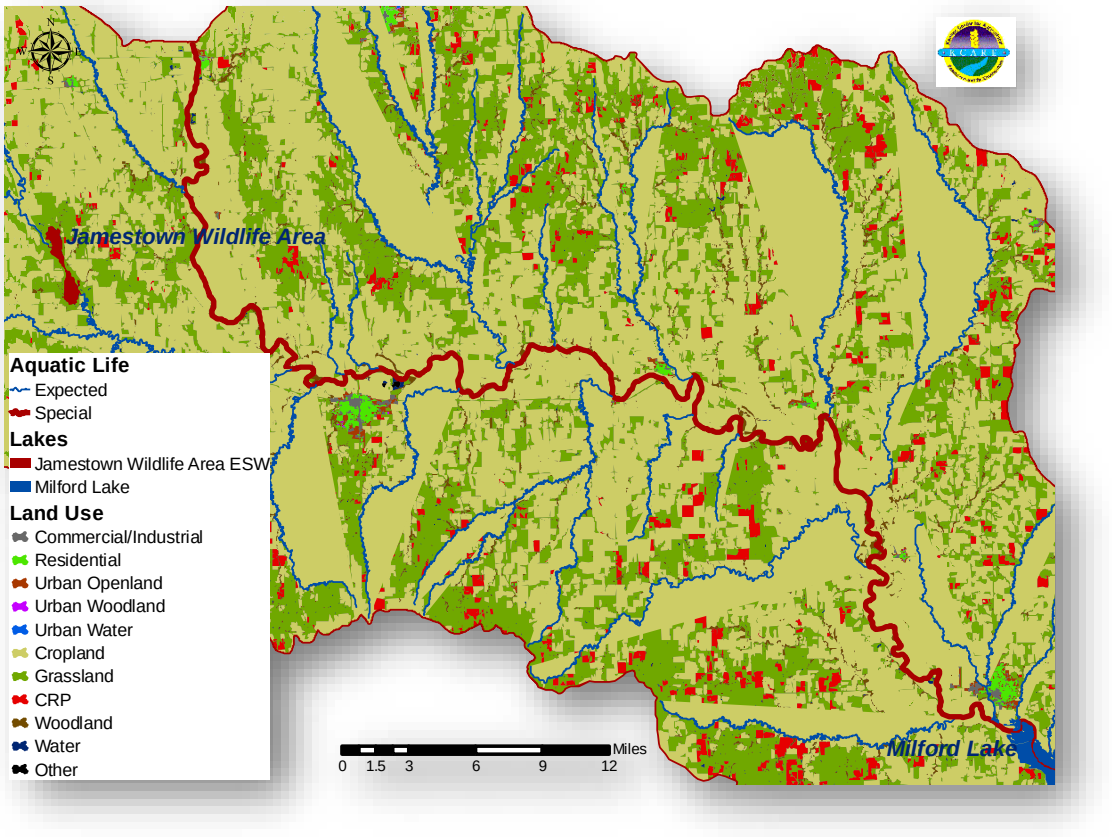


Figure 7 Special Aquatic Life Use Waters and Exceptional State Waters in the Watershed with Land Use. Error! Bookmark not defined. **iii**

4.4 Public Water Supply and National Pollutant Discharge Elimination System

A Public Water Supply (PWS) that derives its water from a surface water supply can be affected by sediment through:

- excess sediment buildup at the water intake, or
- additional treatment procedures for sediment removal prior to consumption.

Nutrients and fecal coliform bacteria will also affect surface water supplies causing excess cost in treatment prior to public consumption. The city of Milford has stopped using Milford Reservoir as a water supply and now buys water from Geary County RWD #04. The table below lists the public water supplies in the Lower Republican Watershed; all derive their water from groundwater wells. Even though the following PWS service customers are in the watershed, not all intake wells are located within the watershed.

Table 3 PWS Serving the Lower Republican Watershed KWO 2017

Name	County Served	Source of Water[a]	Source Basin	RPA Source[b]	Pop Served
Agenda	RP	1 Well (1), RP-02	Kr	Ks	80
Aurora	CD	2 Wells (2)	Kr	Ks	45
Belleville	RP	2 Wells (2)	Kr	Sr	1,975
Clay Center	CY	10 Wells (5), CY-01	Kr	Ks	4,600
Clay RWD 01	CY	1 Well (1), Clay Center	Kr	Ks	102
Clay RWD 02	CY	7 Wells (7)	Ss	Sr	1,070
Clifton	WS	4 Wells (4)	Kr	Ks	590
Cloud RWD 01	CD	4 Wells (4)	Kr	Sr	444
Clyde	CD	3 Wells (3)	Kr	Ks	682
Concordia	CD	6 Wells (4)	Kr	Sr	5,292
Courtland	RP	RP-01	Kr	Sr	300
Cuba	RP	3 Wells (3), RP-02	Kr	Ks	156
Formoso	JW	1 Well (1), RP-01	Kr	Sr	120
Geary RWD 01	GE	Junction City	Kr	Ks	200
Geary RWD 02	GE	1 Well (1)	Kr	Ks	89
Geary RWD 04	GE	3 Wells (3)	Kr	Ks	1,500
Green	CY	6 Wells (4)	Kr	Ks	150
Jamestown	CD	2 Wells (2)	Kr	Sr	277
Jewell	JW	MC-03	Kr	Sr	442
Jewell RWD 01	JW	2 Wells (2)	Kr	Sr	959
Junction City	GE	10 Wells (9)	Kr	Ks	25,500
Linn	WS	2 Wells (2)	Kr	Ks	413
Mankato	JW	5 Wells (3)	Kr	Sr	867
Milford	GE	GE-04	Kr	Ks	598
Mitchell RWD 03[c]	MC, CD, JW	MC-01	So	Sr	950
Morganville	CY	2 Wells (1)	Kr	Ks	200
Palmer	WS	3 Wells (2)	Kr	Ks	110
Randall	JW	1 Well (1), MC-03	Kr	Sr	91
Republic RWD 01	RP, JW	3 Wells (3)	Kr	Sr	400
Republic RWD 02	RP, WS	2 Wells (2)	Kr	Sr	1,250

Scandia	RP	5 Wells (5)	Kr	Sr	350
Wakefield	CY	3 Wells (3)	Kr	Ks	987
Washington RWD 02	WS, CY	4 Wells (4)	Kr	Ks	600

[a] Number of wells used in 2014 in parentheses.
[b] Regional Planning Area. Sr is the Solomon-Republican RPA; Ss is the Smoky-Hill Saline RPA.
[c] MC-03 no water use reported. Pop estimate is based on MC-02 reported water sold and MC-02 GPCD.

Wastewater treatment facilities are point sources of pollution and are permitted and regulated by KDHE. 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. Municipal waste water can contain suspended solids, biological pollutants that reduce oxygen in the water column, inorganic compounds or bacteria. Waste water is 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. Any pollutant discharge from point sources that is allowed by the state is considered to be Wasteload Allocation.

There are 44 NPDES permit facilities within the Milford Lake watershed. Of these facilities, 17 are non-discharging facilities and 26 are permitted discharging facilities. Of the discharging facilities, there are 11 permitted municipal facilities and 15 industrial facilities; nine of these have permits that require nutrient monitoring. These facilities may be sources and contributors to the impairments associated within Milford Lake.

Numerous municipalities 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. Industrial NPDES sites can contribute specific pollutants that could threaten the water supply. The cities that have both a NPDES site and public water supply diversion point are highlighted in the table below in tan.

Table 4 Permitted Point Source Facilities [v] Municipalities that have both NPDES and PWS sites are highlighted in tan.

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

NPDES	Facility Name	Ownership	Description	Industrial Classification	City	County
KS0001988	Northern Natural Gas Clifton	Private	Natural Gas Transmission	Not ON Elg	Clifton	WS
KS0002682	General Finance Inc Clay Pits	Private	Clay, Ceramic & Refrac Mat Nec	ON Elg	Concordia	CL
KS0021385	Mankato City Of Stp	Public	Sewerage Systems	Municipal	Mankato	JW
KS0022403	Clyde City Of Stp	Public	Sewerage Systems	Municipal	Clyde	CS
KS0024678	Morganville City Of Stp	Public	Sewerage Systems	Municipal	Morganville	CY
KS0025577	Concordia City Of Stp	Public	Sewerage Systems	Municipal	Concordia	CL
KS0027529	Belleville City Of Stp	Public	Sewerage Systems	Municipal	Belleville	RP
KS0027545	Wakefield City Of Stp	Public	Sewerage Systems	Municipal	Wakefield	CY
KS0034011	Junction City-City Of Stp	Public	Sewerage Systems	Municipal	Junction City	GE
KS0048399	Clay Center City Of Stp	Public	Sewerage Systems	Municipal	Clay Center	CL
KS0048437	Clifton City Of Stp	Public	Sewerage Systems	Municipal	Clifton	WS
KS0079197	Geary Cnty Sewer Dist #4	Public	Sewerage Systems	Municipal	Geary County	GE
KS0083275	Milford Fish Hatchery	Private	Fish Hatcheries And Preserves	Not On El	Milford	GE
KS0083399	Courtland Wwt Facility	Private	Sewerage Systems	Not On El	Courtland	RP
KS0085898	Fina Oil \7	Private	Petroleum Refining	Primary O		
KS0086231	Milford Wwtf	Public	Sewerage Systems	Municipal	Milford	GE
KS0090018	Valley Fertilizer	Pub /Pri			Clay Center	CL
KS0090891	Ps Quarry	Private			Chapman	GE
KS0117340	Hamm N R Quarry Wakefield #80	Private	Crushed & Broken Limestone	On Elg	Clay Center	CL

Table 5 Permitted Point Source Facilities [vi] Municipalities that have both NPDES and PWS sites are highlighted in tan.

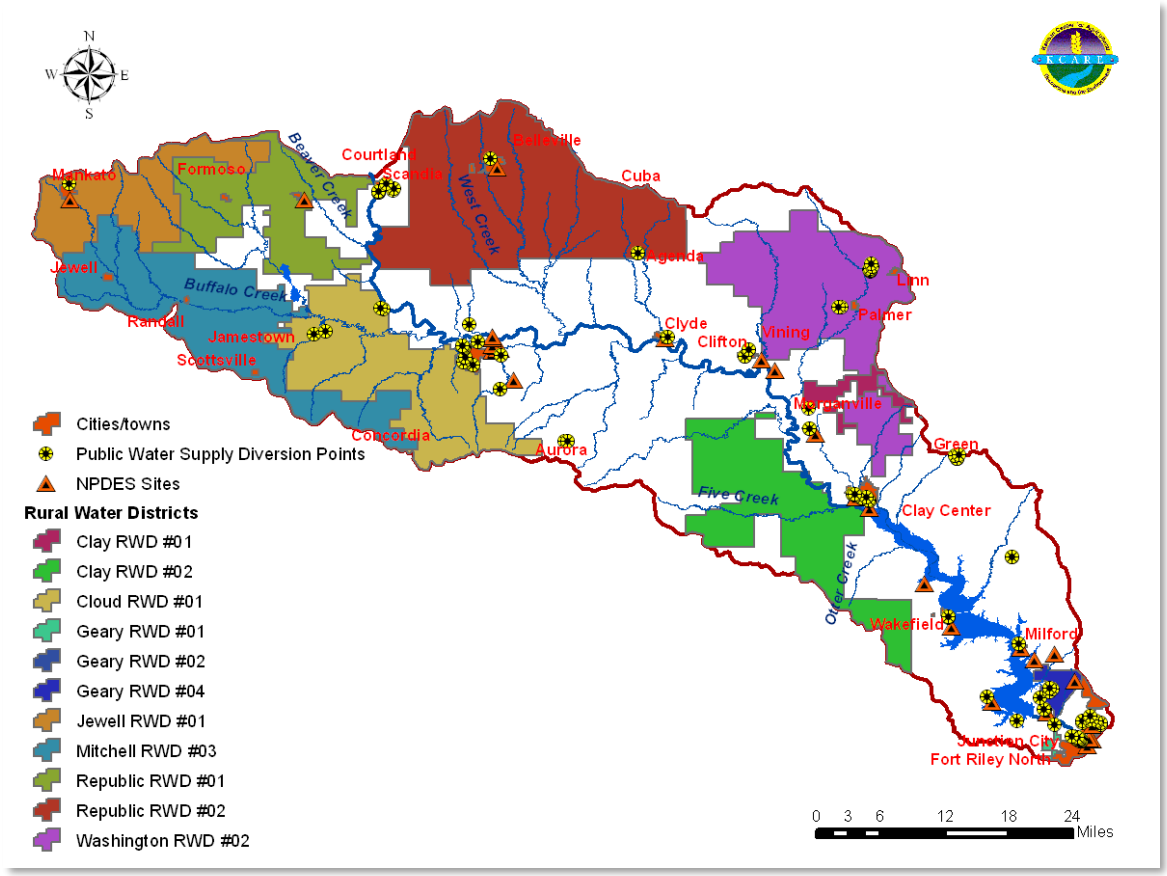


Figure 8 PWS Diversion Points and NPDES sites in the Watershed. [vii]

Households outside of the municipalities that operate a wastewater treatment facility are presumably utilizing on-site septic systems to treat their individual home wastewater. The estimated population of the watershed is approximately 21,290. There are approximately 18,000 people living within the municipalities served by wastewater treatment facilities within the watershed, and there are approximately 3,260 people within the watershed utilizing on-site septic systems. Significant nutrient loading may occur if a system fails and it is located near a stream. However, based on the size of this watershed it is unlikely that on-site septic systems are a significant source contributing to the impairment within the Milford Lake watershed. (KDHE TMDL 2014). All counties in the watershed have sanitary codes that specify construction requirements for new and rebuilt onsite wastewater systems which over time should reduce any contribution from existing and new systems.

4.5 Aquifers

Two aquifers underlie the watershed:

- Alluvial Aquifer - The alluvial aquifer is a part of and connected to a river system and consists of sediments deposited by rivers in the stream valleys. The Republican River has an alluvial aquifer that lies along and below the river and some of its tributaries.
- Dakota Aquifer - The Dakota aquifer extends from southwestern Kansas to the Arctic Circle. In recent years, the Dakota aquifer has been used for irrigation purposes in southwest and in north-central Kansas (Cloud, Republic and Washington counties) and continues to present time. The Dakota aquifer also provides water for municipal, industrial, and stock water supplies.

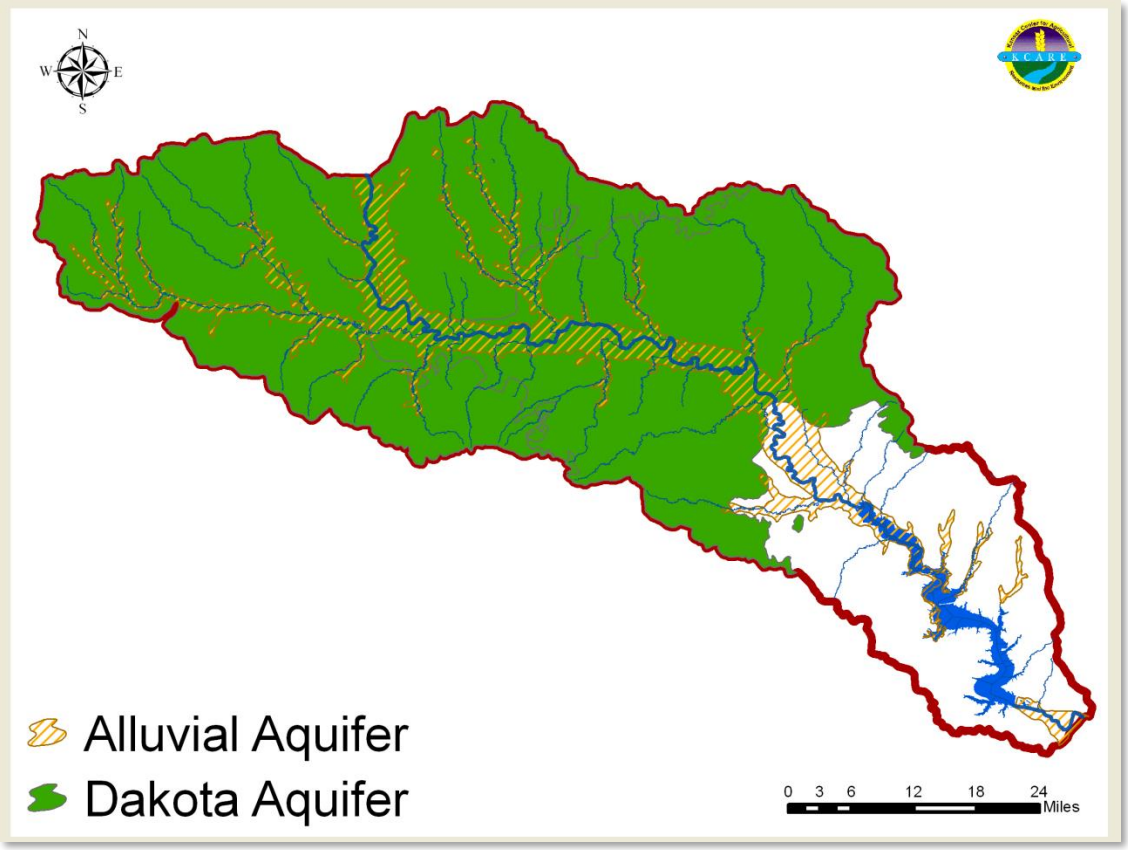


Figure 9 Aquifers in the Watershed [viii]

4.6 TMDLs in the Watershed

A Total Maximum Daily Load (TMDL) sets the maximum amount of pollutant that a specific body of water can receive without violating surface water quality standards, which results in failure to support designated uses. TMDLs provide a tool to target and reduce point and nonpoint pollution sources. TMDLs established by Kansas may be developed on a watershed basis and may use a pollutant-by-pollutant approach, a biomonitoring approach, or both as appropriate. TMDL establishment involves

development of a draft TMDL, publishing of a public notice and receipt of comments on the TMDL, consideration of the public comment, incorporating any necessary revisions to the TMDL due to public comment, and submission of the TMDL to EPA for approval.

The desired outcome of the TMDL process is stated, using the current situation as the baseline. Deviations from the water quality standards are documented. The TMDL states its objective in meeting the appropriate water quality standard by quantifying the degree of pollution reduction expected over time. Interim objectives are defined for midpoints in the implementation process. [14] The goal of the WRAPS process is to address high priority TMDLs.

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

Table 6 TMDLs Review Schedule for the Kansas Lower Republican Basin [ix]

Year Ending in September	Implementation Period	Possible TMDLs to Revise	TMDLs to Evaluate
2010	2011-2020	1999	1999
2015	2016-2025	1999, 2007	1999, 2007
2020	2021-2030	1999, 2007, 2010	1999, 2007, 2010

TMDL development and revisions for the Lower Republican Watershed were approved in 2014. New TMDLs have been developed for eutrophication (phosphorus) and dissolved oxygen in Milford Reservoir.

TMDLs in the watershed are listed in the table below.

Table 7 TMDLs in the Lower Republican Watershed [x] The shaded lines indicate high, medium or low priority priorities. The TMDLs in **bold** print indicate existing TMDLs that will be addressed by this Watershed plan.

TMDLs, Cont.					
Water Segment	**TMDL Pollutant**	**Water Quality Standard**	**Endgoal of TMDL**	**Priority**	**Sampling Station**
Republican River near Rice	Fecal Coliform Bacteria	Primary Contact < 900 colonies per 100 ml water Secondary Contact < 2,000 colonies per 100 ml water	Maintain percent of samples over applicable criteria < 10%	Medium	SC510
Lake Jewell – **The *Lake Jewell dam was breached, but has been repaired. However, the TMDL remains inactive until future assessment can occur.***	Aquatic Plants, Eutrophication and Dissolved Oxygen	Nutrients shall be controlled to prevent accelerated succession of aquatic biota or aquatic life, and development of objectionable concentrations of algae or algal by-products DO 5mg/l	Summer Chlorophyll concentrations = or < 20ug/l	Medium	LM062901 in Lake Jewell
Rimrock Park Lake	Dissolved Oxygen	***Rimrock Park Lake lies on the watershed border with Lower Smoky Hill Watershed. It is not incorporated in this Watershed plan due to the fact that it is downstream of Milford Reservoir. The TMDLs imply that it is applicable to the Smoky Hill Watershed not the Lower Republican.***		Medium	LM070501
Rimrock Park Lake	Eutrophication			Medium	LM070501
Low Priority TMDLs					
Buffalo Creek near Concordia	Fecal Coliform Bacteria	Primary Contact < 900 colonies per 100 ml water Secondary Contact < 2,000 colonies per 100 ml water	Maintain percent of samples over applicable criteria < 10%	Low	SC509
Buffalo Creek near Concordia	Chloride	352 mg/l	Maintain percent of samples over applicable criteria < 10%	Low	SC509

TMDLs, Cont.					
Water Segment	**TMDL Pollutant**	**Water Quality Standard**	**End goal of TMDL**	**Priority**	**Sampling Station**

Belleville City Lake	**Eutrophication**	**Nutrients shall be controlled to prevent accelerated succession of aquatic biota or aquatic life, and development of objectionable concentrations of algae or algal by-products**	**Summer Chlorophyll concentration s = or < 20ug/l**	**Low**	**LM060701**
Jamestown Wildlife Management Area	Eutrophication and pH	Nutrients shall be controlled to prevent accelerated succession of aquatic biota or aquatic life, and development of objectionable concentrations of algae or algal by-products pH > 6.5 and < 8.5	Summer Chlorophyll concentrations = or < 20ug/l and pH between 6.5 and 8.5	Low	LM052801 in Jamestown WMA
Jamestown Wildlife Management Area	Siltation	Suspended solids shall not interfere with the behavior, reproduction, physical habitat or other factor related to the survival and propagation of aquatic or semi-aquatic or terrestrial wildlife	10% or less of samples taken from wetland > 100mg/l TSS	Low	LM052801 in Jamestown WMA
Jamestown Wildlife Management Area	Fecal Coliform Bacteria	2,000 colonies per 100ml water	All FCB samples < 2,000 colonies per 100ml water	Low	LM 052801 in Jamestown WMA

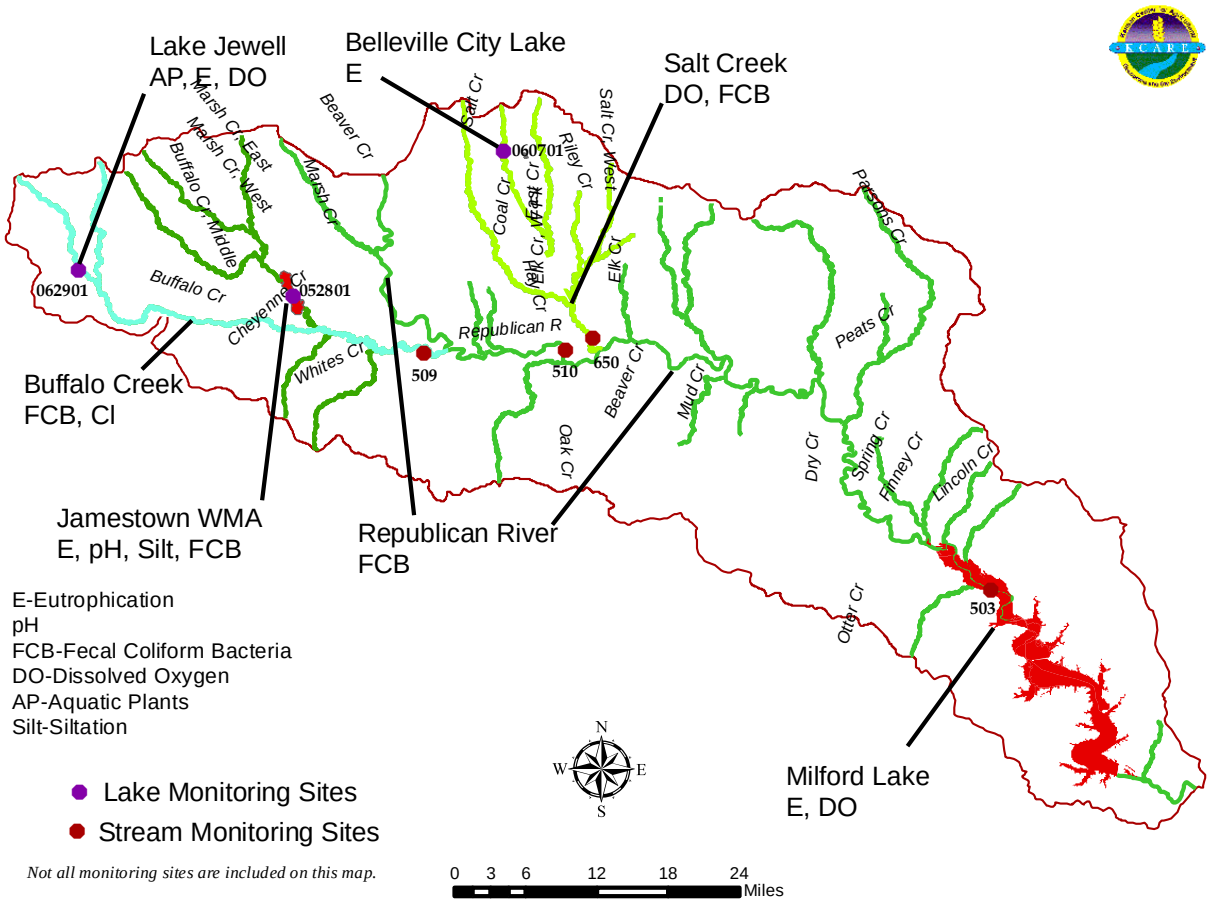


Figure 10 TMDLs in the Lower Republican Watershed [xi]

4.7 303d Listings in the Watershed

The Lower Republican Watershed has numerous listings on the 2016 303d list. [xii] 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 water quality standards and designated uses are not being met. 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". Water bodies are assigned "categories" based on impairment status:

- 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 atrazine problem
- 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 water quality standards

- Category 1 – All designated uses are supported; no use is threatened.

Table 7 2016 303d List of Impaired Waters in the Lower Republican Watershed. [19] The **bold** impairments indicate ones that will be addressed by this watershed plan.

Category	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Buffalo Creek Near Concordia	Water Supply	Arsenic	SC509	JW, CD	Watershed	2023
5	Wolf Creek Near Concordia	Water Supply	Arsenic	SC707	CD	Watershed	2023
5	Republican river Near Clay Center	Aquatic Life	Biology	SC503	CY	Watershed	2023
5	Salt Creek Near Hollis	Water Supply	Chloride	SC650	RP	Watershed	2023
5	Elm Creek Near Ames	Aquatic Life	Copper	SC709	CD	Watershed	2023
5	Mulberry Creek Near Clifton	Aquatic Life	Copper	SC710	CD, CY	Watershed	2023
5	Peats Creek Near Clifton	Aquatic Life	Copper	SC649	WS	Watershed	2023
5	Wolf Creek Near Concordia	Aquatic Life	Dissolved Oxygen	SC707	CD	Watershed	2023
5	Buffalo Creek Near Concordia	Aquatic Life	Selenium	SC509	JW, CD	Watershed	2023
5	Buffalo Creek Near Concordia	Water Supply	Sulfate	SC509	JW, CD	Watershed	2023
5	Fiver Creek Near Clay Center	Water Supply	Sulfate	SC711	CD, CY	Watershed	2023
5	Buffalo Creek Near Concordia	Aquatic Life	Total Phosphorus	SC509	JW, CD	Watershed	2019
5	Elm Creek Near Ames	Aquatic Life	Total Phosphorus	SC709	CD	Watershed	2019
5	Mulberry Creek Near Clifton	Aquatic Life	Total Phosphorus	SC710	CD. CY	Watershed	2019
5	Peats Creek Near Clifton	Aquatic Life	Total Phosphorus	SC649	WS	Watershed	2019
5	Republican River Near Clay Center	Aquatic Life	Total Phosphorus	SC504	RP, WS, CD, CY	Watershed	2019
5	Republican River Near Clay Center	Aquatic Life	Total Phosphorus	SC503	CY	Watershed	2019

5	Republican River Near Rice	Aquatic Life	Total Phosphorus	SC510	JW, RP, CD	Watershed	2019
5	Salt Creek Near Hollis	Aquatic Life	Total Phosphorus	SC650	RP	Watershed	2019
5	Wolf Creek Near Concordia	Aquatic Life	Total Phosphorus	SC707	CD	Watershed	2019
5	Buffalo Creek Near Concordia	Aquatic Life	Total Suspended Solids	SC509	JW, CD	Watershed	2023
5	Republican River Near Clay Center	Aquatic Life	Total Suspended Solids	SC503	CY	Watershed	2023
5	Republican River Near Clay Center	Aquatic Life	Total Suspended Solids	SC504	RP, WS, CD, CY	Watershed	2023
5	Salt Creek Near Hollis	Aquatic Life	Total Suspended Solids	SC650	RP	Watershed	2023
4a	Milford Lake	Aquatic Life	Dissolved Oxygen	LM019001	CY, RL, GE	Lake	High
4a	Rimrock Park Lake	Aquatic Life	Dissolved Oxygen	LM070501	GE	Lake	Medium
4a	Salt Creek Near Hollis	Aquatic Life	Dissolved Oxygen	SC650	RP	Watershed	High
4a	Republican River Near Clay Center	Recreation	E. coli	SC503	CY	Watershed	Medium
4a	Republican River Near Clay Center	Recreation	E. coli	SC504	RP, WS, CD, CY	Watershed	Medium
4a	Republican River Near Rice	Recreation	E. coli	SC510	JW, RP, CD	Watershed	Medium
4a	Salt Creek Near Hollis	Recreation	E. coli	SC650	RP	Watershed	High
4a	Belleville City Lake	Aquatic Life	Eutrophication	LM060701	RP	Lake	Low
4a	Buffalo Creek Near Concordia	Aquatic Life	Eutrophication	SC509		Lake	High
4a	Elm Creek Near Ames	Aquatic Life	Eutrophication	SC709	CD	Lake	High
4a	Five Creek Near Clay Center	Aquatic Life	Eutrophication	SC711	CD, CY	Lake	High
4a	Jamestown Wildlife Area	Aquatic Life	Eutrophication	LM052801	CD	Lake	Low
4a	Milford Lake	Aquatic Life	Eutrophication	LM019001	CY, RY, GE	Lake	High

4a	Mulberry Creek Near Clifton	Aquatic Life	Eutrophication	SC710	Cd, CY	Lake	High
4a	Peats Creek Near Clifton	Aquatic Life	Eutrophication	SC649	WS	Lake	High

Note: Implemented strategies for addressing current TMDLs as determined by the SLT and outlined in this report will have an additional benefit by proactively addressing the impairments on the 303d list. The ultimate goal will be to eliminate the need for TMDL development of these impairments.

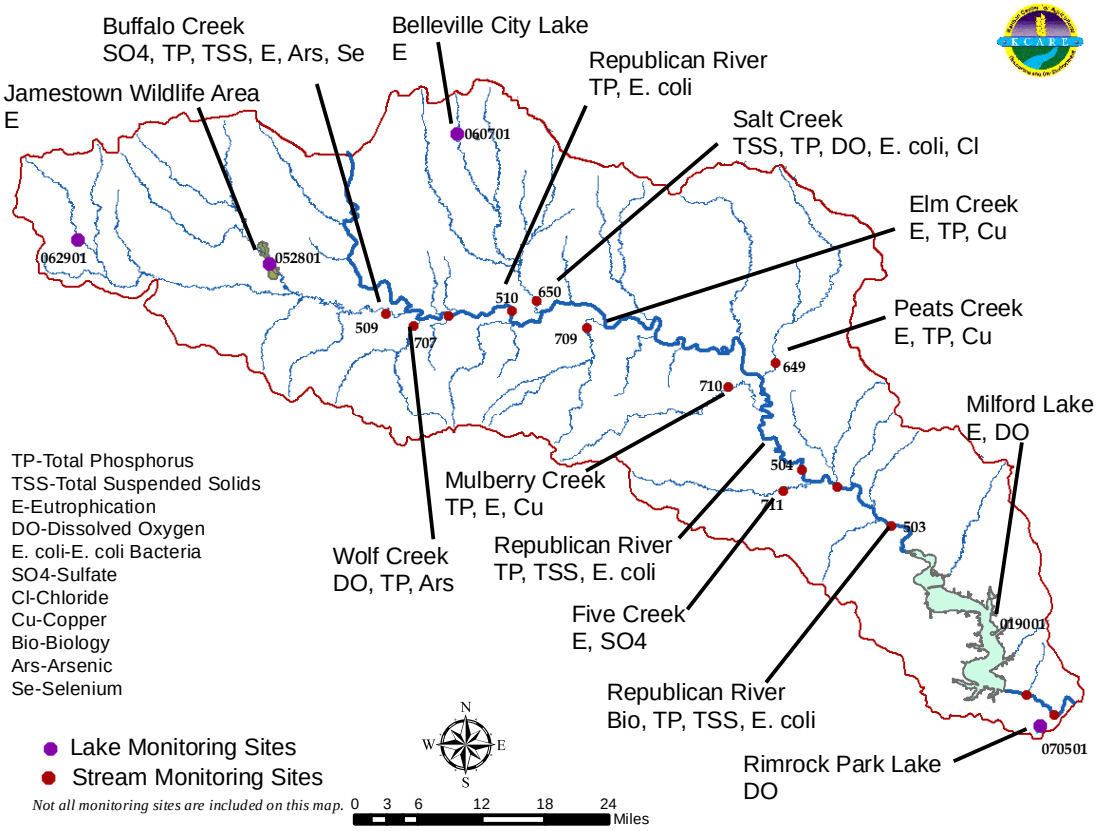


Figure 11 303d Listings in the Watershed, 2016. [13]

4.8 Load Reductions Needed [14]

4.8.1 Nutrients in Milford Reservoir

During development of the 2012 303(d) list, KDHE determined that excessive nutrients in Milford Reservoir are impairing aquatic life, domestic water supply and contributing to Harmful Algae Blooms (HABs) that result in the eutrophication and impairment of contact recreation within Milford Lake.

From 1996-2012, the lake was fully eutrophic and during the 2012 sample season it had become hypereutrophic indicated by a Trophic State Index of 71.98 and an average chlorophyll *a* concentration of 67.9 ug/L. Sampling data indicate that the upper portion of the lake takes the brunt of the nutrient and sediment loads arriving from the watershed and this is reflected in the more severe HABs occurring in this area of the lake. Conditions improve in the lake as it approaches the main body of water near the dam. The algal community in Milford Lake has typically been dominated by blue-green algae, or cyanobacteria, however the number of cyanobacteria had sharply increased since 2009 and in 2012 they accounted for 92% of the entire algal community.

When this watershed plan was originally developed, before the Milford eutrophication TMDL was approved and before the severe and recurring HABs had begun to occur, modeling indicated that 152,000 lbs.. of phosphorus needed to be reduced annually to achieve a 30% load reduction to Milford Reservoir. Water quality data indicate that Milford Reservoir has varied between being co-limited by phosphorus and being limited only by nitrogen for algal growth. Chlorophyll *a* concentrations within the main basin of the lake are greater than 10 ug/L during both conditions, therefore both phosphorus and nitrogen allocations are included in the TMDL.

No load reduction for Total Nitrogen was included in the original plan. The original TP load reduction has been modified due to TMDL development and nitrogen reduction requirements have been added.

The BATHTUB model was used for the eutrophication assessment of Milford Lake to determine the amount of load reductions needed to restore the reservoir to a less eutrophic condition. BATHTUB is an empirical receiving water quality model developed by the U.S. Army Corps of Engineers (USACE, Walker, 1996), and has been widely used in the nation to address many TMDLs relating to issues associated with morphometrically complex lakes and reservoirs (Wang et al., 2005).

Milford Lake was segmented into five sections for the BATHTUB model which included the riverine, upper pool (transitional area), middle pool (transitional area), main basin, and a cove area near the main basin. Atmospheric total nitrogen was obtained from the Clean Air Status and Trends Network (CASTNET), which is available at www.epa.gov/castnet/. The CASTNET station from the Konza Prairie (KS) was utilized to estimate the atmospheric Total Nitrogen concentration for the model. Total Phosphorus atmospheric loading was estimated using the 1983 study of Rast and Lee.

Water quality data from the main basin segment was averaged using the 2008-2012 data from KDHE and the USACE. Data associated with riverine and mid-pool were collected by the USACE from 2008-2012. Stream mass flux, often referred to as load, is the mass of chemical constituents or sediment transported at a point in a stream during a period of time (USGS 2010). Model input data for the lake inflow from the Republican River were estimated from the FLUX model, utilizing 31 KDHE monitoring data from station SC503 on the Republican River and USGS flow data from gage 06856600 on the

Republican River near Clay Center. Inflowing concentrations from unmonitored tributaries flowing into the lake were estimated utilizing data from SC711 on Five Creek near Clay Center and flows were derived from USGS estimates (Perry, 2004). The BATHTUB model was calibrated for the area-weighted mean per EPA's guidance.

The model results estimate that the lake currently retains 75% of the TP and 52% of the TN load annually. Based on the modeling results, a 71% reduction of the TP concentration and a 75% reduction of the TN concentration within the stream inflows of the lake are necessary to meet the TMDL endpoint. To achieve this, the TP annual load must be reduced by 88% and the TN annual load must be reduced by 86% entering the reservoir.

The current total annual loading to the reservoir is 1,216,912 lbs../yr. TP and 4,875,835 lbs../yr. TN. These numbers include loading entering from Nebraska. Because the state of Kansas has no ability to reduce the loading originating in Nebraska, KDHE evaluated the loading coming only from non-point sources in Kansas and adjusted the amount of load reduction needed to include only the parts of the watershed in Kansas.

A mass balance calculation was used to estimate loads from tributaries throughout the watershed above SC503 which is the sample station right before the water enters the reservoir. The loads calculated between the various stations on the Republican River are based on the loads observed at the downstream Republican River stations and subtracting out the upstream loads that are accounted for at the upstream stations. The mass balance calculation suggests that 27% of the TP load reaching SC503 comes in from Nebraska above station SC231 (Republican River near Hardy), 24% of the TP load is attributed to the area in the watershed below the SC231 and above SC510 (Republican River near Rice), 37% of the TP load comes in below SC510 and above SC504 (Republican River near Clay Center), and 12 % of the load reaching SC503 arrives below SC504 and above SC503.

Figure X shows TP load contributions above Milford Lake based on the TP mass balance scenario.

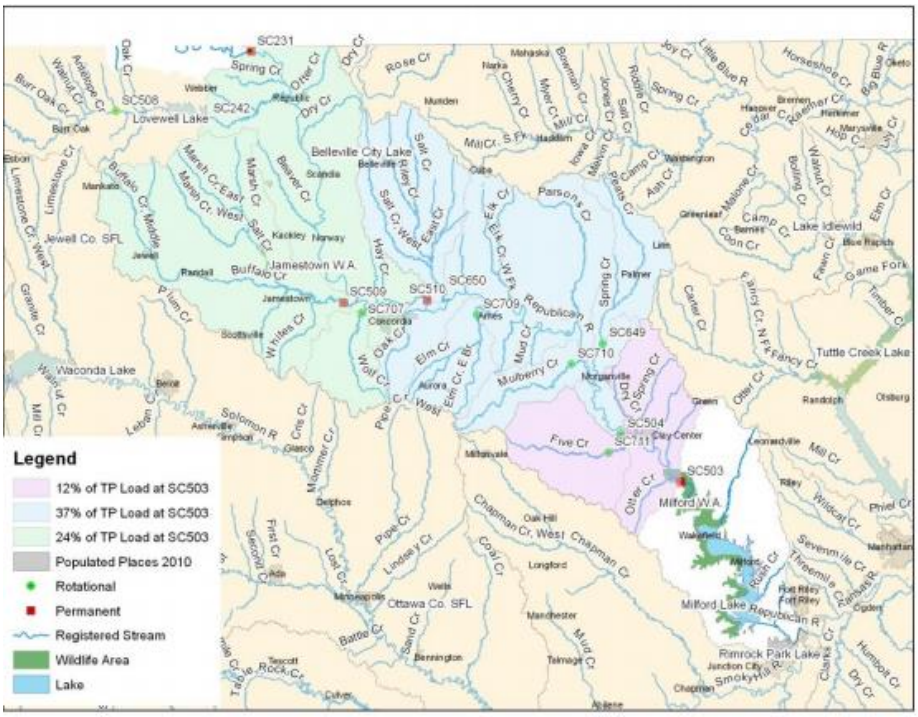


Table X. Milford Lake current average condition and KS adjusted TMDL.

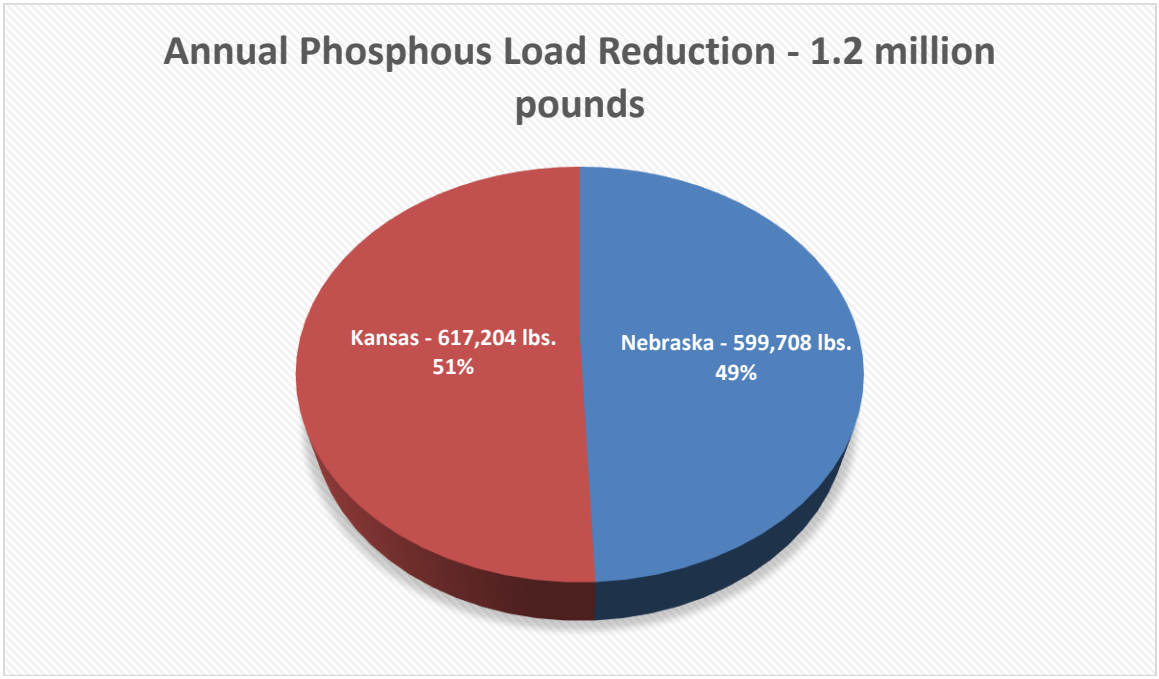
The table below shows the Milford Lake current average condition and the load reductions from both Kansas and Nebraska sources that must be met to achieve the TMDL.

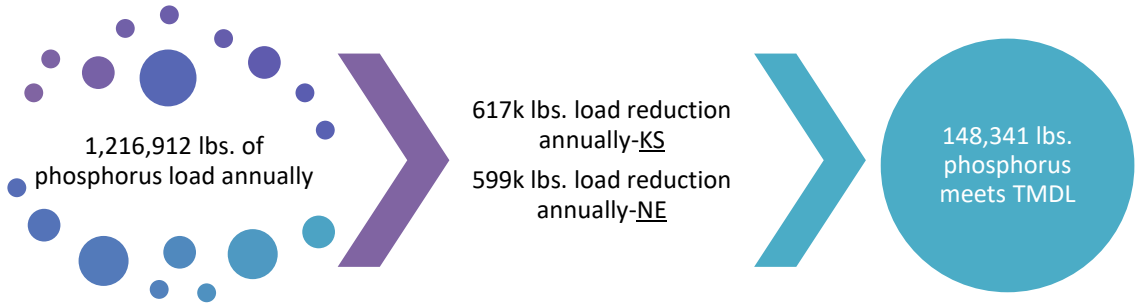
Lake Inflow	Current Avg. Condition	TMDL	% Reduction Needed
TP- Annual Load (lbs./yr)	1,216,912	148,341	88%
TP – Lake Concentration (µg/L)	287	83	71%
TN – Annual Load (lbs./yr)	4,875,835	674,882	86%
TN – Daily Load (lbs./day)	20,706	2,866	86%
TN – Lake Concentration (lbs./day)	1,722	428	75%

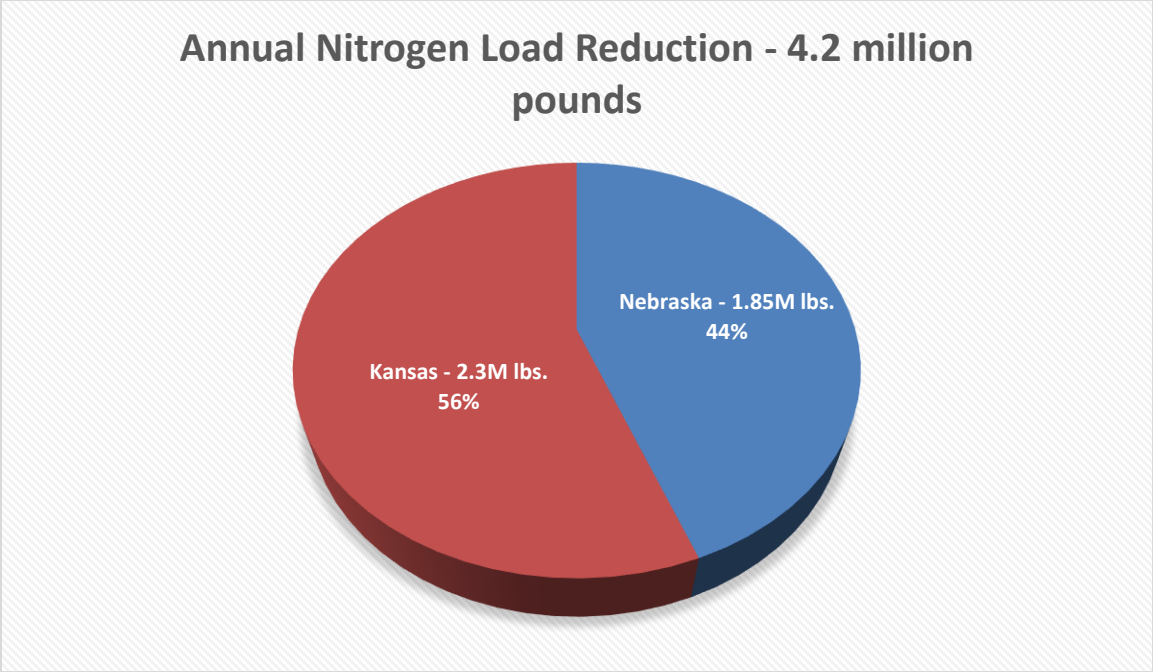
Watershed Planning Goals

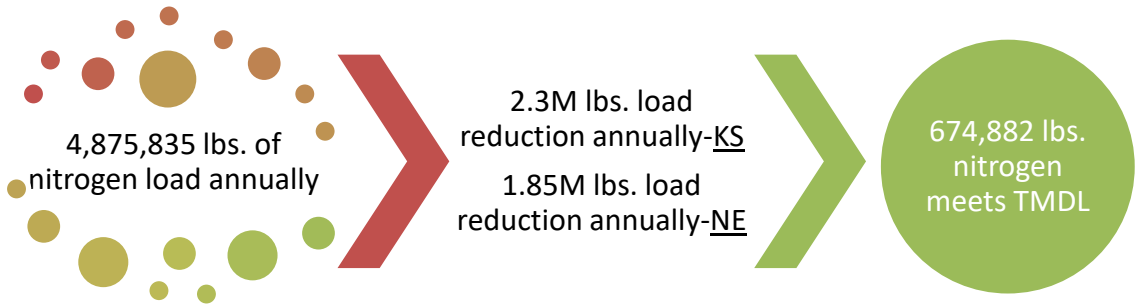
This plan does not address the entire load reductions required from all sources (Kansas and Nebraska). It only addresses the Kansas portion of load reductions needed.

The TMDL, adjusted for Kansas nonpoint sources only, is based on the above mass balance evaluation and does not include load reduction needs for the portion of the load originating in Nebraska. The TP reduction is **617,204 lbs..** of phosphorus needing reduction annually from Kansas sources. In addition, Total Nitrogen annual load reduction from Kansas sources needed was determined to be **2,341,263 lbs../yr.**









4.8.2 Sediment This will be changed

Estimated annual loads for the Republican River were determined from average annual flows at Hardy (NE), Concordia and Clay Center and average Total Suspended Solids (TSS) values from stations in the vicinity of these gages. Only Buffalo Creek and Salt Creek and the portion of the Republican River below the confluence of Salt Creek are impaired by TSS.

Table 8. Milford Reservoir Summary for TSS annual load reductions

Total Sediment Loading	TSS tons/year
Current Load	128,413
Desired Load Capacity	95,414
Reduction in TSS Nonpoint Load	***32,999***

4.8.3 E. Coli Bacteria

Bacteria Load Reductions should result in less frequent exceedance of the nominal ECB criterion (427 counts in these cases); and in lowered magnitude of those exceedances.

In order to assess the impact of BMPs addressing bacteria impairments; an index will be used to ascertain the relative frequency and magnitude of bacteria concentrations seen in the receiving streams, monitored by KDHE on a routine or rotational basis.

The calculated index will be the natural logarithm of each sample value taken during the April-October primary recreation season, divided by the natural logarithm of the bacteria criterion [ln(427)]

$$\text{Index} = \ln(\text{ECB count})/\ln(427)$$

The plot of the cumulative frequency of the samples' index value creates a profile of estimated current frequency and magnitude of bacteria counts in the stream relative to the stream's bacteria criterion. Ideally the post-implementation profile of future samples will plot below the current profile and cross the index value = 1 at the 90th percentile. This indicates that at least 90% of sampled values are under the criterion value and more intensive sampling would likely show attainment of the water quality standard.

Compliance with water quality standards requires sampling 5 times within 30 days during several periods during the primary recreation season, and calculating the geometric mean of those samplings. Meeting that test will be justification for delisting the stream impairment.

Salt Creek has been sampled twice for *E. coli* bacteria, in 2005 and 2009. As such, there are only seven samples collected during the primary recreation season of April to October of both years. Five of the seven samples were over the nominal criterion value of 427 (index = 1), thus, elevated bacteria during primary recreation season is the norm. The profile derived from the seven samples, shown below, tends to be weighed toward showing excessive bacteria.

The future profile, developed from samples taken during the primary recreation seasons of 2013 and 2017 should plot below the current profile and a subsequent profile from data collected in 2021 and 2025 should approach that shown as the TMDL profile. At that time, less than 10 percent of samples should exceed the nominal criterion value and intensive (5 in 30 day) sampling should commence to determine if Salt Creek complies with water quality standards.

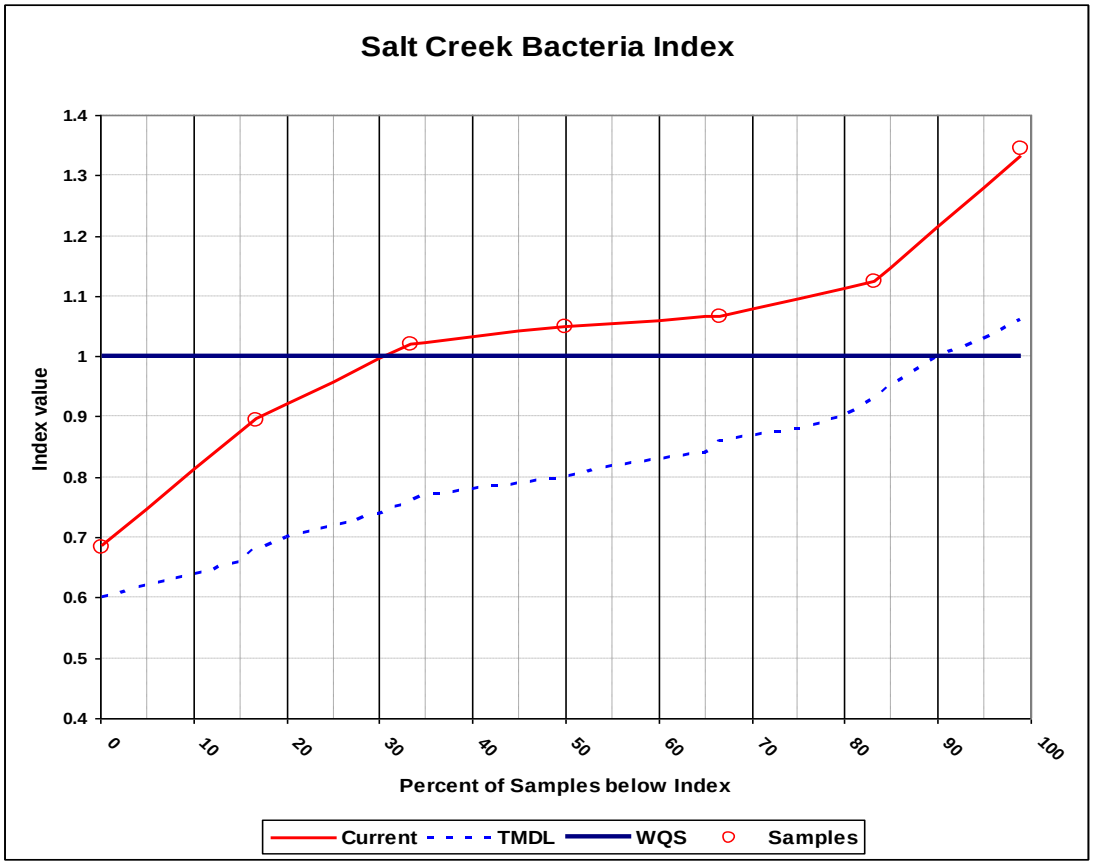


Figure 12 Salt Creek Bacteria Index

5.0 Targeted Areas and Load Reduction Methodology

5.1 Targeted Areas

The Lower Republican Watershed was assessed using the Soil and Water Assessment Tool (SWAT) by Kansas State University Department of Biological and Agricultural Engineering. SWAT was used as an assessment tool 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-basin. Some sub-basins have higher loads than others. All sub-basins are ranked based on the values of an average annual load, sorted from highest to lowest, and form the ranking list. Sub-basins within the top 20-30 percent of the list are selected as targeted areas for cropland and livestock BMP implementation.

The SWAT model was developed by USDA-Agricultural Research Service (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 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.

SWAT is a physically based, deterministic, continuous, watershed-scale simulation model. 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 sub-basin, reservoir, and channel routing components.

1. The sub-basin 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 sub-basin 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 that is provided in the crop database.
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 retains 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 targeted areas.

Data for the Lower Republican 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 meter 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)

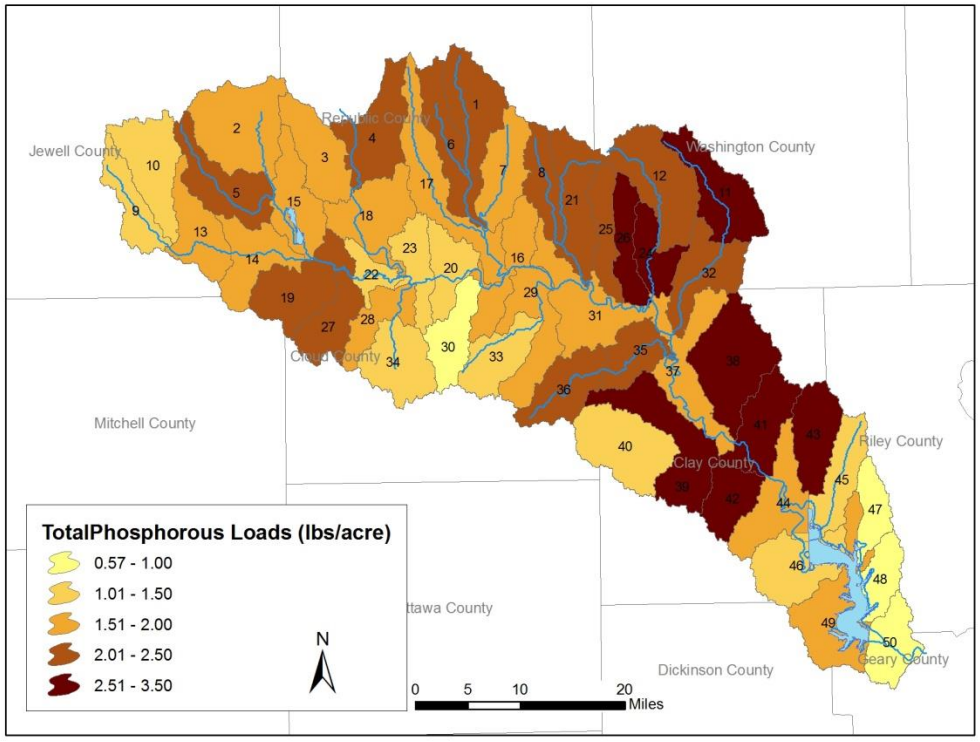
In every watershed, there are specific locations that contribute a greater pollutant load due to soil type, proximity to a stream and land use practices. By focusing BMPs in these areas pollutants can be reduced at a more efficient rate. Through research at the University of Wisconsin, it has been shown that there is a "bigger bang for the buck" with targeting BMP placement in contrast to a "shotgun" approach of applying BMPs in a random nature throughout the watershed. The SWAT targeted area will be used for cropland BMP placement. Additional cropland BMP targeted areas have been identified through water quality monitoring and through aerial assessments followed by ground-truthing. The livestock targeted area was set by the KDHE based on monitoring data and by the SLT through their knowledge of the

watershed and will focus BMP placement for nutrient runoff. The 2015 Kansas Water Office (KWO) Streambank Assessment will be used to target sediment and nutrient reduction from streambank improvements. Targeting for this watershed will be accomplished in three areas:

1. Cropland will be targeted for sediment and nutrients,
2. Livestock areas will be targeted for bacteria and nutrients, and
3. Streambanks will be targeted for sediment and nutrients.

The maps produced by the SWAT modeling are displayed below. The darker the shading in the map, the greater the potential for nitrogen, phosphorus or sediment runoff. The sub watersheds in the central portion of the watershed, mainly contained in Clay County, show the highest potential for erosion, phosphorous, and nitrogen runoff. As stated earlier, this model accounts for land use, soil type, slope, and current conservation practices. This is the area of the watershed with the greatest percentage of cropland, which leads to a higher potential for erosion compared to areas that are mainly composed of grassland.

Figure 13 Phosphorus (lbs../acre) Yield as Determined by SWAT **Fix this move to below figure**



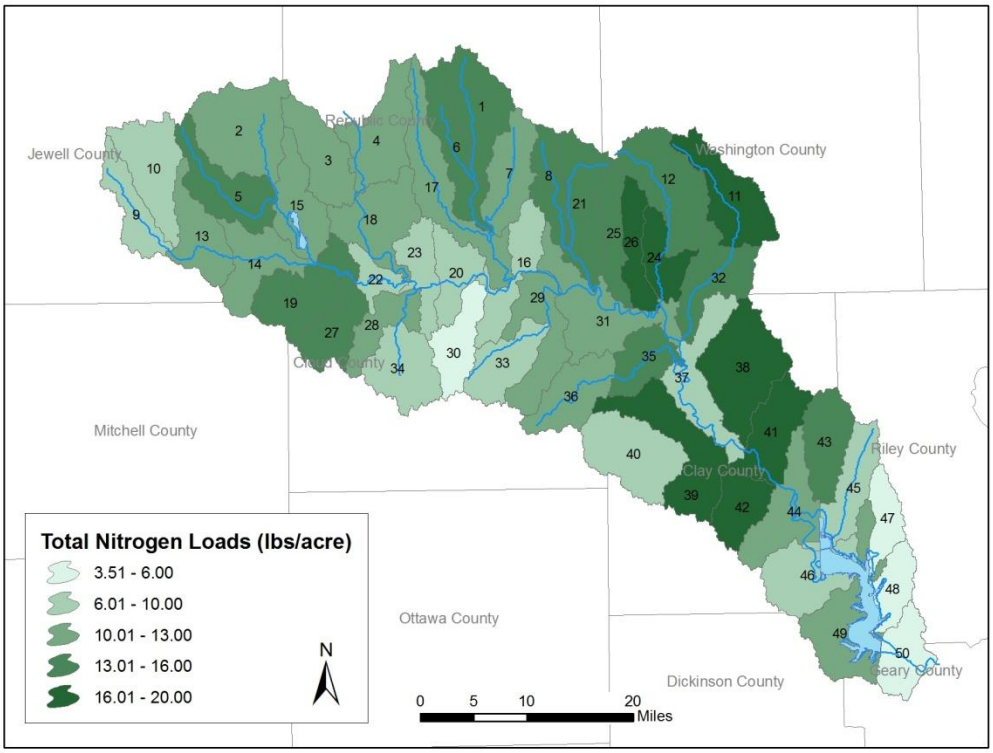


Figure 14 Nitrogen (lbs../acre) Yield as Determined by SWAT

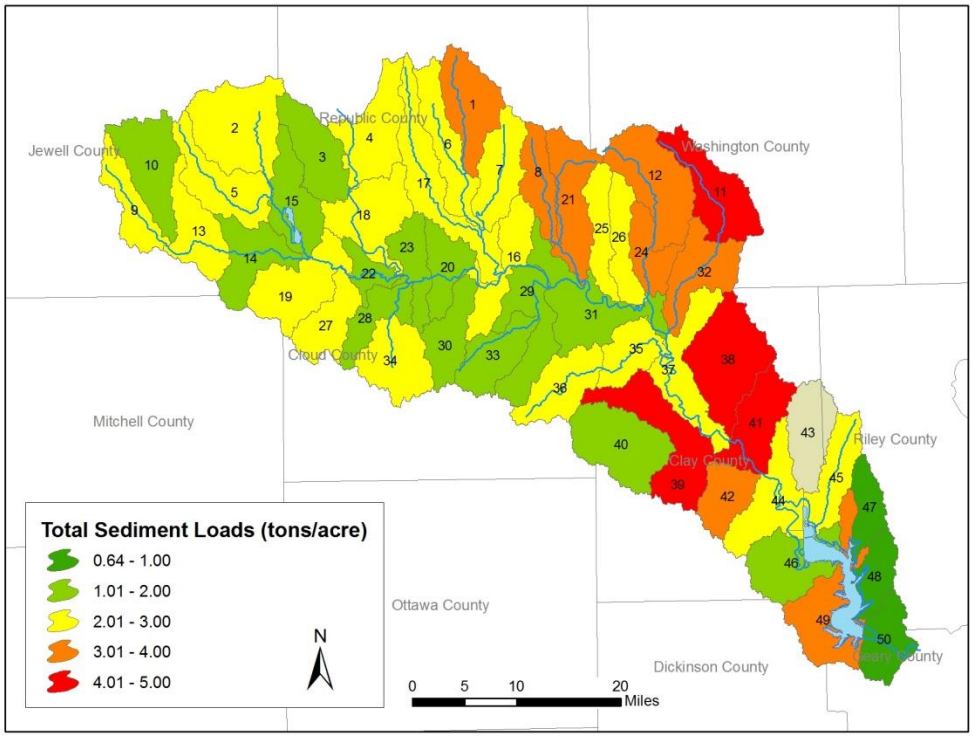


Figure 15. Sediment (tons/acre) Yield as Determined by SWAT

After locating initial critical targeted areas, the area was ground-truthed to determine what BMPs are currently being utilized in the targeted areas. The ground-truthing involved conducting windshield surveys throughout the targeted areas identified by the watershed models to determine which BMPs are currently installed. These surveys were conducted by local agency personnel and members of the SLT that are familiar with the area and its land use history. Ground-truthing estimates the current adoption rate of BMPs, provides pictures of the targeted areas, and may identify additional water quality concerns not captured by watershed modeling. In 2009, the ground-truthing provided the current adoption rates for four common BMPs (conservation crop rotation, grassed waterways, no-till, and vegetative buffers) in the cropland targeted area of the watershed averaged across counties. The results are as follows:

- Conservation Crop Rotation – current adoption rate of 96 percent
- Grassed waterways – current adoption rate of 82 percent
- No-till cultivation – current adoption rate of 52 percent
- Vegetative buffer strips – current adoption rate of 6 percent

The SWAT model was supplemented by combining the ground-truthing information and aerial assessments. This allows the SLT to develop a more accurate determination of appropriate

targeted areas. The SLT then determined number of acres needed to be implemented for each BMP. This information is provided in Tables X and X.

KDHE has recently completed aerial assessments (AA) for all priority HUCs. The purpose of the AA is to identify potential sources of sediment and nutrients in targeted HUC12s that could be addressed by BMP implementation. The Peats Creek and Buffalo Creek priority areas have been ground-truthed based on the aerial assessments and the resulting maps are presented in Figures X and X. All priority areas will be ground-truthed for additional sources of sediment and nutrients not detected in the AA during the next several years.

Figure X. Peats Creek Ground-truthing and Project Priorities

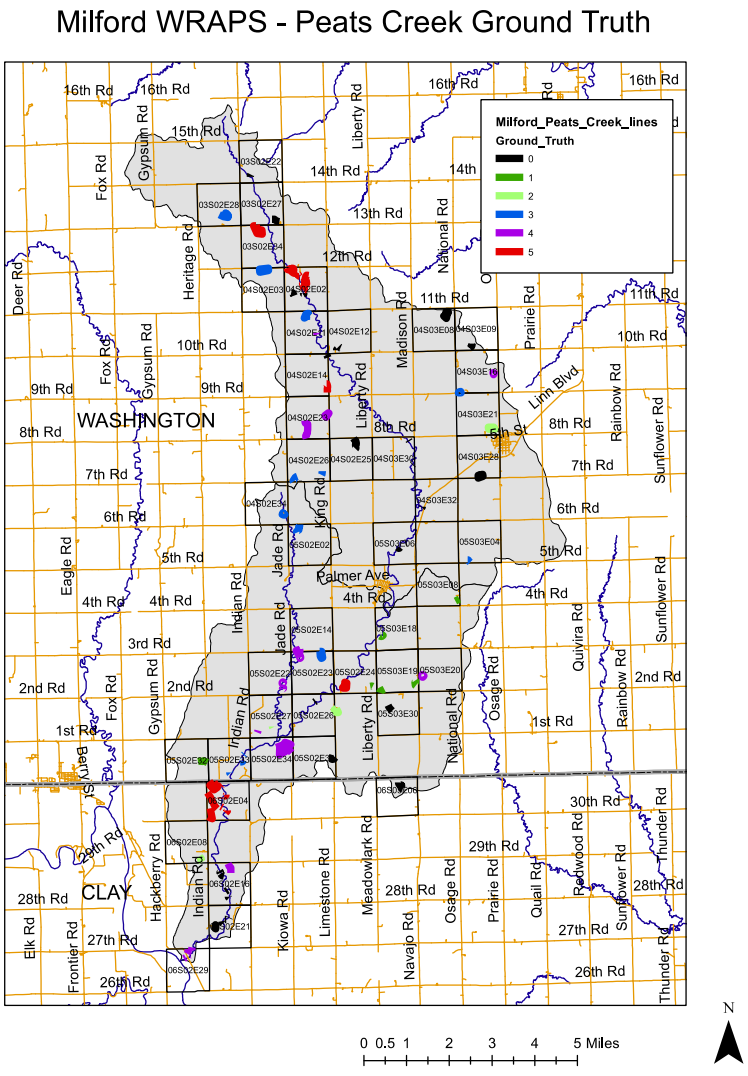
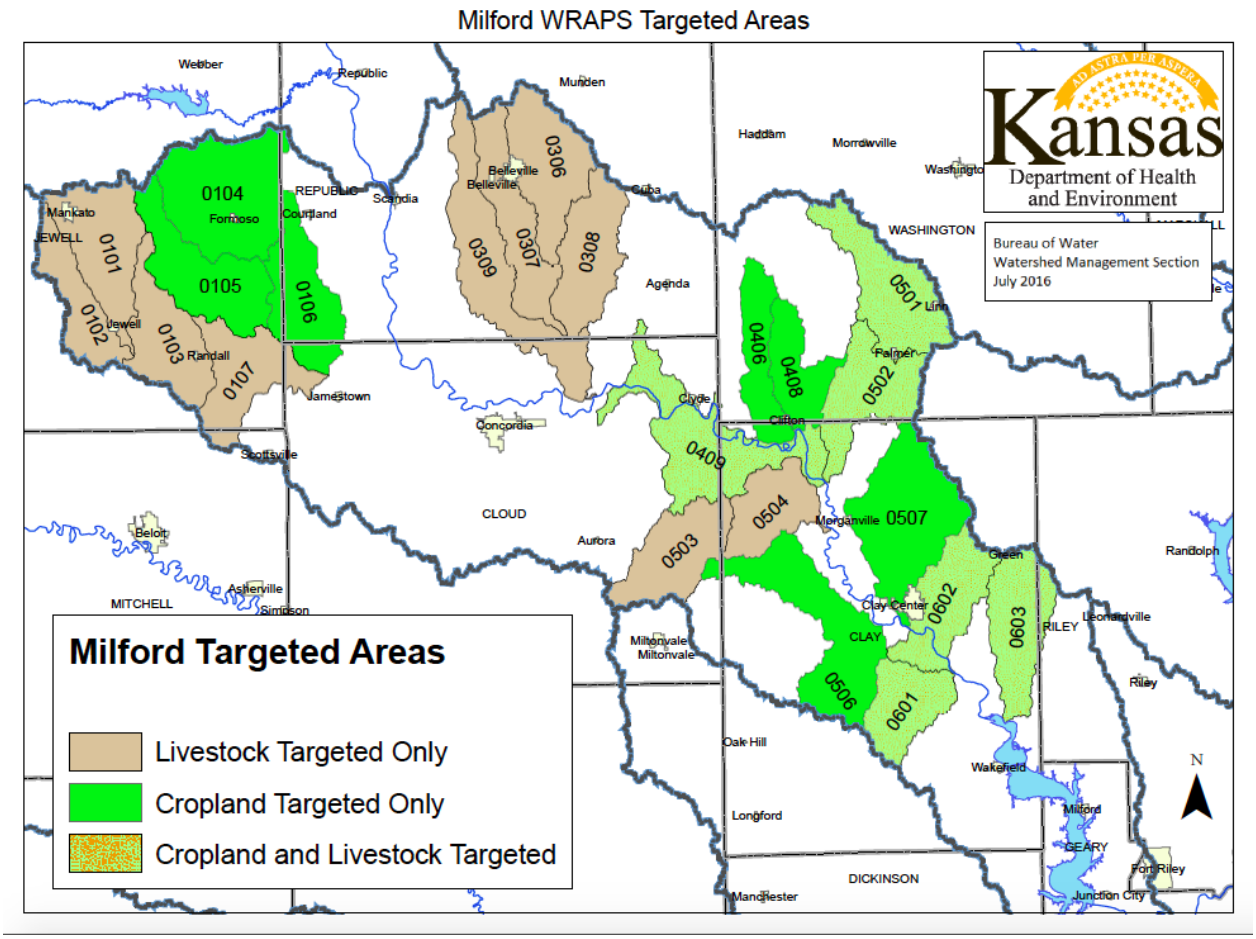


Figure X. Milford WRAPS

Buffalo Creek Ground-truthing and Project Priorities

Insert buffalo creek ground truth map

Figure 16 Composite of Targeted Areas for Cropland and Livestock BMP Placement [xv]



Some HUCs are targeted for both livestock and cropland BMPs. Table X summarizes the targeted areas for cropland and livestock BMPs.

Table X. Summary of Cropland and Livestock BMP target areas by HUC 12

HUC	Cropland Target Area	Livestock Target Area
102500170101		X
102500170102		X
102500170103		X
102500170104	X	
102500170105	X	
102500170106	X	
102500170107		X

102500170306		X
102500170307		X
102500170308		X
102500170309		X
102500170406	X	
102500170408	X	
102500170409	X	X
102500170501	X	X
102500170502	X	X
102500170503		X
102500170504		X
102500170506	X	
102500170507	X	
102500170601	X	X
102500170602	X	X
102500170603	X	X

When the TMDL was developed, a different, less data intensive model was used to identify landscape areas with higher potential for nutrient and sediment runoff: The Spreadsheet Tool for Estimating Pollutant Load (STEPL) model, and results are very similar to those HUCs identified and targeted by the SWAT model, therefore future targeting will continue to rely on the original SWAT model results, KDHE water quality data and aerial assessments followed by ground-truthing. Future targeted areas may be changed or added based on new water quality information derived from the KDHE monitoring program.

Maybe end this section here and move detailed info below to appendix

5.2 Cropland Erosion

The SWAT delineated (primary ranked) Targeted Area of this project was used for the initial determination of BMP placement for sediment (overland origin). Since then, six additional areas have been added based on KDHE monitoring data. Targeted areas include a portion of the Five Creek, Mall Creek, Lincoln Creek, Finney Creek, Otter Creek, Dry Creek, Peats Creek and Marsh Creek (Jamestown Wildlife Area). This area contains HUC numbers:

- 10250017**0104**
- 10250017**0105**
- 10250017**0106**
- 10250017**0406**
- 10250017**0408**
- 10250017**0409**

- 10250017**0501**
- 10250017**0502**
- 10250017**0506**
- 10250017**0507**
- 10250017**0601**
- 10250017**0602**
- 10250017**0603**

Table 11 Land use in the Cropland Targeted Area [24]

Only land uses comprising at least 1% of the total are included.

HUC	Total Acres	Land Use	Acres	% Sub-basin Area
102500170501	**30,200**	Cropland	17,900	59
		Grassland	10,000	33
		Woodland	1,800	6
		Hay	300	1
102500170408	**16,000**	Cropland	12,100	75
		Grassland	3000	19
		Woodland	900	6
102500170406	**16,900**	Cropland	13,500	80
		Grassland	2,000	12
		Woodland	1,000	6
102500170507	**39,400**	Cropland	28,000	71
		Grassland	6,400	26
		Woodland	1,250	5
		Water	340	1
102500170506	**37,400**	Cropland	24,900	66
		Grassland	10,300	28
		Woodland	2,160	6
102500170602	**24,300**	Cropland	15,000	62
		Grassland	6,400	26
		Woodland	1,250	5

		Water	340	1
102500170601	**18,700**	Cropland	12,200	65
		Grassland	5,500	29
		Woodland	1,000	5
102500170603	**25,000**	Cropland	12,000	48
		Grassland	11,000	44
		Woodland	2,000	8
		Water	150	1
102500170104	**39,300**	Cropland	22,300	57
		Grassland	14,500	37
		Woodland	2,180	5
102500170105	**28,800**	Cropland	20,500	71
		Grassland	7,000	24
		Woodland	1,200	4
102500170106	**25,600**	Cropland	15,600	61
		Grassland	7,500	29
		Woodland	1,400	5
		Water	1,200	5
102500170409	**40,000**	Cropland	28,700	72
		Grassland	7,300	18
		Woodland	2,600	6
		Water	1,300	3
102500170502	**24,900**	Cropland	14,800	59
		Grassland	8,400	34
		Woodland	1,600	6

5.3 Livestock Targeted Areas

Targeted areas for livestock BMP implementation were selected by the KDHE TMDL section based on past monitoring data, with input from the SLT. Additional targeted areas have been added since plan development and are included in the table below. A presentation of common livestock BMPs to reduce phosphorous and bacteria runoff from livestock facilities was given to the SLT. Livestock producers within these areas as well as local agency personnel familiar with these areas then discussed which BMPs were needed in the area. The top five livestock BMPs were selected by need, cost-effectiveness, and producer acceptability. Adoption rate goals were set for the next 20 years based on their overall need and what can be feasibly adopted.

The SLT has determined an area for targeting **livestock** related phosphorus and bacteria pollutants. Livestock BMPs will be placed in these areas. The HUC 12 areas and correlated SWAT delineated and KDHE identified areas are:

- 10250017**0101**
- 10250017**0102**
- 10250017**0103**
- 10250017**0107**
- 10250017**0306**
- 10250017**0307**
- 10250017**0308**
- 10250017**0309**
- 10250017**0409**
- 10250017**0501**
- 10250017**0502**
- 10250017**0503**
- 10250017**0504**
- 10250017**0601**
- 10250017**0602**
- 10250017**0603**

Table 9 Land Use in the Livestock Targeted Area **Error! Bookmark not defined.**

Only land uses comprising at least 1% of the total are included.

HUC	Total Acres	Land Use	Acres	% Sub-basin Area
102500170306	28,000	Cropland	15,700	56
		Grassland	9,300	33
		Woodland	2,100	8

102500170307	25,000	Cropland	15,200	62
		Grassland	6,400	26
		Woodland	2,100	9
102500170102	17,900	Cropland	10,500	59
		Grassland	6,200	35
		Woodland	1,000	6
102500170101	27,600	Cropland	13,200	45
		Grassland	11,300	41
		Woodland	2,200	8
102500170103	22,900	Cropland	18,000	79
		Grassland	4,000	17
		Woodland	800	3
102500170107	25,000	Cropland	18,400	75
		Grassland	5,300	22
		Woodland	800	3
102500170309	35,900	Cropland	22,300	62
		Grassland	10,800	30
		Woodland	2,600	7
102500170502	24,900	Cropland	14,800	59
		Grassland	8,400	34
		Woodland	1,600	6
102500170504	18,500	Cropland	11,200	61
		Grassland	6,200	34
		Woodland	1,000	4
102500170503	23,700	Grassland	11,500	48
		Cropland	11,100	47
		Woodland	1,000	4
102500170308	24,500	Cropland	11,800	48
		Grassland	10,600	43
		Woodland	2,000	8
102500170409	40,000	Cropland	28,700	72
		Grassland	7,300	18

		Woodland	2,600	6
		Water	1,300	3
102500170501	30,200	Cropland	17,900	59
		Grassland	10,000	33
		Woodland	1,800	6
102500170601	18,700	Cropland	12,200	65
		Grassland	5,500	29
		Woodland	1,000	5
102500170602	24,300	Cropland	15,000	62
		Grassland	6,400	26
		Woodland	1,300	5
		Cropland	340	1
102500107603	25,100	Cropland	12,000	48
		Grassland	11,000	44
		Woodland	2,000	8
		Water	150	1

5.3 Streambank Erosion

When this plan was originally developed, there was no streambank assessment available for targeting streambank improvement areas and the 1991 USDA/NRCS Riparian layer from the Kansas Geospatial Community Commons was used to identify barren lands along the Republican River as a surrogate for a detailed assessment.

In 2013 the Kansas Water Office (KWO) completed a detailed GIS based streambank assessment and that report will be used to target streambank improvement projects as funds become available. The assessment quantifies annual tons of sediment eroded from the Lower Republican River watershed between 1991 and 2008 or 2012. Using aerial assessments, a total of 64 streambank erosion sites were identified, covering 54,336 feet of unstable streambank and transporting 119,731 tons of sediment downstream per year, accounting for roughly 112 acre-feet per year of sediment accumulation in Milford Lake. The identified streambank erosion locations are only a portion of all streambank erosion occurrences in the watershed. Only those streambank erosion sites covering an area 1,000 sq. feet or more were identified for this assessment.

5.4 Load Reduction Estimate Methodology

5.4.1 Cropland

Baseline loadings are calculated using the SWAT model delineated to the HUC 14 watershed scale. BMP load reduction efficiencies are derived from K-State Research and

Extension Publication MF-2572. [16] Load reduction estimates are the product of baseline loading and the applicable BMP load reduction efficiencies.

5.4.2 Livestock

Baseline nutrient loadings per animal unit are calculated using the Livestock Waste Facilities Handbook.[17] Livestock management practice load reduction efficiencies are derived from numerous sources including K-State Research and Extension Publication MF-2737 and MF-2454.[18] Load reduction estimates are the product of baseline loading and the applicable BMP load reduction efficiencies.

5.4.3 Streambanks

Streambank erosion sites were analyzed by stream reach, 10-digit HUC10 and 12-digit HUC12. Nearly all of the identified eroded sediment in the watershed is transported annually from the main-stem Republican River reaches one, two, three, four and five (R01, R02, R03, R04 and R05), accounting for roughly 117,613 tons of sediment annually or 98% of sediment eroding from all identified streambank erosion sites. Target main-stem reaches are R02 and R03 accounting for roughly 98,435 tons of sediment annually or 82% of sediment from all identified actively eroding sites. Main-stem reaches R02 and R03 account for an estimated 48% or $1.86 million of total stabilization cost needs in the watershed ($3.89 million).

Results by HUC10 identified 1025001705 as the most active HUC10 for streambank degradation, accounting for 19,515 feet of unstable streambank; 58,012 tons (54 acre-feet of reservoir sedimentation) of sediment per year and 36% of total stabilization costs. Results by HUC12 identified HUC 102500170508 as the most active HUC12 for streambank degradation, accounting for 19,515 feet of unstable streambank; 58,012 tons (54 acre-feet of reservoir sedimentation) of sediment per year and 36% of total stabilization costs. Note the values for the most active HUC10 and HUC12 are the same because they encompass the same actively eroding streambank sites. Based on the average stabilization costs of $71.50 per linear foot, conducting streambank stabilization practices for the entire watershed would cost approximately $3.9 million. (KWO 2013)

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

1. **Sedimentation**
    a. **Cropland erosion**
    b. **Streambank erosion**
2. **Nutrients**
    a. **Cropland runoff of fertilizer**
    b. **Livestock runoff of manure (including ECB)**
    c. **Streambank erosion with soil adhered nutrient runoff**

All goals and best management practices will be aimed at 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 Watershed

6.1 Nutrients

Nutrient related TMDLs in the watershed are found in Salt Creek, Lake Jewell, Belleville City Lake, Jamestown Wildlife Management Area and Milford Reservoir.

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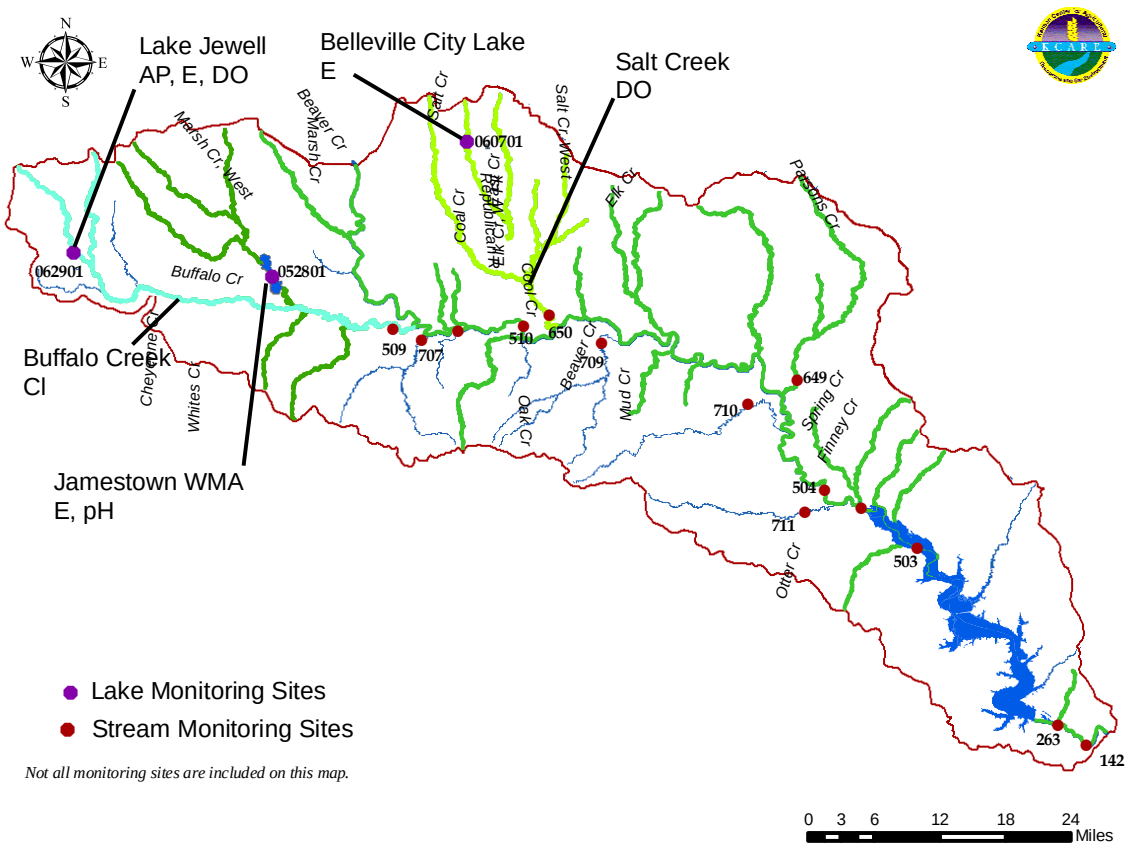

Figure 17 Nutrient Related TMDLS in the Watershed [x]

Nutrient related impairments that are listed on the 303d list are found in the Republican River, Peats Creek, Buffalo Creek, Elm Creek, Mulberry Creek, Salt Creek and Wolf Creek.

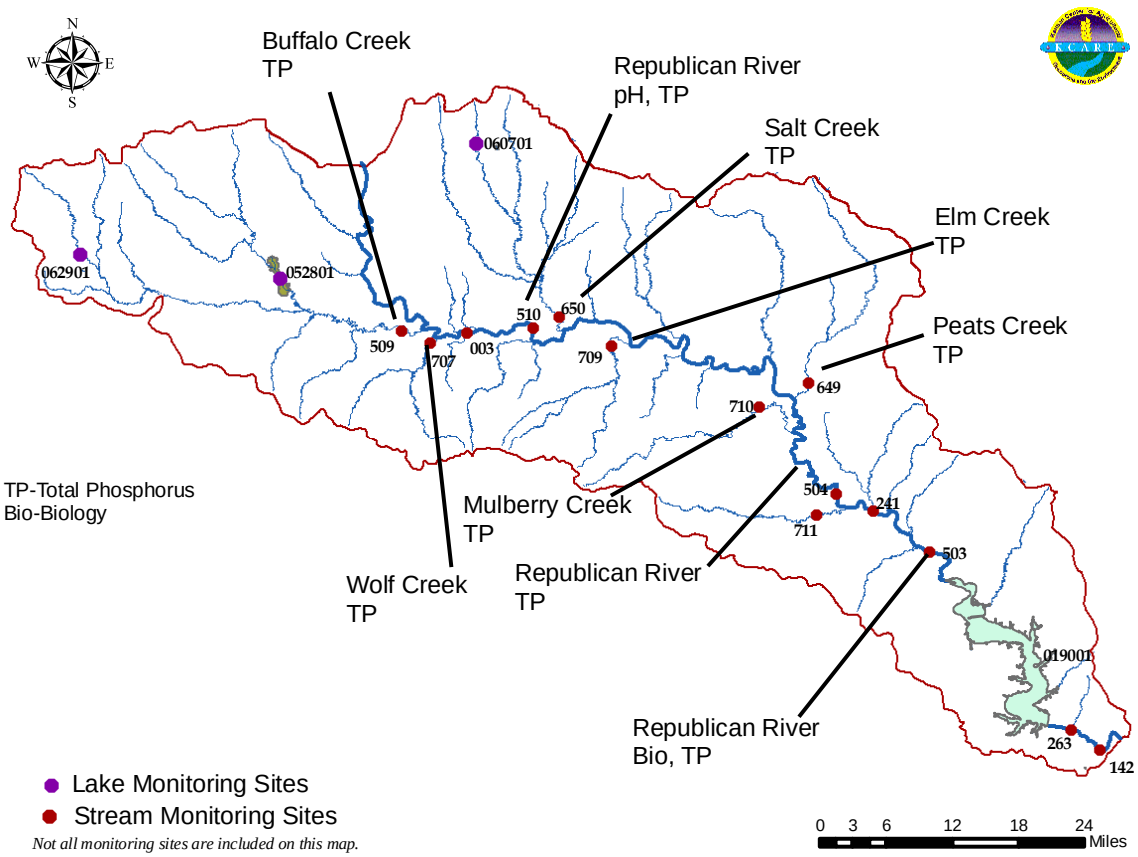

Figure 18 Nutrient Related Impairments on the 303d List Error! Bookmark not defined.

Eutrophication occurs when a water body receives excess nutrients. Excess nutrients, primarily nitrogen and phosphorus, create conditions favorable for algal blooms and plant growth. Milford Reservoir, Lake Jewell, Belleville City Lake and Jamestown Wildlife Management Area have TMDLs for eutrophication. Proliferation of algae and subsequent decomposition depletes available **dissolved oxygen** in the water profile. This lack of oxygen is devastating for aquatic species and can lead to fish kills. Milford Reservoir, Salt Creek and Lake Jewell have TMDLs for low dissolved oxygen concentration. Desirable criteria for a healthy water profile includes dissolved oxygen (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. **pH** is another indicator of excess organic matter. Jamestown Wildlife Management Area has a TMDL for pH. Lake Jewell also has a TMDL for **aquatic plants** which covers submersed, floating or emergent aquatic vegetation. Excess nutrients can originate from failing septic systems and manure and fertilizer runoff in rural and urban areas.

6.1.1 Possible Sources of the Nutrient Impairment

An excess in nutrients can be caused by any land practice that will contribute 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.

This section will review several potential sources or environmental actions that have the potential of increasing nutrients in the waters. They are (not in order of importance):

1) Crops
   - Land use distribution in the watershed
2) Livestock
   - Grazing density and Confined Animal Feeding Operations as it relates to nutrients and fecal coliform bacteria
3) Streambank erosion
   - Precipitation

It must be noted that not all phosphorus and nitrogen contributions can be attributed to agricultural practices. Excess fertilization of lawns, golf courses and urban areas can easily transport nitrogen and phosphorus downstream. However, for this WRAPS process, targeting will be for livestock and cropland since they are the major contributors in the watershed.

6.1.1. A Land Use

Cropland commonly has manure applied from livestock confinement operations. 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. In this watershed, the cropland is distributed mainly in the central and northern areas. Most cropland is located in river and stream flood plains because over time flooding has deposited the most fertile soils. If cropland is located near a stream or river, it is important that conservation practices be installed to prevent nutrient runoff. Cropland covers over 60% of the watershed.

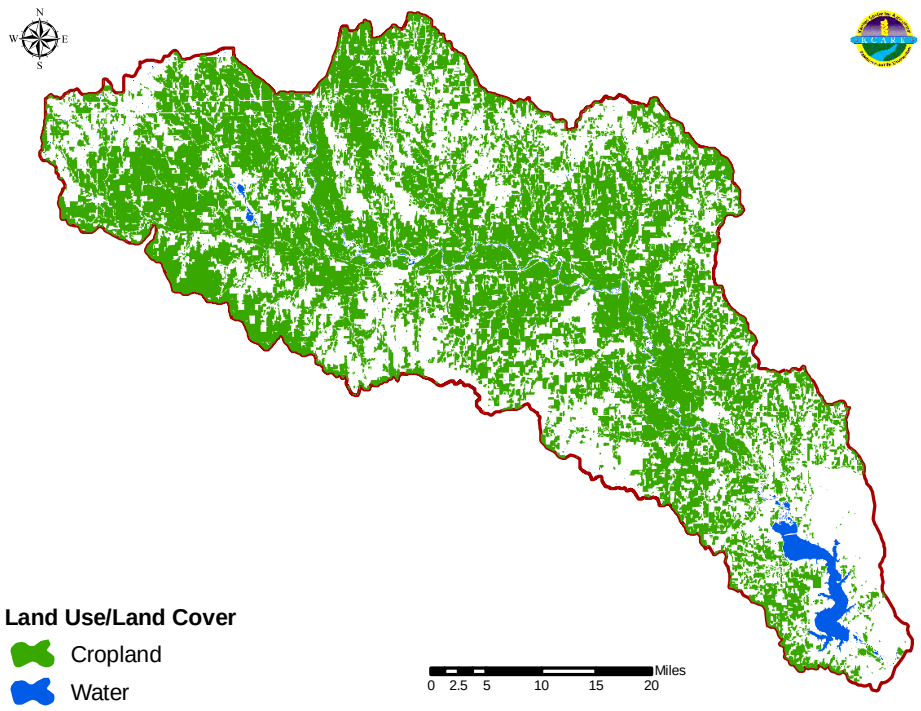

Figure 19 Cropland Distribution within the Watershed [33]

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 bacteria by defecating directly in the streams. Overgrazing will lead to faster runoff of manure since there is not adequate biomass to slow water flow. Similarly, livestock that are located in close proximity to a stream will also contribute phosphorus and fecal coliform bacteria during a runoff rainfall event. All BMPs that are to be implemented under the direction of the SLT will be directed towards restricting nutrient runoff, but will have a similar effect on fecal coliform bacteria runoff as an additional benefit. Grassland in this watershed is mainly concentrated in the southern portion and covers 36% of this watershed.

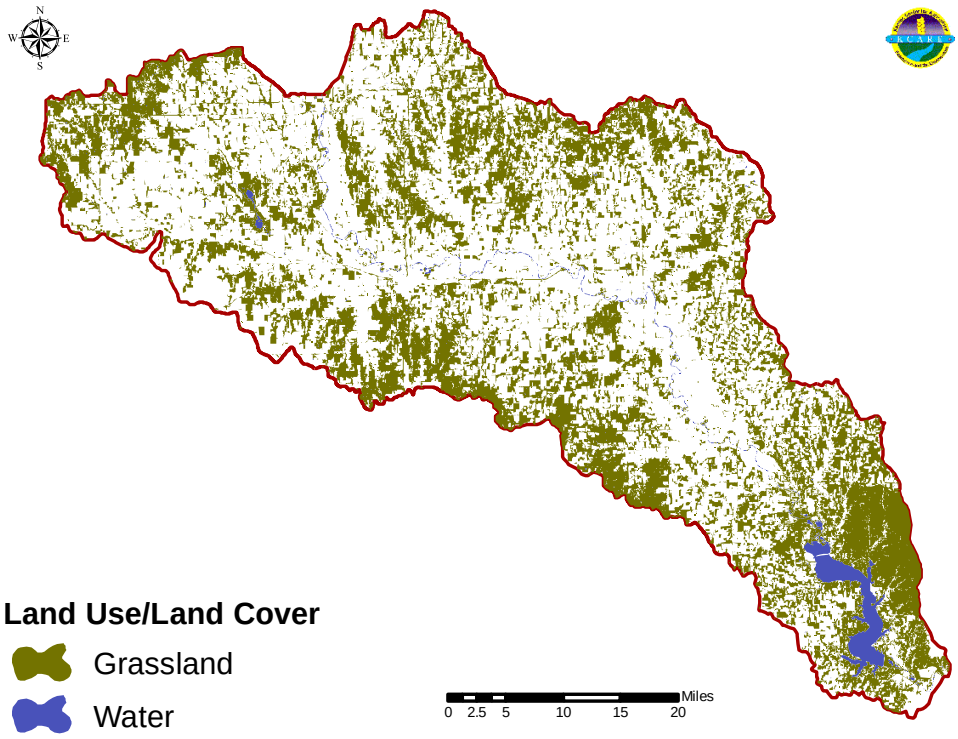

Figure 20 Grassland Distribution within the Watershed [33]

The **Conservation Reserve Program** (CRP) is a USDA program that removes cropland from production. The land is required to be established into permanent grass cover and the owner receives a yearly payment for the duration of the contract. This land cannot be grazed and therefore is not fertilized so there will be no nutrient runoff or fecal coliform bacteria runoff from livestock sources. For this reason, CRP land is the least likely to contribute to phosphorus and eutrophication. A major concern is that with the recent high price of corn and soybeans, much of the CRP land will be returned to cropping when contracts expire. This will be a detriment to water quality. CRP is distributed equally throughout and consists of 3.5% of the watershed.

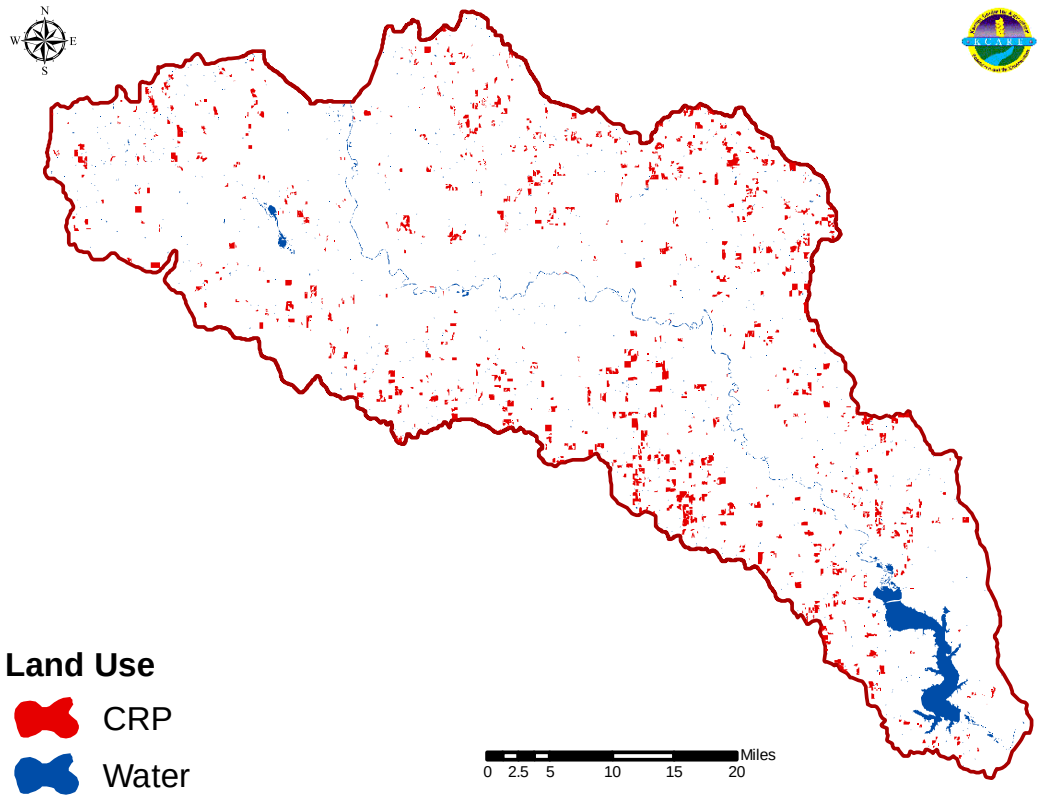

Figure 21 CRP Distribution within the Watershed [33]

6.1.1. B Grazing Density and Confined Animal Feeding Operations

Grasslands cover approximately 36% of the watershed. The watershed is part of the Flint Hills ecosystem which 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. This area also contains numerous livestock confinement operations. 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 by 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 to cropland and incorporate it to be used as fertilizer for 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.

The SLT considered grazing density and CAFO placements when deciding on livestock BMPs.

Fecal coliform bacteria (FCB) are high priority TMDLs in Salt Creek and Buffalo Creek. **All livestock BMPs aimed at reducing nutrients in this watershed will have a positive effect on FCB as well.** FCB are a broad spectrum of bacteria species which includes E. coli bacteria. While FCB is present in the digestive tract of all warm-blooded animals including humans and animals (domestic and wild), its presence in water indicates that the water has been in contact with human or animal waste. FCB is not itself harmful to humans, but its presence indicates that disease causing organisms, or pathogens, may also be present. A few of these are Giardia, Hepatitis, and Cryptosporidium. KDHE now measures levels of E. coli bacteria (ECB) due to its being more specific for indicating potential for human disease. In order to qualify for listing on the 303d list, water samples have to have the average of five samples taken over a month's time to exceed the criteria level. In the past, one sample exceedance could require the issuance of a TMDL for FCB. Therefore, in the future, it will be more difficult for a TMDL for E. coli to be issued.

Presence of E. coli in waterways can originate from failing septic systems, runoff from livestock production areas, close proximity of any mammals to water sources, and manure application to agricultural fields. E. coli can originate in both rural and urban areas. It can be caused by both point and nonpoint sources. Failing onsite wastewater systems, manure runoff from livestock operations, improper manure disposal and livestock or wildlife access to streams can contribute to FCB in streams. **It must be noted that not all FCB or ECB can be attributed to livestock. Wildlife has a contribution to ECB loads. In addition, failing septic systems can be a source of ECB from humans. However, in this watershed these contributions are considered minimal compared to livestock contributions.**

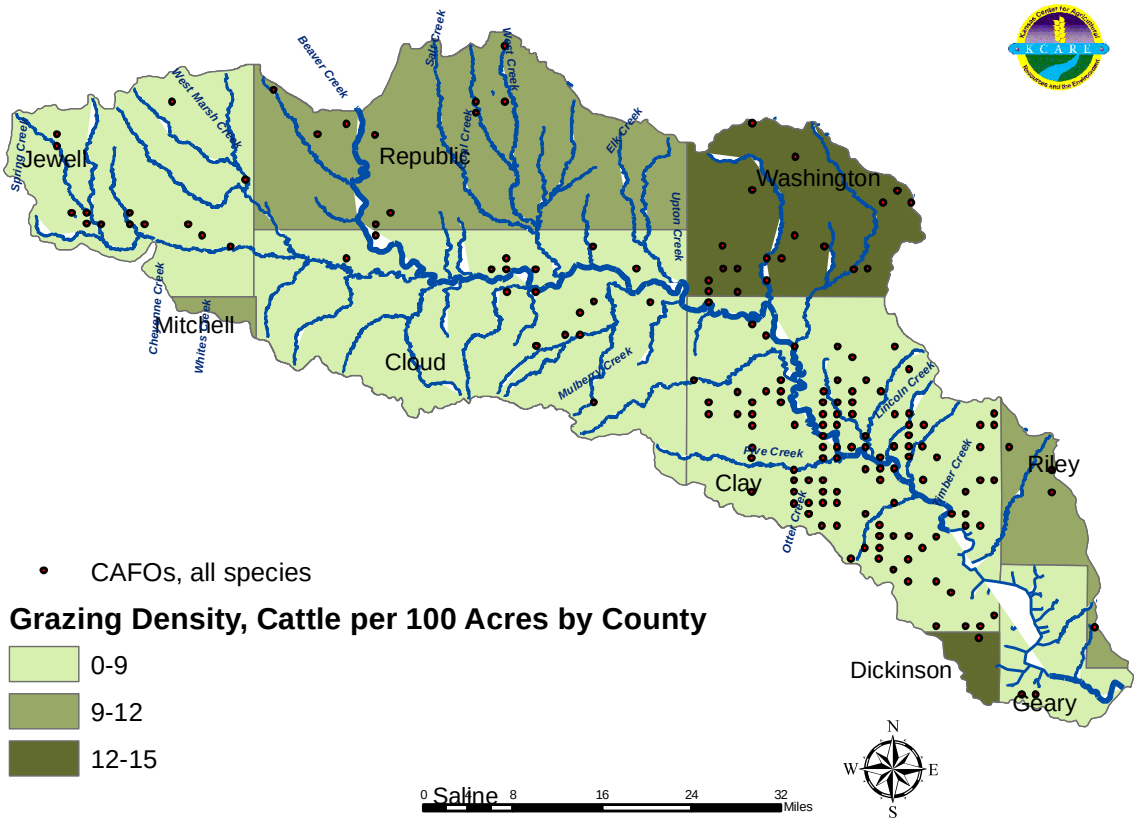

Figure 22 Grazing Density and CAFOs in the Watershed [19]

6.1.2 Pollutant Loads and Load Reductions

All BMPs aimed at phosphorus, nitrogen and ECB reductions will be expressed with a focus on phosphorus. Sampling for phosphorus improvements in water quality is currently being monitored and changes in concentrations will be determined. All phosphorus BMPs will have a positive effect on ECB and nitrogen concentrations

Total annual average phosphorus loads in Milford Reservoir since 1990 are **1,216,912 lbs../year** according to the TMDL section of KDHE. This watershed plan will achieve an annual reduction of **617,204 lb**. of phosphorous entering Milford Reservoir.

Total annual nitrogen loads in Milford Reservoir since 1990 are **4,875,835** lbs../year according to the TMDL section of KDHE. This watershed plan will achieve an annual reduction of **2,341,263 lbs.**. of nitrogen entering Milford Reservoir.

It is to be noted that the nutrient related BMPs also support the ECB and sediment TMDLs. The SLT has laid out specific BMPs that they have determined will be acceptable to watershed residents. **These BMPs will be implemented in the cropland, livestock and streambank targeted areas.** Implementation of these BMPs is necessary to meet

the required load reduction. The acres and number of projects have been approved by the SLT. It will require 20 years to meet the phosphorus goal if all BMPs are implemented.

Best Management Practice Category	Total Load Reduction (pounds)	Percent of Phosphorous Reduction Goal
Cropland	544,840	88
Livestock	72,307	11
Streambank	800	1
Total	**617,947**	**100**

Put new load reduction tables here, break out costs in Section 8.

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

6.2 Sediment

The only siltation TMDL in the watershed is for Jamestown Wildlife Management Area (JWMA). According to the TMDL reference, between 1989 and 1998 JWMA had elevated total suspended solids concentration 70% of the time. The average concentration was 133 mg/L whereas it is desired to maintain concentrations below 100mg/L.

JWMA is a collection of wetlands and marshes. Dams were constructed on the lower end of the two largest marshes in the early 1900s to provide a more reliable source of water. Hunting is the predominant recreation in addition to fishing and wildlife viewing of numerous migratory fowl. Silt or sediment accumulation in the shallow marshes restricts habitat for birds and fish, reduces wetland volume and therefore limits public access to the lakes because of inaccessibility to boat ramps. 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. JWMA also has TMDLs for eutrophication and pH indicating that phosphorus runoff is occurring. Reducing erosion is necessary for a reduction in sediment. The watershed of this area is primarily row crops. Agricultural BMPs such as continuous no-till, conservation tillage, grass buffer strips around cropland, terraces, grassed waterways, cover crops and reducing activities within the riparian areas will reduce erosion and improve water quality.

All load reductions are directed at Milford Reservoir since it is close to the endpoint of the watershed and is a major geographic feature in this watershed. All cropland and

streambank BMPs implemented within the watershed will reduce the amount of sediment that enters the reservoir, positively impacting water quality.

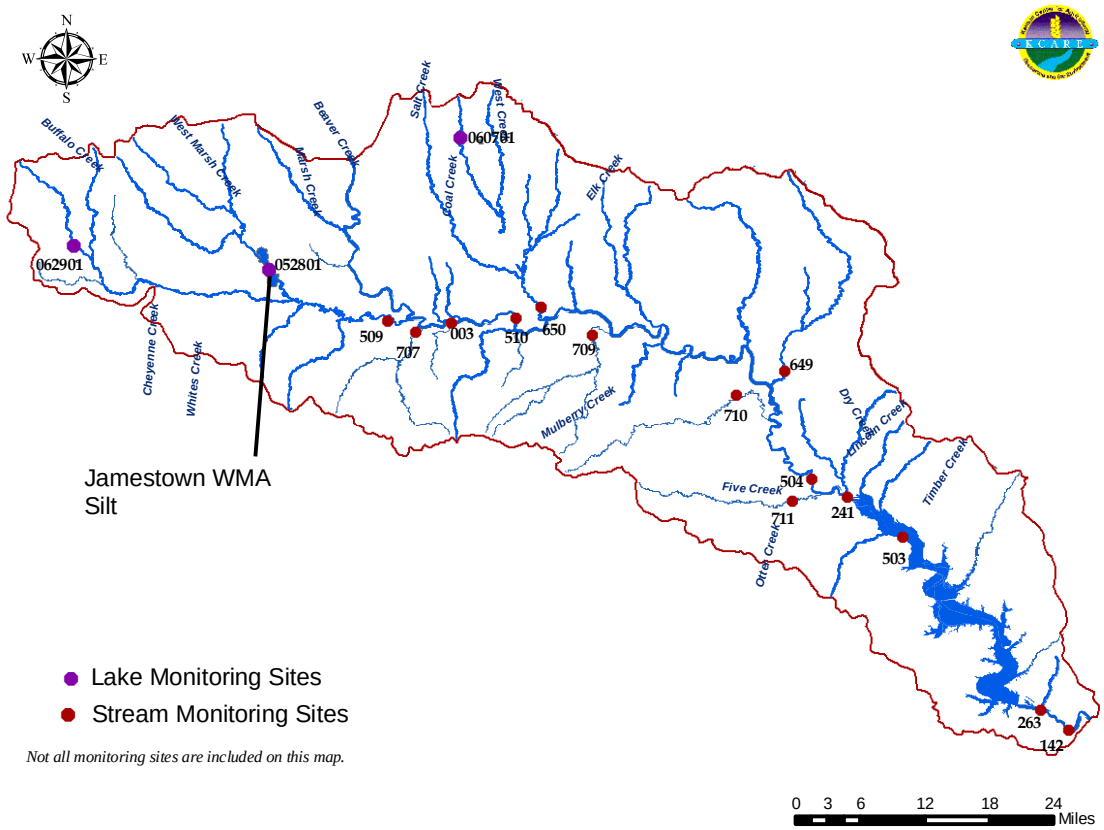

Figure 23 Lower Republican Watershed Siltation TMDL. [xx]

Possible Sources of Sediment in the Entire Watershed

Activities performed on the land affects sediment that is transported downstream to the lakes. Physical components of the terrain are important in sediment movement.

- 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.
- Cropland that does not have conservation practices, uses conventional tillage practices or does not incorporate cover crops will have a greater amount of sediment runoff than those fields with waterways, buffer strips or cover crops in addition to practicing no-till or conservation tillage.
- Silt that is present in the stream from past activities and is gradually moving downstream with each high intensity rainfall event.

Cropland BMPs that have been selected by the SLT based on acceptability by the landowners, cost effectiveness and sediment and nutrient pollutant load reduction effectiveness are listed below and provide definitions of the BMPs, average load reductions and their approximate costs (where available):

Cover Crop

- A cover crop is planted primarily to manage soil erosion, soil fertility, soil quality, water, weeds, pests, diseases, biodiversity and wildlife in an agroecosystem (Lu et al. 2000), an ecological system managed and largely shaped by humans across a range of intensities to produce food, feed, or fiber. To be eligible for cost share:
- it must be the first time for cover crops to be planted on this field by this operator, or must be planted for demonstration purposes.
- A plan that includes species mix, seeding rates and dates and a Milford WRAPS grazing management plan (if applicable) must be followed.
- Grazing is allowed as prescribed by the Milford WRAPS grazing management plan. No-Till is required.

Vegetative Buffer

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

Grassed Waterway

- Grassed strip used as an outlet to prevent silt and gully formation.
- Can also be used as outlets for water from terraces.
- On average for Kansas fields, 1 acre waterway will treat 10 acres of cropland.
- 40% erosion reduction efficiency, 40% phosphorous reduction efficiency.
- $800 an acre, 50% cost-share available from NRCS.
- $5,000 project limit, not to exceed 70% of total cost

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% erosion reduction efficiency, 40% phosphorous reduction efficiency.
- $50/acre, $5,000 project limit. Conversion for 10 yrs required

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% erosion reduction efficiency, 25%phosphorous reduction efficiency
- $5 an acre for 10 years 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% erosion reduction efficiency, 30% phosphorous reduction efficiency
- $1.00 per linear foot, 50% cost-share available from NRCS

Nutrient Management Plan

- Managing the amount, source, placement, form and timing of the application of nutrients and soil amendments.
- Requires intensive soil testing
- 25% erosion and 25% P reduction efficiency.
- $7.30 an acre for 10 years to entice producers to convert, 50% cost-share is available from NRCS.

Subsurface Fertilizer Application

- Placing or injecting fertilizer beneath the soil surface.
- Reduces fertilizer runoff.
- 0% soil and 50% P reduction efficiency.
- $3.50 an acre for 10 years to entice producers to convert, 50% cost-share is available from NRCS.

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

Vegetative Filter Strip

- A vegetated area that receives runoff during rainfall from an animal feeding operation.
- Often requires 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%.
- $1,000/acre, $5,000 project limit

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 $$8,000 per unit.
- Average P reduction: 30-80%

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% of the time.
- 10-25 year lifespan, average P reduction: 30-98% with greater efficiencies for limited stream access.
- $3,795 installed for solar system, including present value of maintenance costs.

Pond

- Water impoundment made by constructing an earthen dam.
- Traps sediment and nutrients from leaving edge of pasture.
- Provides source of water.
- 50% 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% P Reduction.
- Approximately $7,000 with complex systems significantly more expensive.

Stream Fencing

- Fencing out streams and ponds to prevent livestock from entering.
- 95% P Reduction.
- 25-year life expectancy.
- Approximately $4,100 per ¼ mile of fence, including labor, materials, and maintenance.

This section will review several potential sources or environmental actions that have the potential of increasing sediment in the waters. They are (not in order of importance):

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

6.2.1 Cropland Erosion

Cropland erosion Targeted Areas were chosen due to land use or the high density of cropland, soil types, soil slope and weather. The Targeted Areas for cropland in this watershed lie in HUC 12s that drain Parsons Creek, Peats Creek, Dry Creek, Spring Creek, Finney Creek, Lincoln Creek, Five Creek, Buffalo Creek and Otter Creek. Causes of erosion are discussed in more detail in the rest of this section.

The Targeted Area encompasses **366,700** acres and is **29%** of the entire watershed. The predominant land use is row crops at **66%**. Implementing BMPs in the Cropland Targeted Area will reduce siltation impairments that are listed on the 2016 303d list for the Republican River near Clay Center at KDHE sample sites 503 and 504. It is hoped that the need to develop a siltation TMDL in these sections of the river will be averted.

6.2.1. A Soil Erosion Caused by Wind and/or Water

NRCS has established a "T factor" in evaluating soil erosion. T is the soil loss tolerance factor. It is defined as the maximum rate of annual soil loss that will permit crop productivity to be sustained economically and indefinitely on a given soil. It is assigned to soils without respect to land use or cover and ranges from one ton per acre for shallow soils to five tons per acre for deep soils that are not as affected by loss of productivity by erosion. T factors represent the goal for maximum annual soil loss in sustaining productivity of the land use. [21] 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.

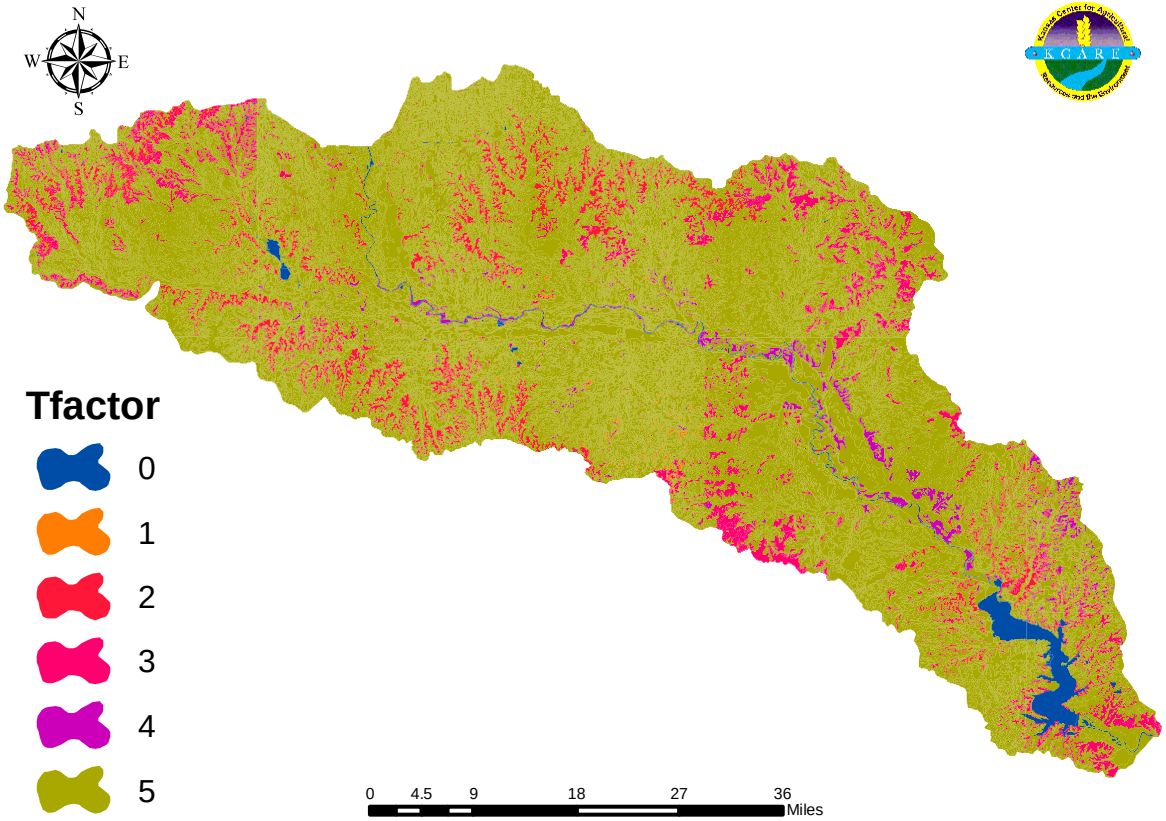

Figure 24 T Factor of the Watershed, tons/acre [22]

The predominant soil loss tolerance category in the watershed is 5, in 85% of the soils of the watershed. This indicates that the soils are deep and can be highly erosive and highlights the importance of proper conservation techniques.

Table 14 T Factor Summarization in the Watershed [32]

T Factor, tons/acre	Acres in Watershed	Percent of Watershed
0	22,200	2
1	2,100	<1
2	64,000	5
3	84,000	7
4	19,000	1
5	1,078,000	85
Total	**1,269,000**	**100**

6.2.1. B Soil Erosion Influenced by 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, with A soils having the least runoff potential and D soils having the most.

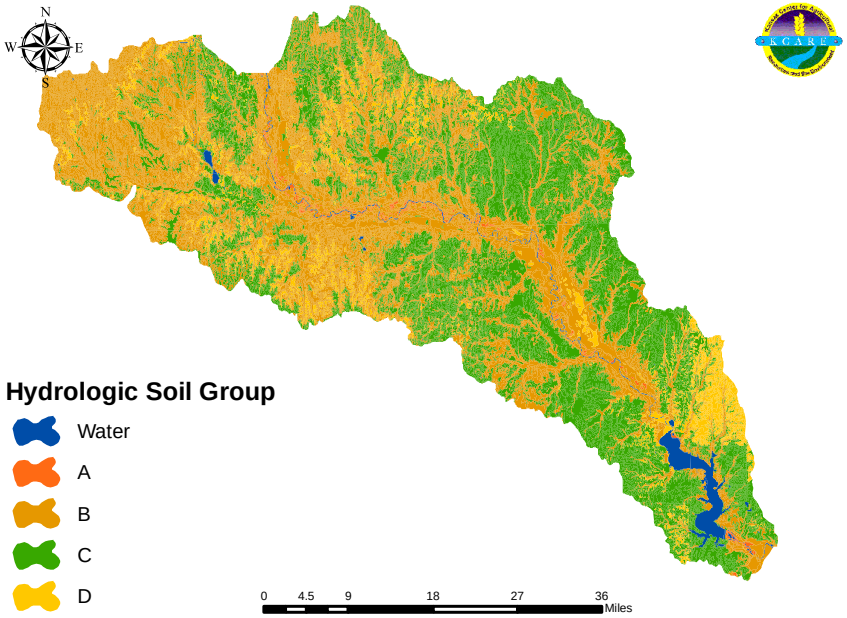

Figure 25 Hydrologic Soil Groups of the Watershed [22]

The watershed is comprised of 49% Soil Group B. These soils have a moderate infiltration rate. Forty one percent of the soils are Group C with a slower infiltration rate. This highlights the importance of slowing water flow from rainfall events to allow the soil adequate time to absorb the water before it flushes into creeks and streams causing erosion and degradation of the streambanks.

Table 15 Hydrologic Soil Groups of the Watershed [32]

Hydrologic Soil Group	Definition	Acres of Watershed in HSG	Percentage of Watershed 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.	7,200	<1
B	Soils having moderate infiltration rates even when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well drained to sell drained soils with moderately fine to moderately coarse textures.	619,000	49

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.	521,000	41
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	100,00	8
Other	Water, dams, pits, sewage lagoons	22,000	2
Total		**1,269,000**	**100**

6.2.2 Streambank Erosion

Streambank erosion is a natural process that contributes a large portion of annual sediment yield, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Many land use activities can affect and lead to accelerated bank erosion (EPA, 2008). In most Kansas watersheds, this natural process has been accelerated due to changes in land cover and the modification of stream channels to accommodate agricultural, urban and other land uses.

A naturally stable stream has the ability, over time, to transport the water and sediment of its watershed in such a manner that the stream maintains its dimension, pattern and profile without significant aggregation or degradation (Rosgen, 1997). Streams significantly impacted by land use changes in their watersheds or by modifications to streambeds and banks go through an evolutionary process to regain a more stable condition. This process generally involves a sequence of incision (downcutting), widening and re-stabilizing of the stream. Many streams in Kansas are incised (SCC, 1999).

Streambank erosion is often a symptom of a larger, more complex problem requiring solutions that may involve more than just streambank stabilization (EPA, 2008). It is important to analyze watershed conditions and understand the evolutionary tendencies of a stream when considering stream stabilization measures. Efforts to restore and re-stabilize streams should allow the stream to speed up the process of regaining natural stability along the evolutionary sequence (Rosgen, 1997). A watershed-based approach to developing stream stabilization plans can accommodate the comprehensive review and implementation.

6.2.2. A Riparian Quality

Riparian areas are vital components of proper watershed function that, when wisely managed in context of a watershed system, can moderate and reduce sediment input. There is growing evidence that a substantial source of sediment in streams in many areas of the country is generated from stream channels and edge of field gullies (Balch, 2007).

Additional research in Kansas documents the effectiveness of forested riparian areas on bank stabilization and sediment trapping (Geyer, 2003; Brinson, 1981; Freeman, 1996; Huggins, 1994). Vegetative cover based on rooting characteristics can mitigate erosion by protecting banks from fluvial entrainment and collapse by providing internal bank strength. Riparian vegetative type is an important tool that provides indicators of erosion occurrence from land use practices. Forested riparian areas are superior to grassland in holding banks during high flows, when most sediment is transported. When riparian vegetation is changed from woody species to annual grasses and/or forbs, sub-surface internal strength is weakened, causing acceleration of mass wasting processes (extensive sedimentation due to sub-surface instability) (EPA, 2008). The primary threats to forested riparian areas are agricultural production and suburban/urban development. (KWO 2013).

An adequately functioning and healthy riparian area will stop the sediment flow from cropland and rangeland. Cropland lying adjacent to the river without buffer protection will cause erosion along the streambanks. It is important that cropland has buffers and filter strips along with forested riparian areas to impede erosion and streambank sloughing. The SLT has decided because of this, they will incorporate BMPs aimed at streambank restoration into the Watershed plan. Two listings on the 303d list will be addressed by stabilizing streambanks and implementing adequate buffers. They are:

- Total Suspended Solids at the Republican River near Clay Center, sampling station #504
- Total Suspended Solids at the Republican River near Clay Center, sampling station #503

It is hoped that by improving conditions along the Republican River, these impairments on the 303d list will not need TMDL development

6.2.2. B Rainfall and Runoff

Rainfall duration (extended duration of rainfall events causing soil saturation and subsequent runoff) and intensity (high rainfall rates overwhelming soil adsorptive capacity causing runoff) are key components that affect sediment runoff from agricultural cropland. These events can cause cropland erosion, rangeland gully erosion and sloughing of streambanks, which add sediment to streams, rivers and reservoirs. High intensity rainfall events primarily occur in the late spring and early summer in this watershed. See Figure below. This emphasizes the importance of stable river banks and cropland conservation practices to prevent soil loss.

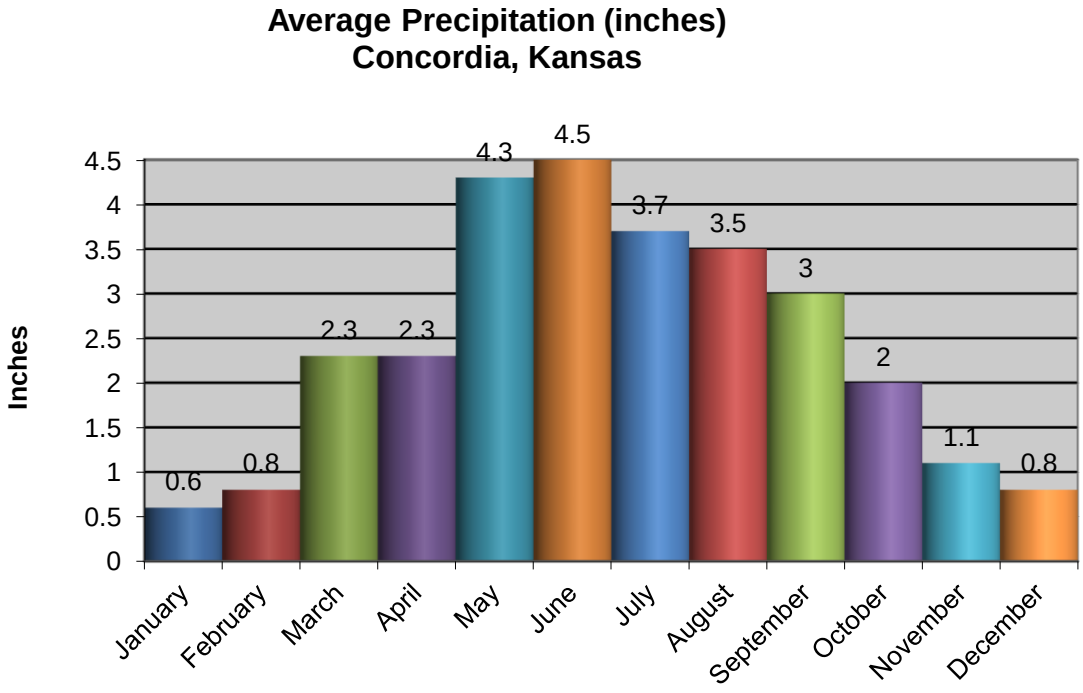

Figure 26 Average Precipitation by Month. [23] Concordia, Kansas

6.2.3 Sediment Pollutant Loads and Load Reductions

The current estimated Total Suspended Solids load in the Milford Watershed is **128,413** tons per year according to the TMDL section of KDHE. The overall goal of this WRAPS as set by KDHE is to reduce sediment by 30% which would be 32,999 tons. This is the amount of sediment reduction that will have to be met by implemented BMPs in the watershed. Another goal is to prevent sediment or TSS TMDLs from being developed at sampling sites #503 and 504 in the Republican River. These sites are listed on the 303d list.

The SLT has laid out specific BMPs that they have determined will be acceptable to watershed residents as listed below. **These BMPs will be implemented in the cropland and streambank targeted areas.** Specific acreages or projects that need to be implemented have been determined through modeling and economic analysis and approved by the SLT. The duration of this plan is **twenty** years as determined by the time required to meet the nutrient goals. The sediment goal will be met in the first year of the plan if all BMPs are implemented. At this time, the sediment goal will be "protection" instead of "restoration".

A Lower Republican River Streambank Assessment was completed in 2013 by KWO. This assessment identifies areas of streambank erosion to provide a better understanding of the Lower Republican River Watershed for streambank restoration purposes. The study was designed to guide prioritization of streambank restoration by identifying reaches of streams where erosion is most severe in the watershed above Milford Lake. The assessment quantifies annual tons of sediment eroded from the Lower Republican River Watershed between 1991 and 2008 or 2012 within the Lower Republican River Watershed above Milford Reservoir.

Based on the average stabilization costs of $71.50 per linear foot, conducting streambank stabilization practices for the entire watershed would cost approximately $3.9 million. Information contained in the assessment can be used by the Milford Reservoir WRAPS SLT to target streambank stabilization and riparian restoration efforts toward high priority stream reaches within the Lower Republican River Watershed above Milford Reservoir.

Figure X shows delineation of the stream reaches used in the streambank assessment.

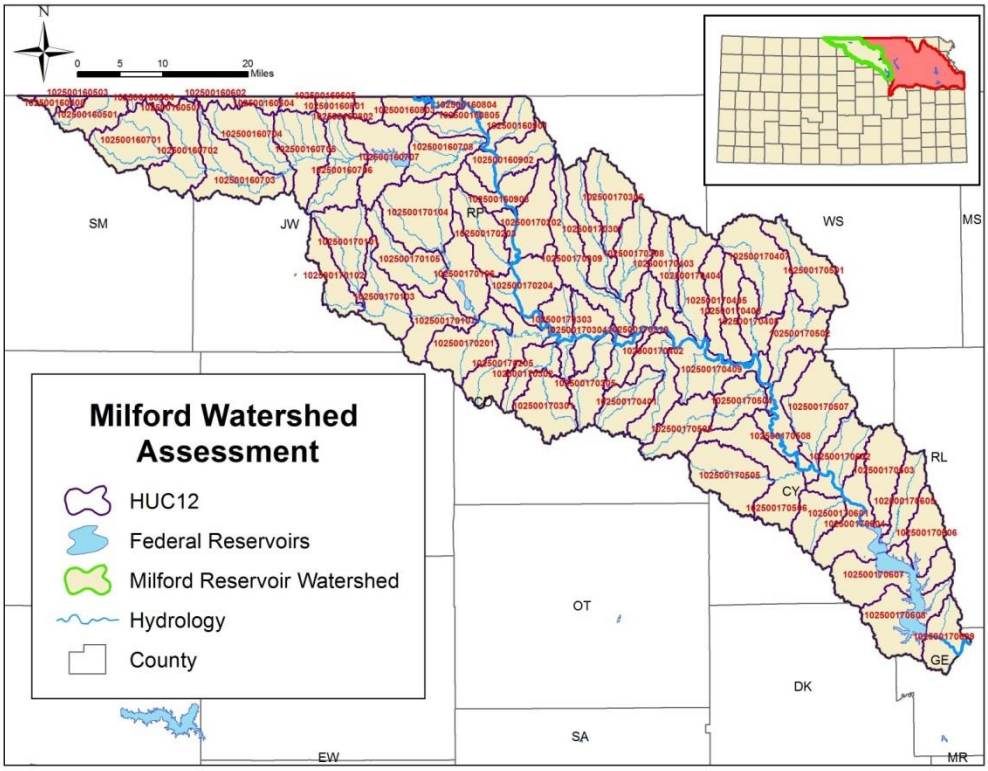

Table 10 Twenty Year Sediment Load Reduction by Category Aimed at Reducing the Need for Implementing New TSS TMDLs in the Republican River at Sampling Sites #503 and 504 and Reduce Sediment in Milford Reservoir by 30%.

Best Management Practice Category	Total Load Reduction (tons)	Percent of Sediment Reduction Goal
Cropland	610,612	1,850%

Streambank	20,000	60%
Total	**630,612**	**1,911%**

6.3 Load Reduction Tables for Phosphorus, Nitrogen and Sediment.

The following tables summarize cumulative load reductions achieved from implementation of all BMPs in all targeted areas.

Phosphorus Reduction for All Implemented BMPs, pounds							
Year	Jamestown WA	Peat's Creek	Lower Milford	Livestock	Streambank	Total	% of Goal
1	5,174	10,106	11,962	3,615	40	30,897	5%
2	10,348	20,211	23,924	7,231	80	61,795	10%
3	15,523	30,317	35,887	10,846	120	92,692	15%
4	20,697	40,422	47,849	14,461	160	123,589	20%
5	25,871	50,528	59,811	18,077	200	154,487	25%
6	31,045	60,634	71,773	21,692	240	185,384	30%
7	36,219	70,739	83,735	25,308	280	216,281	35%
8	41,394	80,845	95,697	28,923	320	247,179	40%
9	46,568	90,950	107,660	32,538	360	278,076	45%
10	51,742	101,056	119,622	36,154	400	308,973	50%
11	56,916	111,162	131,584	39,769	440	339,871	55%
12	62,090	121,267	143,546	43,384	480	370,768	60%
13	67,264	131,373	155,508	47,000	520	401,665	65%
14	72,439	141,478	167,471	50,615	560	432,563	70%
15	77,613	151,584	179,433	54,231	600	463,460	75%
16	82,787	161,690	191,395	57,846	640	494,357	80%
17	87,961	171,795	203,357	61,461	680	525,255	85%
18	93,135	181,901	215,319	65,077	720	556,152	90%
19	98,310	192,006	227,281	68,692	760	587,049	95%
20	103,484	202,112	239,244	72,307	800	617,947	100%
Total	**103,484**	**202,112**	**239,244**	**72,307**	**800**	**617,947**	
Phosphorus TMDL 617,204							

Nitrogen							
Year	Jamestown WA	Peat's Creek	Lower Milford	Livestock	Streambank	Total	% of Goal
1	28,038	53,886	61,758	6,810	0	150,492	5%
2	56,076	107,772	123,517	13,619	0	300,984	10%
3	84,114	161,657	185,275	20,429	0	451,475	15%

4	112,152	215,543	247,034	27,238	0	601,967	20%
5	140,190	269,429	308,792	34,048	0	752,459	26%
6	168,228	323,315	370,551	40,857	0	902,951	31%
7	196,266	377,201	432,309	47,667	0	1,053,443	36%
8	224,304	431,087	494,068	54,476	0	1,203,934	41%
9	252,341	484,972	555,826	61,286	0	1,354,426	46%
10	280,379	538,858	617,585	68,096	0	1,504,918	51%
11	308,417	592,744	679,343	74,905	0	1,655,410	56%
12	336,455	646,630	741,102	81,715	0	1,805,902	61%
13	364,493	700,516	802,860	88,524	0	1,956,393	66%
14	392,531	754,401	864,619	95,334	0	2,106,885	71%
15	420,569	808,287	926,377	102,143	0	2,257,377	77%
16	448,607	862,173	988,136	108,953	0	2,407,869	82%
17	476,645	916,059	1,049,894	115,762	0	2,558,361	87%
18	504,683	969,945	1,111,653	122,572	0	2,708,852	92%
19	532,721	1,023,831	1,173,411	129,382	0	2,859,344	97%
20	560,759	1,077,716	1,235,170	136,191	0	3,009,836	102%
Total	**560,759**	**1,077,716**	**1,235,170**	**136,191**	**0**	**3,009,836**	
Nitrogen TMDL 2,947,581							

Sediment Reduction for All Implemented BMPs, tons							
Year	Jamestown WA	Peat's Creek	Lower Milford	Livestock	Streambank	Total	% of Goal
1	5,460	10,328	14,743	0	1,000	31,531	96%
2	10,919	20,655	29,487	0	2,000	63,061	191%
3	16,379	30,983	44,230	0	3,000	94,592	287%
4	21,838	41,311	58,973	0	4,000	126,123	382%
5	27,298	51,639	73,717	0	5,000	157,653	478%
6	32,758	61,966	88,460	0	6,000	189,184	573%
7	38,217	72,294	103,203	0	7,000	220,715	669%
8	43,677	82,622	117,947	0	8,000	252,245	764%
9	49,137	92,949	132,690	0	9,000	283,776	860%
10	54,596	103,277	147,433	0	10,000	315,307	956%
11	60,056	113,605	162,177	0	11,000	346,837	1051%
12	65,515	123,933	176,920	0	12,000	378,368	1147%
13	70,975	134,260	191,663	0	13,000	409,899	1242%
14	76,435	144,588	206,406	0	14,000	441,429	1338%
15	81,894	154,916	221,150	0	15,000	472,960	1433%
16	87,354	165,244	235,893	0	16,000	504,491	1529%
17	92,814	175,571	250,636	0	17,000	536,021	1624%
18	98,273	185,899	265,380	0	18,000	567,552	1720%

19	103,733	196,227	280,123	0	19,000	599,083	1815%
20	109,192	206,554	294,866	0	20,000	630,613	1911%
Total	**109,192**	**206,554**	**294,866**	**0**	**20,000**	**630,613**	
Sediment Goal 32,999							

Jamestown Wildlife Area BMPs

The following tables summarize load reductions achieved from implementation of all BMPs in the **Jamestown Wildlife Area** targeted watershed.

Protection Measures	Best Management Practices and Other Actions	Adoption Rate for BMP	Acres or Projects to be Implemented at the End of Twenty Years
Prevention of sediment, phosphorus and nitrogen contribution from **cropland**	Conservation Crop Rotation	10%	5,838 acres
	Grassed Waterways	40%	23,353 treated acres
	Continuous No-till Cultivation	25%	14,596 acres
	Buffers Strips	20%	11,676 treated acres
	Terraces	20%	11,676 treated acres
	Grade Stabilization Projects	20%	11,676 treated acres
	Applying Subsurface Fertilizer	20%	11,676 acres
	Cover Crops	30%	17,515 acres
	Nutrient Management Plans	50%	29,191 treated acres

Load Reductions for Cropland BMPs in Jamestown Wildlife Area – Cumulative Phosphorus Reduction, pounds

Jamestown WA Annual Phosphorous Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	141	900	562	562	337	562	562	844	703	5,174

2	281	1,800	1,125	1,125	675	1,125	1,125	1,687	1,406	10,348
3	422	2,700	1,687	1,687	1,012	1,687	1,687	2,531	2,109	15,523
4	562	3,599	2,250	2,250	1,350	2,250	2,250	3,374	2,812	20,697
5	703	4,499	2,812	2,812	1,687	2,812	2,812	4,218	3,515	25,871
6	844	5,399	3,374	3,374	2,025	3,374	3,374	5,062	4,218	31,045
7	984	6,299	3,937	3,937	2,362	3,937	3,937	5,905	4,921	36,219
8	1,125	7,199	4,499	4,499	2,700	4,499	4,499	6,749	5,624	41,394
9	1,265	8,099	5,062	5,062	3,037	5,062	5,062	7,593	6,327	46,568
10	1,406	8,999	5,624	5,624	3,374	5,624	5,624	8,436	7,030	51,742
11	1,547	9,898	6,187	6,187	3,712	6,187	6,187	9,280	7,733	56,916
12	1,687	10,798	6,749	6,749	4,049	6,749	6,749	10,123	8,436	62,090
13	1,828	11,698	7,311	7,311	4,387	7,311	7,311	10,967	9,139	67,264
14	1,968	12,598	7,874	7,874	4,724	7,874	7,874	11,811	9,842	72,439
15	2,109	13,498	8,436	8,436	5,062	8,436	8,436	12,654	10,545	77,613
16	2,250	14,398	8,999	8,999	5,399	8,999	8,999	13,498	11,248	82,787
17	2,390	15,298	9,561	9,561	5,737	9,561	9,561	14,342	11,951	87,961
18	2,531	16,197	10,123	10,123	6,074	10,123	10,123	15,185	12,654	93,135
19	2,671	17,097	10,686	10,686	6,411	10,686	10,686	16,029	13,357	98,310
20	2,812	17,997	11,248	11,248	6,749	11,248	11,248	16,872	14,060	103,484
Total	**2,812**	**17,997**	**11,248**	**11,248**	**6,749**	**11,248**	**11,248**	**16,872**	**14,060**	**103,484**

Load Reductions for Cropland BMPs in Jamestown Wildlife Area – Cumulative Nitrogen Reduction, pounds

Jamestown WA Annual Nitrogen Reduction (lbs..), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	879	5,625	2,197	1,758	2,109	3,516	4,922	2,637	4,395	28,038
2	1,758	11,250	4,395	3,516	4,219	7,031	9,844	5,274	8,789	56,076
3	2,637	16,876	6,592	5,274	6,328	10,547	14,766	7,910	13,184	84,114
4	3,516	22,501	8,789	7,031	8,438	14,063	19,688	10,547	17,579	112,152
5	4,395	28,126	10,987	8,789	10,547	17,579	24,610	13,184	21,973	140,190
6	5,274	33,751	13,184	10,547	12,657	21,094	29,532	15,821	26,368	168,228
7	6,153	39,376	15,381	12,305	14,766	24,610	34,454	18,458	30,763	196,266
8	7,031	45,001	17,579	14,063	16,876	28,126	39,376	21,094	35,157	224,304
9	7,910	50,627	19,776	15,821	18,985	31,642	44,298	23,731	39,552	252,341
10	8,789	56,252	21,973	17,579	21,094	35,157	49,220	26,368	43,947	280,379
11	9,668	61,877	24,171	19,337	23,204	38,673	54,142	29,005	48,341	308,417
12	10,547	67,502	26,368	21,094	25,313	42,189	59,064	31,642	52,736	336,455
13	11,426	73,127	28,565	22,852	27,423	45,704	63,986	34,278	57,131	364,493

14	12,305	78,752	30,763	24,610	29,532	49,220	68,908	36,915	61,525	392,531
15	13,184	84,378	32,960	26,368	31,642	52,736	73,830	39,552	65,920	420,569
16	14,063	90,003	35,157	28,126	33,751	56,252	78,752	42,189	70,315	448,607
17	14,942	95,628	37,355	29,884	35,860	59,767	83,674	44,826	74,709	476,645
18	15,821	101,253	39,552	31,642	37,970	63,283	88,596	47,462	79,104	504,683
19	16,700	106,878	41,749	33,399	40,079	66,799	93,518	50,099	83,499	532,721
20	17,579	112,503	43,947	35,157	42,189	70,315	98,440	52,736	87,893	560,759
Total	**17,579**	**112,503**	**43,947**	**35,157**	**42,189**	**70,315**	**98,440**	**52,736**	**87,893**	**560,759**

Load Reductions for Cropland BMPs in Jamestown Wildlife Area – Cumulative Soil Loss Reduction, tons

Jamestown WA Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer	Cover Crops	Nutrient Management	Total Load Reduction
1	181	1,161	1,360	726	435	726	0	871	0	5,460
2	363	2,322	2,721	1,451	871	1,451	0	1,741	0	10,919
3	544	3,483	4,081	2,177	1,306	2,177	0	2,612	0	16,379
4	726	4,643	5,441	2,902	1,741	2,902	0	3,483	0	21,838
5	907	5,804	6,802	3,628	2,177	3,628	0	4,353	0	27,298
6	1,088	6,965	8,162	4,353	2,612	4,353	0	5,224	0	32,758
7	1,270	8,126	9,523	5,079	3,047	5,079	0	6,094	0	38,217
8	1,451	9,287	10,883	5,804	3,483	5,804	0	6,965	0	43,677
9	1,632	10,448	12,243	6,530	3,918	6,530	0	7,836	0	49,137
10	1,814	11,609	13,604	7,255	4,353	7,255	0	8,706	0	54,596
11	1,995	12,769	14,964	7,981	4,789	7,981	0	9,577	0	60,056
12	2,177	13,930	16,324	8,706	5,224	8,706	0	10,448	0	65,515
13	2,358	15,091	17,685	9,432	5,659	9,432	0	11,318	0	70,975
14	2,539	16,252	19,045	10,157	6,094	10,157	0	12,189	0	76,435
15	2,721	17,413	20,406	10,883	6,530	10,883	0	13,060	0	81,894
16	2,902	18,574	21,766	11,609	6,965	11,609	0	13,930	0	87,354
17	3,084	19,734	23,126	12,334	7,400	12,334	0	14,801	0	92,814
18	3,265	20,895	24,487	13,060	7,836	13,060	0	15,671	0	98,273
19	3,446	22,056	25,847	13,785	8,271	13,785	0	16,542	0	103,733
20	3,628	23,217	27,207	14,511	8,706	14,511	0	17,413	0	109,192
Total	**3,628**	**23,217**	**27,207**	**14,511**	**8,706**	**14,511**	**0**	**17,413**	**0**	**109,192**

Short, Medium and Long-Term Adoption Rates for Cropland BMPs in Jamestown Wildlife Area

Jamestown WA Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	292	1,168	730	584	584	584	584	876	1,460	**6,860**
2	292	1,168	730	584	584	584	584	876	1,460	**6,860**
3	292	1,168	730	584	584	584	584	876	1,460	**6,860**
4	292	1,168	730	584	584	584	584	876	1,460	**6,860**
5	292	1,168	730	584	584	584	584	876	1,460	**6,860**
Total	*1,460*	*5,838*	*3,649*	*2,919*	*2,919*	*2,919*	*2,919*	*4,379*	*7,298*	**34,299**
6	292	1,168	730	584	584	584	584	876	1,460	**6,860**
7	292	1,168	730	584	584	584	584	876	1,460	**6,860**
8	292	1,168	730	584	584	584	584	876	1,460	**6,860**
9	292	1,168	730	584	584	584	584	876	1,460	**6,860**
10	292	1,168	730	584	584	584	584	876	1,460	**6,860**
Total	*2,919*	*11,676*	*7,298*	*5,838*	*5,838*	*5,838*	*5,838*	*8,757*	*14,596*	**68,599**
11	292	1,168	730	584	584	584	584	876	1,460	**6,860**
12	292	1,168	730	584	584	584	584	876	1,460	**6,860**
13	292	1,168	730	584	584	584	584	876	1,460	**6,860**
14	292	1,168	730	584	584	584	584	876	1,460	**6,860**
15	292	1,168	730	584	584	584	584	876	1,460	**6,860**
Total	*4,379*	*17,515*	*10,947*	*8,757*	*8,757*	*8,757*	*8,757*	*13,136*	*21,893*	**102,898**
16	292	1,168	730	584	584	584	584	876	1,460	**6,860**
17	292	1,168	730	584	584	584	584	876	1,460	**6,860**
18	292	1,168	730	584	584	584	584	876	1,460	**6,860**
19	292	1,168	730	584	584	584	584	876	1,460	**6,860**
20	292	1,168	730	584	584	584	584	876	1,460	**6,860**
Total	***5,838***	***23,353***	***14,596***	***11,676***	***11,676***	***11,676***	***11,676***	***17,515***	***29,191***	**137,198**

Annual Adoption Rate, cropland treated acres, for Jamestown Wildlife Area

Jamestown WA Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	292	1,168	730	584	584	584	584	876	1,460	6,860
2	292	1,168	730	584	584	584	584	876	1,460	6,860
3	292	1,168	730	584	584	584	584	876	1,460	6,860
4	292	1,168	730	584	584	584	584	876	1,460	6,860
5	292	1,168	730	584	584	584	584	876	1,460	6,860
6	292	1,168	730	584	584	584	584	876	1,460	6,860

7	292	1,168	730	584	584	584	584	876	1,460	6,860
8	292	1,168	730	584	584	584	584	876	1,460	6,860
9	292	1,168	730	584	584	584	584	876	1,460	6,860
10	292	1,168	730	584	584	584	584	876	1,460	6,860
11	292	1,168	730	584	584	584	584	876	1,460	6,860
12	292	1,168	730	584	584	584	584	876	1,460	6,860
13	292	1,168	730	584	584	584	584	876	1,460	6,860
14	292	1,168	730	584	584	584	584	876	1,460	6,860
15	292	1,168	730	584	584	584	584	876	1,460	6,860
16	292	1,168	730	584	584	584	584	876	1,460	6,860
17	292	1,168	730	584	584	584	584	876	1,460	6,860
18	292	1,168	730	584	584	584	584	876	1,460	6,860
19	292	1,168	730	584	584	584	584	876	1,460	6,860
20	292	1,168	730	584	584	584	584	876	1,460	6,860

The following tables summarize load reductions achieved from implementation of all BMPs in the Peats Creek targeted watershed.

Protection Measures	Best Management Practices and Other Actions	Adoption Rate for BMP	Acres or Projects to be Implemented at the End of Twenty Years
Prevention of sediment (TSS) contribution from **cropland**	Conservation Crop Rotation	10%	8,699 acres
	Grassed Waterways	40%	34,796 treated acres
	Continuous No-till Cultivation	25%	21,747 acres
	Buffers Strips	20%	17,398 treated acres
	Terraces	20%	17,398 treated acres
	Grade Stabilization Projects	20%	17,398 treated acres
	Applying Subsurface Fertilizer	20%	17,398 acres
	Cover Crops	30%	26,097 acres
	Nutrient Management Plans	50%	43,495 treated acres

Peats Creek Cumulative Annual Phosphorus Reduction, pounds

Annual Phosphorous Reduction (lbs..), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	275	1,757	1,098	1,098	659	1,098	1,098	1,648	1,373	10,106
2	549	3,515	2,197	2,197	1,318	2,197	2,197	3,295	2,746	20,211
3	824	5,272	3,295	3,295	1,977	3,295	3,295	4,943	4,119	30,317
4	1,098	7,030	4,394	4,394	2,636	4,394	4,394	6,591	5,492	40,422
5	1,373	8,787	5,492	5,492	3,295	5,492	5,492	8,238	6,865	50,528
6	1,648	10,545	6,591	6,591	3,954	6,591	6,591	9,886	8,238	60,634
7	1,922	12,302	7,689	7,689	4,613	7,689	7,689	11,534	9,611	70,739
8	2,197	14,060	8,787	8,787	5,272	8,787	8,787	13,181	10,984	80,845
9	2,471	15,817	9,886	9,886	5,932	9,886	9,886	14,829	12,357	90,950
10	2,746	17,575	10,984	10,984	6,591	10,984	10,984	16,477	13,730	101,056
11	3,021	19,332	12,083	12,083	7,250	12,083	12,083	18,124	15,103	111,162
12	3,295	21,090	13,181	13,181	7,909	13,181	13,181	19,772	16,477	121,267
13	3,570	22,847	14,280	14,280	8,568	14,280	14,280	21,419	17,850	131,373
14	3,845	24,605	15,378	15,378	9,227	15,378	15,378	23,067	19,223	141,478
15	4,119	26,362	16,477	16,477	9,886	16,477	16,477	24,715	20,596	151,584
16	4,394	28,120	17,575	17,575	10,545	17,575	17,575	26,362	21,969	161,690
17	4,668	29,877	18,673	18,673	11,204	18,673	18,673	28,010	23,342	171,795
18	4,943	31,635	19,772	19,772	11,863	19,772	19,772	29,658	24,715	181,901
19	5,218	33,392	20,870	20,870	12,522	20,870	20,870	31,305	26,088	192,006
20	5,492	35,150	21,969	21,969	13,181	21,969	21,969	32,953	27,461	202,112
Total	**5,492**	**35,150**	**21,969**	**21,969**	**13,181**	**21,969**	**21,969**	**32,953**	**27,461**	**202,112**

Peats Creek Cumulative Annual Nitrogen Reduction, pounds

Annual Nitrogen Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	1,689	10,811	4,223	3,378	4,054	6,757	9,460	5,068	8,446	53,886
2	3,378	21,622	8,446	6,757	8,108	13,514	18,919	10,135	16,892	107,772
3	5,068	32,433	12,669	10,135	12,162	20,271	28,379	15,203	25,338	161,657
4	6,757	43,244	16,892	13,514	16,216	27,027	37,838	20,271	33,784	215,543
5	8,446	54,055	21,115	16,892	20,271	33,784	47,298	25,338	42,230	269,429
6	10,135	64,866	25,338	20,271	24,325	40,541	56,757	30,406	50,676	323,315
7	11,824	75,677	29,561	23,649	28,379	47,298	66,217	35,473	59,122	377,201
8	13,514	86,488	33,784	27,027	32,433	54,055	75,677	40,541	67,568	431,087

9	15,203	97,299	38,007	30,406	36,487	60,812	85,136	45,609	76,014	484,972
10	16,892	108,109	42,230	33,784	40,541	67,568	94,596	50,676	84,461	538,858
11	18,581	118,920	46,453	37,163	44,595	74,325	104,055	55,744	92,907	592,744
12	20,271	129,731	50,676	40,541	48,649	81,082	113,515	60,812	101,353	646,630
13	21,960	140,542	54,899	43,919	52,703	87,839	122,975	65,879	109,799	700,516
14	23,649	151,353	59,122	47,298	56,757	94,596	132,434	70,947	118,245	754,401
15	25,338	162,164	63,345	50,676	60,812	101,353	141,894	76,014	126,691	808,287
16	27,027	172,975	67,568	54,055	64,866	108,109	151,353	81,082	135,137	862,173
17	28,717	183,786	71,791	57,433	68,920	114,866	160,813	86,150	143,583	916,059
18	30,406	194,597	76,014	60,812	72,974	121,623	170,272	91,217	152,029	969,945
19	32,095	205,408	80,238	64,190	77,028	128,380	179,732	96,285	160,475	1,023,831
20	33,784	216,219	84,461	67,568	81,082	135,137	189,192	101,353	168,921	1,077,716
Total	**33,784**	**216,219**	**84,461**	**67,568**	**81,082**	**135,137**	**189,192**	**101,353**	**168,921**	**1,077,716**

Peat's Creek Cumulative Soil Loss Reduction, tons

Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface	Cover Crops	Nutrient Management	Total Load Reduction
1	343	2,196	2,573	1,372	823	1,372	0	1,647	0	10,328
2	686	4,392	5,147	2,745	1,647	2,745	0	3,294	0	20,655
3	1,029	6,588	7,720	4,117	2,470	4,117	0	4,941	0	30,983
4	1,372	8,784	10,293	5,490	3,294	5,490	0	6,588	0	41,311
5	1,716	10,980	12,867	6,862	4,117	6,862	0	8,235	0	51,639
6	2,059	13,176	15,440	8,235	4,941	8,235	0	9,882	0	61,966
7	2,402	15,371	18,013	9,607	5,764	9,607	0	11,529	0	72,294
8	2,745	17,567	20,587	10,980	6,588	10,980	0	13,176	0	82,622
9	3,088	19,763	23,160	12,352	7,411	12,352	0	14,823	0	92,949
10	3,431	21,959	25,734	13,725	8,235	13,725	0	16,469	0	103,277
11	3,774	24,155	28,307	15,097	9,058	15,097	0	18,116	0	113,605
12	4,117	26,351	30,880	16,469	9,882	16,469	0	19,763	0	123,933
13	4,460	28,547	33,454	17,842	10,705	17,842	0	21,410	0	134,260
14	4,804	30,743	36,027	19,214	11,529	19,214	0	23,057	0	144,588
15	5,147	32,939	38,600	20,587	12,352	20,587	0	24,704	0	154,916
16	5,490	35,135	41,174	21,959	13,176	21,959	0	26,351	0	165,244
17	5,833	37,331	43,747	23,332	13,999	23,332	0	27,998	0	175,571
18	6,176	39,527	46,320	24,704	14,823	24,704	0	29,645	0	185,899
19	6,519	41,723	48,894	26,077	15,646	26,077	0	31,292	0	196,227

20	6,862	43,919	51,467	27,449	16,469	27,449	0	32,939	0	206,554
Total	**6,862**	**43,919**	**51,467**	**27,449**	**16,469**	**27,449**	**0**	**32,939**	**0**	**206,554**

Lower Milford BMPs

The following tables summarize load cumulative load reductions achieved from implementation of all BMPs in the Lower Milford targeted watershed.

Protection Measures	Best Management Practices and Other Actions	Adoption Rate for BMP	Acres or Project to be Implemented at the End of Twenty Years
Prevention of sediment, phosphorus and nitrogen contribution from **cropland**	Conservation Crop Rotation	10%	9,198 acres
	Grassed Waterways	40%	36,793 treated acres
	Continuous No-till Cultivation	25%	22,996 treated acres
	Buffer Strips	20%	18,396 treated acres
	Terraces	20%	18,396 treated acres
	Grade Stabilization Projects	20%	18,396 treated acres
	Applying Subsurface Fertilizer	20%	18,396 acres
	Cover Crops	30%	27,595 acres
	Nutrient Management Plans	50%	45,991 treated acres

Lower Milford Cumulative Phosphorus Reduction, pounds

Lower Milford Annual Phosphorous Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	325	2,080	1,300	1,300	780	1,300	1,300	1,950	1,625	11,962
2	650	4,161	2,600	2,600	1,560	2,600	2,600	3,901	3,251	23,924
3	975	6,241	3,901	3,901	2,340	3,901	3,901	5,851	4,876	35,887
4	1,300	8,322	5,201	5,201	3,121	5,201	5,201	7,801	6,501	47,849
5	1,625	10,402	6,501	6,501	3,901	6,501	6,501	9,752	8,126	59,811
6	1,950	12,482	7,801	7,801	4,681	7,801	7,801	11,702	9,752	71,773

7	2,275	14,563	9,102	9,102	5,461	9,102	9,102	13,652	11,377	83,735
8	2,600	16,643	10,402	10,402	6,241	10,402	10,402	15,603	13,002	95,697
9	2,926	18,723	11,702	11,702	7,021	11,702	11,702	17,553	14,628	107,660
10	3,251	20,804	13,002	13,002	7,801	13,002	13,002	19,504	16,253	119,622
11	3,576	22,884	14,303	14,303	8,582	14,303	14,303	21,454	17,878	131,584
12	3,901	24,965	15,603	15,603	9,362	15,603	15,603	23,404	19,504	143,546
13	4,226	27,045	16,903	16,903	10,142	16,903	16,903	25,355	21,129	155,508
14	4,551	29,125	18,203	18,203	10,922	18,203	18,203	27,305	22,754	167,471
15	4,876	31,206	19,504	19,504	11,702	19,504	19,504	29,255	24,379	179,433
16	5,201	33,286	20,804	20,804	12,482	20,804	20,804	31,206	26,005	191,395
17	5,526	35,366	22,104	22,104	13,262	22,104	22,104	33,156	27,630	203,357
18	5,851	37,447	23,404	23,404	14,043	23,404	23,404	35,106	29,255	215,319
19	6,176	39,527	24,705	24,705	14,823	24,705	24,705	37,057	30,881	227,281
20	6,501	41,608	26,005	26,005	15,603	26,005	26,005	39,007	32,506	239,244
Total	**6,501**	**41,608**	**26,005**	**26,005**	**15,603**	**26,005**	**26,005**	**39,007**	**32,506**	**239,244**

Lower Milford Cumulative Nitrogen Reduction, pounds

Lower Milford Annual Nitrogen Reduction (lbs..), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	1,936	12,390	4,840	3,872	4,646	7,744	10,842	5,808	9,680	61,758
2	3,872	24,781	9,680	7,744	9,293	15,488	21,683	11,616	19,360	123,517
3	5,808	37,171	14,520	11,616	13,939	23,232	32,525	17,424	29,040	185,275
4	7,744	49,562	19,360	15,488	18,586	30,976	43,366	23,232	38,720	247,034
5	9,680	61,952	24,200	19,360	23,232	38,720	54,208	29,040	48,400	308,792
6	11,616	74,342	29,040	23,232	27,878	46,464	65,050	34,848	58,080	370,551
7	13,552	86,733	33,880	27,104	32,525	54,208	75,891	40,656	67,760	432,309
8	15,488	99,123	38,720	30,976	37,171	61,952	86,733	46,464	77,440	494,068
9	17,424	111,514	43,560	34,848	41,818	69,696	97,575	52,272	87,120	555,826
10	19,360	123,904	48,400	38,720	46,464	77,440	108,416	58,080	96,800	617,585
11	21,296	136,295	53,240	42,592	51,110	85,184	119,258	63,888	106,480	679,343
12	23,232	148,685	58,080	46,464	55,757	92,928	130,099	69,696	116,160	741,102
13	25,168	161,075	62,920	50,336	60,403	100,672	140,941	75,504	125,840	802,860
14	27,104	173,466	67,760	54,208	65,050	108,416	151,783	81,312	135,520	864,619
15	29,040	185,856	72,600	58,080	69,696	116,160	162,624	87,120	145,200	926,377
16	30,976	198,247	77,440	61,952	74,342	123,904	173,466	92,928	154,880	988,136
17	32,912	210,637	82,280	65,824	78,989	131,648	184,307	98,736	164,560	1,049,894
18	34,848	223,027	87,120	69,696	83,635	139,392	195,149	104,544	174,240	1,111,653

19	36,784	235,418	91,960	73,568	88,282	147,136	205,991	110,352	183,920	1,173,411
20	38,720	247,808	96,800	77,440	92,928	154,880	216,832	116,160	193,600	1,235,170
Total	**38,720**	**247,808**	**96,800**	**77,440**	**92,928**	**154,880**	**216,832**	**116,160**	**193,600**	**1,235,170**

Lower Milford Cumulative Soil Reduction, tons

Lower Milford Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	490	3,135	3,674	1,959	1,176	1,959	0	2,351	0	14,743
2	980	6,270	7,347	3,918	2,351	3,918	0	4,702	0	29,487
3	1,469	9,404	11,021	5,878	3,527	5,878	0	7,053	0	44,230
4	1,959	12,539	14,694	7,837	4,702	7,837	0	9,404	0	58,973
5	2,449	15,674	18,368	9,796	5,878	9,796	0	11,755	0	73,717
6	2,939	18,809	22,042	11,755	7,053	11,755	0	14,107	0	88,460
7	3,429	21,944	25,715	13,715	8,229	13,715	0	16,458	0	103,203
8	3,918	25,078	29,389	15,674	9,404	15,674	0	18,809	0	117,947
9	4,408	28,213	33,062	17,633	10,580	17,633	0	21,160	0	132,690
10	4,898	31,348	36,736	19,592	11,755	19,592	0	23,511	0	147,433
11	5,388	34,483	40,409	21,552	12,931	21,552	0	25,862	0	162,177
12	5,878	37,618	44,083	23,511	14,107	23,511	0	28,213	0	176,920
13	6,368	40,752	47,757	25,470	15,282	25,470	0	30,564	0	191,663
14	6,857	43,887	51,430	27,429	16,458	27,429	0	32,915	0	206,406
15	7,347	47,022	55,104	29,389	17,633	29,389	0	35,266	0	221,150
16	7,837	50,157	58,777	31,348	18,809	31,348	0	37,618	0	235,893
17	8,327	53,291	62,451	33,307	19,984	33,307	0	39,969	0	250,636
18	8,817	56,426	66,125	35,266	21,160	35,266	0	42,320	0	265,380
19	9,306	59,561	69,798	37,226	22,335	37,226	0	44,671	0	280,123
20	9,796	62,696	73,472	39,185	23,511	39,185	0	47,022	0	294,866
Total	**9,796**	**62,696**	**73,472**	**39,185**	**23,511**	**39,185**	**0**	**47,022**	**0**	**294,866**

Cumulative Phosphorus Load Reductions (lbs..) from Adopted Livestock BMPs

Cumulative Phosphorous Load Reductions (lbs..)						
Year	Vegetative Filter Strip	Relocate Feedlot	Relocate Pasture Feeding Site	Off Stream Watering System	Rotational Grazing	Total Load Reduction
1	1,276	1,914	76	229	120	**3,615**
2	2,552	3,828	153	459	240	**7,231**
3	3,827	5,742	229	688	360	**10,846**
4	5,103	7,656	306	917	480	**14,461**

5	6,379	9,569	382	1,147	600	**18,077**
6	7,655	11,483	459	1,376	720	**21,692**
7	8,930	13,397	535	1,605	840	**25,308**
8	10,206	15,311	611	1,834	960	**28,923**
9	11,482	17,225	688	2,064	1,080	**32,538**
10	12,758	19,139	764	2,293	1,200	**36,154**
11	14,033	21,053	841	2,522	1,320	**39,769**
12	15,309	22,967	917	2,752	1,440	**43,384**
13	16,585	24,880	994	2,981	1,560	**47,000**
14	17,861	26,794	1,070	3,210	1,680	**50,615**
15	19,136	28,708	1,147	3,440	1,800	**54,231**
16	20,412	30,622	1,223	3,669	1,920	**57,846**
17	21,688	32,536	1,299	3,898	2,040	**61,461**
18	22,964	34,450	1,376	4,128	2,160	**65,077**
19	24,239	36,364	1,452	4,357	2,280	**68,692**
20	25,515	38,278	1,529	4,586	2,400	**72,307**
Total	**25,515**	**38,278**	**1,529**	**4,586**	**2,400**	**72,307**

Cumulative Nitrogen Load Reductions (lbs..) from Adopted Livestock BMPs

Cumulative Nitrogen Load Reductions (lbs..)						
Year	**Vegetative Filter Strip**	**Relocate Feedlot**	**Relocate Pasture Feeding Site**	**Off Stream Watering System**	**Rotational Grazing**	**Total Load Reduction**
1	2,403	3,605	144	432	226	**6,810**
2	4,806	7,210	288	864	452	**13,619**
3	7,209	10,814	432	1,296	678	**20,429**
4	9,612	14,419	576	1,728	904	**27,238**
5	12,014	18,024	720	2,160	1,130	**34,048**
6	14,417	21,629	864	2,591	1,356	**40,857**
7	16,820	25,233	1,008	3,023	1,582	**47,667**
8	19,223	28,838	1,152	3,455	1,808	**54,476**
9	21,626	32,443	1,296	3,887	2,034	**61,286**
10	24,029	36,048	1,440	4,319	2,260	**68,096**
11	26,432	39,653	1,584	4,751	2,486	**74,905**
12	28,835	43,257	1,728	5,183	2,712	**81,715**
13	31,237	46,862	1,872	5,615	2,938	**88,524**
14	33,640	50,467	2,016	6,047	3,164	**95,334**
15	36,043	54,072	2,160	6,479	3,390	**102,143**
16	38,446	57,677	2,304	6,911	3,616	**108,953**
17	40,849	61,281	2,447	7,342	3,842	**115,762**
18	43,252	64,886	2,591	7,774	4,068	**122,572**
19	45,655	68,491	2,735	8,206	4,294	**129,382**

20	48,058	72,096	2,879	8,638	4,520	**136,191**
Total	**48,058**	**72,096**	**2,879**	**8,638**	**4,520**	**136,191**

Streambank Stabilization Load Reductions and Annual Costs

Year	Annual Implementation, feet	Cumulative Reductions		Annual Costs
		Sediment Reduction, tons	**Phosphorus Reduction, pounds**	
1	500	1000	40	$20,830
2	500	2000	80	$21,455
3	500	3000	120	$22,099
4	500	4000	160	$22,762
5	500	5000	200	$23,444
6	500	6000	240	$24,148
7	500	7000	280	$24,872
8	500	8000	320	$25,618
9	500	9000	360	$26,387
10	500	10000	400	$27,178
11	500	11000	440	$27,994
12	500	12000	480	$28,834
13	500	13000	520	$29,699
14	500	14000	560	$30,590
15	500	15000	600	$31,507
16	500	16000	640	$32,452
17	500	17000	680	$33,426
18	500	18000	720	$34,429
19	500	19000	760	$35,462
20	500	20000	800	$36,526
Total	**10,000**	**20,000**	**800**	**$559,710**

7.0 Information and Education in Support of BMPs

7.1 Information and Education Activities

The SLT has determined which information and education activities will be needed in the watershed. These activities are important in providing the residents of the watershed with a higher awareness of watershed issues, which will lead to an increase in adoption rates of BMPs. Listed below are the activities and events along with their costs and possible sponsoring agencies. These activities will be implemented as time allows and as new information becomes available.

Table 11 Information and Education Activities and Events as Requested by the SLT.

Cropland BMP Implementation					
BMP	**Target Audience**	**Activity/Event**	**Time Frame**	**Estimated Costs**	**Service Providers**
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 - Summer	$1,700 per tour	Kansas Forest Service
		One-on-One Technical Assistance for Landowners	Annual - Ongoing	No cost	Conservation Technician or Buffer Coordinator
No-Till	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 Districts County Extension Offices

		One on One Technical Assistance for Farmers	Annual - Ongoing	$2,000 per year	County Extension Offices
		Seasonal Informational Meetings	Annual – spring (planting) summer (harvest)	$5,500 ($2,750/meeting)	County Extension Offices No-till on the Plains

Cropland BMP Implementation, Cont.					
BMP	**Target Audience**	**Activity/Event**	**Time Frame**	**Estimated Costs**	**Service Providers**
Grassed Waterways	Farmers	Tour/Field Day	Annual – Summer	$1,500 per tour	Conservation Districts County Extension Offices
Conservation Crop Rotations	Farmers and Rental Operators	Workshop	Annual – Summer	$1,500 per workshop	County Extension Offices
Nutrient Management Plans	Farmers and Rental Operators	Workshop	Annual – Summer	$1,500 per workshop	County Extension Offices
Cover Crops	Farmers and Rental Operators	Tour/Field Day Workshop	Annual – Summer	$1,500 per workshop	Conservation Districts County Extension Offices
Livestock BMP Implementation					
BMP	**Target Audience**	**Activity/Event**	**Time Frame**	**Estimated Costs**	**Service Providers**
Vegetative Filter Strips	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 & Feedlots	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
		One-on-One Technical Assistance	Ongoing	$5,000 per year	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
		Tour/Field Day	Annual - Summer	$500 per tour	Kansas Rural Center
		Informational Meeting/ Workshop	Annual - Fall	Combine with relocating pasture feeding sites meeting	Kansas Rural Center
		One-on-One Technical Assistance	Ongoing	$5,000 per year	Kansas Rural Center
Cover Crops	Farmers and Rental Operators	Tour/Field Day Workshop	Annual – Summer	$1,500 per workshop	Conservation Districts County Extension Offices
Livestock BMP Implementation, Cont.					
BMP	**Target Audience**	**Activity/Event**	**Time Frame**	**Estimated Costs**	**Service Providers**
Rotational Grazing	Landowners and Ranchers	Tour/Field Day	Annual - Summer	Combine with relocated feeding	Kansas Rural Center County Extension Offices
Streambank Restoration/Stabilization Projects					
BMP	**Target Audience**	**Activity/Event**	**Time Frame**	**Estimated Costs**	**Service Providers**
Streambank Projects	Landowners	Demonstration Projects	Annual –Ongoing (1 per year)	$10,000 per project	KAWS Conservation Districts Crossroads RC&D
		Tour/Field Day highlighting successful projects	Annual – Summer (1 per year)	$1,000 per tour	KAWS Conservation Districts Crossroads RC&D
		Engineering Services	Ongoing	Varies by project (approx. $10K - $20K)	Watershed Institute
		Educational outreach and One-on-One Technical Assistance for Landowners	Ongoing	$2,500 per year	Conservation Districts KAWS
General / Watershed Wide Information and Education					
BMP	**Target Audience**	**Activity/Event**	**Time Frame**	**Estimated Costs**	**Service Providers**
	Educators,	Day on the Farm	Annual – Spring	$500 per event	Conservation Districts

Educational Activities Targeting Youth	K-12 Students				Kansas FFA County Extension Office s
		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

General / Watershed Wide Information and Education, Cont.					
BMP	**Target Audience**	**Activity/Event**	**Time Frame**	**Estimated Costs**	**Service Providers**
Educational Activities Targeting Adults	Watershed residents	Newspaper/newsletter articles	Annual – Ongoing	No cost	Conservation Districts, County Extension Offices
		Presentation about water quality issues & WRAPS update at annual meetings	Annual – Winter	No cost	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	Ongoing	$1,500 per year	Kansas Forest Service
		Educational campaign 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
	Watershed residents living in cities/towns	KS Healthy Yards & Communities training	Ongoing	$2,500 per year	K-State Horticulture Dept.
Total Cost per Year				**$124,100**	

7.2 Evaluation of Information and Education Activities

All service providers conducting Information and Education (I&E) activities funded through the Lower Republican WRAPS will be required to include an evaluation component in their project proposals and Project Implementation Plans. 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 the 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 streambank). Most of the BMPs that are targeted will be advantageous to more than one impairment, thus being more efficient.

Cropland BMP Cost Estimates

Conservation Crop Rotation: **$50/acre with $5000 project limit**.

Grassed Waterway: **$5000 project limit not to exceed 70% of actual cost.**

No-Till: **$50/acre with $5000 project limit.**

Riparian Vegetative Buffer: **$1,000 per acre**

Nutrient Management Plan: **$7.30 per acre for 10 years**

Cover Crops **$50/acre, not to exceed actual costs, termination costs not included, $5000 project limit.**

Terraces: **$5000 project limit, not to exceed $1 per linear foot of terrace.**

Grade Stabilization**: $5000 project limit**

Livestock BMP Cost Estimates

Vegetative Filter Strip: **$714 an acre was calculated figuring the average filter strip in the watershed will require four hours of bulldozer work at $125 an hour plus the cost of seeding one acre in permanent vegetation.**

Relocated Feedlot: **Average cost of $12,000 with payment not to exceed 70% of actual costs.**

Relocated Pasture Feeding Site: **Average cost $8,000 because the focus is on the most impacted, or worst, sites. Payment not to exceed 70% of actual costs**.

Off-Stream Watering System: **$20,000 project limit. Pond renovations have $2000 limit. Payment not to exceed 70% of actual costs.**

Rotational Grazing: **$7,000 average cost. More complex systems that require significant cross fencing and buried water lines will come with a much higher price.**

Prices below reflect prices 2015 costs for implementation and also include technical assistance costs such as NRCS planning and engineering design in the case of streambank stabilization. All BMPs will be applied in the targeted areas.

Annual Costs for All BMP Implementation in Targeted Areas Before Cost Share

Annual Costs for Implemented BMPs Before Cost Share				
Year	**Cropland**	**Livestock**	**Streambank**	**Annual Total**
1	$1,762,742	$35,258	$20,830	$1,818,830
2	$1,815,624	$36,316	$21,455	$1,873,395
3	$1,870,093	$37,405	$22,099	$1,929,596
4	$1,926,195	$38,527	$22,762	$1,987,484
5	$1,983,981	$39,683	$23,444	$2,047,109
6	$2,043,501	$40,874	$24,148	$2,108,522
7	$2,104,806	$42,100	$24,872	$2,171,778
8	$2,167,950	$43,363	$25,618	$2,236,931
9	$2,232,988	$44,664	$26,387	$2,304,039
10	$2,299,978	$46,004	$27,178	$2,373,160
11	$2,368,977	$47,384	$27,994	$2,444,355
12	$2,440,047	$48,805	$28,834	$2,517,686
13	$2,513,248	$50,269	$29,699	$2,593,216
14	$2,588,645	$51,778	$30,590	$2,671,013
15	$2,666,305	$53,331	$31,507	$2,751,143

16	$2,746,294	$54,931	$32,452	$2,833,677
17	$2,828,683	$56,579	$33,426	$2,918,688
18	$2,913,543	$58,276	$34,429	$3,006,248
19	$3,000,950	$60,024	$35,462	$3,096,436
20	$3,090,978	$61,825	$36,526	$3,189,329
20 Year Total	**$47,365,527**	**$947,396**	**$559,710**	**$48,872,633**

Annual Costs for All BMP Implementation in Targeted Areas After Cost Share

Annual Costs for Implemented BMPs After Cost Share				
Year	**Cropland**	**Livestock**	**Streambank**	**Annual Total**
1	$899,073	$17,629	$20,830	$937,532
2	$926,046	$18,158	$21,455	$965,658
3	$953,827	$18,703	$22,099	$994,628
4	$982,442	$19,264	$22,762	$1,024,467
5	$1,011,915	$19,842	$23,444	$1,055,201
6	$1,042,272	$20,437	$24,148	$1,086,857
7	$1,073,541	$21,050	$24,872	$1,119,463
8	$1,105,747	$21,681	$25,618	$1,153,047
9	$1,138,919	$22,332	$26,387	$1,187,638
10	$1,173,087	$23,002	$27,178	$1,223,267
11	$1,208,279	$23,692	$27,994	$1,259,965
12	$1,244,528	$24,403	$28,834	$1,297,764
13	$1,281,864	$25,135	$29,699	$1,336,697
14	$1,320,320	$25,889	$30,590	$1,376,798
15	$1,359,929	$26,665	$31,507	$1,418,102
16	$1,400,727	$27,465	$32,452	$1,460,645
17	$1,442,749	$28,289	$33,426	$1,504,464
18	$1,486,031	$29,138	$34,429	$1,549,598
19	$1,530,612	$30,012	$35,462	$1,596,086
20	$1,576,531	$30,913	$36,526	$1,643,969
20 Year Total	**$24,158,439**	**$473,698**	**$559,710**	**$25,191,846**

Jamestown Wildlife Area Targeted Annual Costs, Cropland BMPs, Before Cost Share

Jamestown WA Targeted Areas Annual Cost, Cropland BMPs										
Year	**Conservation Rotations**	**Grassed Waterways**	**No-Till**	**Buffers**	**Terraces**	**Grade Stabilization**	**Subsurface Fertilizer Application**	**Cover Crops**	**Nutrient Management Plans**	**Total**

1	$14,596	$186,822	$36,489	$38,921	$72,978	$14,012	$15,763	$43,787	$10,217	$433,584
2	$15,033	$192,427	$37,583	$40,089	$75,167	$14,432	$16,236	$45,100	$10,523	$446,591
3	$15,484	$198,200	$38,711	$41,292	$77,422	$14,865	$16,723	$46,453	$10,839	$459,989
4	$15,949	$204,146	$39,872	$42,530	$79,744	$15,311	$17,225	$47,847	$11,164	$473,789
5	$16,427	$210,270	$41,068	$43,806	$82,137	$15,770	$17,742	$49,282	$11,499	$488,002
6	$16,920	$216,578	$42,300	$45,120	$84,601	$16,243	$18,274	$50,761	$11,844	$502,642
7	$17,428	$223,076	$43,569	$46,474	$87,139	$16,731	$18,822	$52,283	$12,199	$517,722
8	$17,951	$229,768	$44,877	$47,868	$89,753	$17,233	$19,387	$53,852	$12,565	$533,253
9	$18,489	$236,661	$46,223	$49,304	$92,446	$17,750	$19,968	$55,467	$12,942	$549,251
10	$19,044	$243,761	$47,610	$50,784	$95,219	$18,282	$20,567	$57,131	$13,331	$565,728
11	$19,615	$251,074	$49,038	$52,307	$98,076	$18,831	$21,184	$58,845	$13,731	$582,700
12	$20,204	$258,606	$50,509	$53,876	$101,018	$19,395	$21,820	$60,611	$14,143	$600,181
13	$20,810	$266,364	$52,024	$55,493	$104,048	$19,977	$22,474	$62,429	$14,567	$618,187
14	$21,434	$274,355	$53,585	$57,157	$107,170	$20,577	$23,149	$64,302	$15,004	$636,732
15	$22,077	$282,586	$55,193	$58,872	$110,385	$21,194	$23,843	$66,231	$15,454	$655,834
16	$22,739	$291,063	$56,848	$60,638	$113,697	$21,830	$24,558	$68,218	$15,918	$675,509
17	$23,421	$299,795	$58,554	$62,457	$117,107	$22,485	$25,295	$70,264	$16,395	$695,774
18	$24,124	$308,789	$60,310	$64,331	$120,621	$23,159	$26,054	$72,372	$16,887	$716,648
19	$24,848	$318,053	$62,120	$66,261	$124,239	$23,854	$26,836	$74,544	$17,394	$738,147
20	$25,593	$327,594	$63,983	$68,249	$127,966	$24,570	$27,641	$76,780	$17,915	$760,292
Total Costs	**$392,187**	**$5,019,988**	**$980,466**	**$1,045,831**	**$1,960,933**	**$376,499**	**$423,561**	**$1,176,560**	**$274,531**	**$11,650,555**

Jamestown Wildlife Area Targeted Annual Costs, Cropland BMPs, After Cost Share

Jamestown WA Targeted Annual Cost After Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$14,596	$93,411	$22,258	$3,892	$36,489	$7,006	$15,763	$17,515	$10,217	$221,146
2	$15,033	$96,214	$22,926	$4,009	$37,583	$7,216	$16,236	$18,040	$10,523	$227,781
3	$15,484	$99,100	$23,614	$4,129	$38,711	$7,432	$16,723	$18,581	$10,839	$234,614
4	$15,949	$102,073	$24,322	$4,253	$39,872	$7,655	$17,225	$19,139	$11,164	$241,652
5	$16,427	$105,135	$25,052	$4,381	$41,068	$7,885	$17,742	$19,713	$11,499	$248,902
6	$16,920	$108,289	$25,803	$4,512	$42,300	$8,122	$18,274	$20,304	$11,844	$256,369
7	$17,428	$111,538	$26,577	$4,647	$43,569	$8,365	$18,822	$20,913	$12,199	$264,060
8	$17,951	$114,884	$27,375	$4,787	$44,877	$8,616	$19,387	$21,541	$12,565	$271,982
9	$18,489	$118,331	$28,196	$4,930	$46,223	$8,875	$19,968	$22,187	$12,942	$280,141
10	$19,044	$121,880	$29,042	$5,078	$47,610	$9,141	$20,567	$22,853	$13,331	$288,546
11	$19,615	$125,537	$29,913	$5,231	$49,038	$9,415	$21,184	$23,538	$13,731	$297,202

12	$20,204	$129,303	$30,810	$5,388	$50,509	$9,698	$21,820	$24,244	$14,143	$306,118
13	$20,810	$133,182	$31,735	$5,549	$52,024	$9,989	$22,474	$24,972	$14,567	$315,302
14	$21,434	$137,177	$32,687	$5,716	$53,585	$10,288	$23,149	$25,721	$15,004	$324,761
15	$22,077	$141,293	$33,667	$5,887	$55,193	$10,597	$23,843	$26,492	$15,454	$334,503
16	$22,739	$145,532	$34,677	$6,064	$56,848	$10,915	$24,558	$27,287	$15,918	$344,538
17	$23,421	$149,898	$35,718	$6,246	$58,554	$11,242	$25,295	$28,106	$16,395	$354,875
18	$24,124	$154,394	$36,789	$6,433	$60,310	$11,580	$26,054	$28,949	$16,887	$365,521
19	$24,848	$159,026	$37,893	$6,626	$62,120	$11,927	$26,836	$29,817	$17,394	$376,487
20	$25,593	$163,797	$39,030	$6,825	$63,983	$12,285	$27,641	$30,712	$17,915	$387,781
Total Cost	**$392,187**	**$2,509,994**	**$598,084**	**$104,583**	**$980,466**	**$188,250**	**$423,561**	**$470,624**	**$274,531**	**$5,942,280**

Peat's Creek Targeted Annual Costs, Cropland BMPs, Before Cost Share

Peat's Creek Targeted Areas Annual Cost, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$21,747	$278,365	$54,368	$57,993	$108,736	$20,877	$23,487	$65,242	$15,223	$646,038
2	$22,400	$286,716	$55,999	$59,732	$111,998	$21,504	$24,192	$67,199	$15,680	$665,419
3	$23,072	$295,317	$57,679	$61,524	$115,358	$22,149	$24,917	$69,215	$16,150	$685,382
4	$23,764	$304,177	$59,410	$63,370	$118,819	$22,813	$25,665	$71,291	$16,635	$705,944
5	$24,477	$313,302	$61,192	$65,271	$122,384	$23,498	$26,435	$73,430	$17,134	$727,122
6	$25,211	$322,701	$63,028	$67,229	$126,055	$24,203	$27,228	$75,633	$17,648	$748,935
7	$25,967	$332,382	$64,918	$69,246	$129,837	$24,929	$28,045	$77,902	$18,177	$771,404
8	$26,746	$342,354	$66,866	$71,324	$133,732	$25,677	$28,886	$80,239	$18,722	$794,546
9	$27,549	$352,624	$68,872	$73,463	$137,744	$26,447	$29,753	$82,646	$19,284	$818,382
10	$28,375	$363,203	$70,938	$75,667	$141,876	$27,240	$30,645	$85,126	$19,863	$842,933
11	$29,226	$374,099	$73,066	$77,937	$146,132	$28,057	$31,565	$87,679	$20,459	$868,221
12	$30,103	$385,322	$75,258	$80,275	$150,516	$28,899	$32,512	$90,310	$21,072	$894,268
13	$31,006	$396,882	$77,516	$82,684	$155,032	$29,766	$33,487	$93,019	$21,704	$921,096
14	$31,937	$408,788	$79,841	$85,164	$159,683	$30,659	$34,491	$95,810	$22,356	$948,729
15	$32,895	$421,052	$82,237	$87,719	$164,473	$31,579	$35,526	$98,684	$23,026	$977,191
16	$33,882	$433,683	$84,704	$90,351	$169,408	$32,526	$36,592	$101,645	$23,717	$1,006,507
17	$34,898	$446,694	$87,245	$93,061	$174,490	$33,502	$37,690	$104,694	$24,429	$1,036,702
18	$35,945	$460,095	$89,862	$95,853	$179,724	$34,507	$38,820	$107,835	$25,161	$1,067,803
19	$37,023	$473,897	$92,558	$98,729	$185,116	$35,542	$39,985	$111,070	$25,916	$1,099,837
20	$38,134	$488,114	$95,335	$101,690	$190,670	$36,609	$41,185	$114,402	$26,694	$1,132,832
Total costs	**$584,357**	**$7,479,766**	**$1,460,892**	**$1,558,285**	**$2,921,784**	**$560,982**	**$631,105**	**$1,753,070**	**$409,050**	**$17,359,291**

Peat's Creek Targeted Annual Costs, Cropland BMPs, After Cost Share

Peat's Creek Targeted Annual Cost After Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$21,747	$139,182	$33,165	$5,799	$54,368	$10,439	$23,487	$26,097	$15,223	$329,507
2	$22,400	$143,358	$34,159	$5,973	$55,999	$10,752	$24,192	$26,880	$15,680	$339,392
3	$23,072	$147,659	$35,184	$6,152	$57,679	$11,074	$24,917	$27,686	$16,150	$349,574
4	$23,764	$152,088	$36,240	$6,337	$59,410	$11,407	$25,665	$28,517	$16,635	$360,061
5	$24,477	$156,651	$37,327	$6,527	$61,192	$11,749	$26,435	$29,372	$17,134	$370,863
6	$25,211	$161,351	$38,447	$6,723	$63,028	$12,101	$27,228	$30,253	$17,648	$381,989
7	$25,967	$166,191	$39,600	$6,925	$64,918	$12,464	$28,045	$31,161	$18,177	$393,449
8	$26,746	$171,177	$40,788	$7,132	$66,866	$12,838	$28,886	$32,096	$18,722	$405,252
9	$27,549	$176,312	$42,012	$7,346	$68,872	$13,223	$29,753	$33,059	$19,284	$417,410
10	$28,375	$181,601	$43,272	$7,567	$70,938	$13,620	$30,645	$34,050	$19,863	$429,932
11	$29,226	$187,050	$44,570	$7,794	$73,066	$14,029	$31,565	$35,072	$20,459	$442,830
12	$30,103	$192,661	$45,908	$8,028	$75,258	$14,450	$32,512	$36,124	$21,072	$456,115
13	$31,006	$198,441	$47,285	$8,268	$77,516	$14,883	$33,487	$37,208	$21,704	$469,798
14	$31,937	$204,394	$48,703	$8,516	$79,841	$15,330	$34,491	$38,324	$22,356	$483,892
15	$32,895	$210,526	$50,164	$8,772	$82,237	$15,789	$35,526	$39,474	$23,026	$498,409
16	$33,882	$216,842	$51,669	$9,035	$84,704	$16,263	$36,592	$40,658	$23,717	$513,361
17	$34,898	$223,347	$53,219	$9,306	$87,245	$16,751	$37,690	$41,878	$24,429	$528,762
18	$35,945	$230,047	$54,816	$9,585	$89,862	$17,254	$38,820	$43,134	$25,161	$544,625
19	$37,023	$236,949	$56,460	$9,873	$92,558	$17,771	$39,985	$44,428	$25,916	$560,964
20	$38,134	$244,057	$58,154	$10,169	$95,335	$18,304	$41,185	$45,761	$26,694	$577,793
Total Cost	**$584,357**	**$3,739,883**	**$891,144**	**$155,828**	**$1,460,892**	**$280,491**	**$631,105**	**$701,228**	**$409,050**	**$8,853,979**

Lower Milford Targeted Annual Costs, Cropland BMPs, Before Cost Share

Lower Milford Targeted Areas Annual Cost, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$22,996	$294,342	$57,489	$61,321	$114,978	$22,076	$24,835	$68,987	$16,097	$683,120
2	$23,685	$303,173	$59,213	$63,161	$118,427	$22,738	$25,580	$71,056	$16,580	$703,613
3	$24,396	$312,268	$60,990	$65,056	$121,980	$23,420	$26,348	$73,188	$17,077	$724,722
4	$25,128	$321,636	$62,820	$67,007	$125,639	$24,123	$27,138	$75,383	$17,589	$746,463
5	$25,882	$331,285	$64,704	$69,018	$129,408	$24,846	$27,952	$77,645	$18,117	$768,857

6	$26,658	$341,224	$66,645	$71,088	$133,290	$25,592	$28,791	$79,974	$18,661	$791,923
7	$27,458	$351,460	$68,645	$73,221	$137,289	$26,360	$29,654	$82,373	$19,220	$815,681
8	$28,282	$362,004	$70,704	$75,418	$141,408	$27,150	$30,544	$84,845	$19,797	$840,151
9	$29,130	$372,864	$72,825	$77,680	$145,650	$27,965	$31,460	$87,390	$20,391	$865,356
10	$30,004	$384,050	$75,010	$80,010	$150,020	$28,804	$32,404	$90,012	$21,003	$891,316
11	$30,904	$395,572	$77,260	$82,411	$154,520	$29,668	$33,376	$92,712	$21,633	$918,056
12	$31,831	$407,439	$79,578	$84,883	$159,156	$30,558	$34,378	$95,493	$22,282	$945,597
13	$32,786	$419,662	$81,965	$87,430	$163,930	$31,475	$35,409	$98,358	$22,950	$973,965
14	$33,770	$432,252	$84,424	$90,052	$168,848	$32,419	$36,471	$101,309	$23,639	$1,003,184
15	$34,783	$445,219	$86,957	$92,754	$173,914	$33,391	$37,565	$104,348	$24,348	$1,033,280
16	$35,826	$458,576	$89,566	$95,537	$179,131	$34,393	$38,692	$107,479	$25,078	$1,064,278
17	$36,901	$472,333	$92,253	$98,403	$184,505	$35,425	$39,853	$110,703	$25,831	$1,096,207
18	$38,008	$486,503	$95,020	$101,355	$190,040	$36,488	$41,049	$114,024	$26,606	$1,129,093
19	$39,148	$501,098	$97,871	$104,395	$195,741	$37,582	$42,280	$117,445	$27,404	$1,162,965
20	$40,323	$516,131	$100,807	$107,527	$201,614	$38,710	$43,549	$120,968	$28,226	$1,197,854
Total Costs										
	$617,898	**$7,909,091**	**$1,544,744**	**$1,647,727**	**$3,089,488**	**$593,182**	**$667,330**	**$1,853,693**	**$432,528**	**$18,355,681**

Lower Milford Targeted Annual Costs, Cropland BMPs, After Cost Share

Lower Milford Targeted Annual Cost After Cost-Share, Cropland BMPs										
Year	**Conservation Rotations**	**Grassed Waterways**	**No-Till**	**Buffers**	**Terraces**	**Grade Stabilization**	**Subsurface Fertilizer Application**	**Cover Crops**	**Nutrient Management Plans**	**Total**
1	$22,996	$147,171	$35,068	$6,132	$57,489	$11,038	$24,835	$27,595	$16,097	$348,420
2	$23,685	$151,586	$36,120	$6,316	$59,213	$11,369	$25,580	$28,422	$16,580	$358,873
3	$24,396	$156,134	$37,204	$6,506	$60,990	$11,710	$26,348	$29,275	$17,077	$369,639
4	$25,128	$160,818	$38,320	$6,701	$62,820	$12,061	$27,138	$30,153	$17,589	$380,728
5	$25,882	$165,642	$39,469	$6,902	$64,704	$12,423	$27,952	$31,058	$18,117	$392,150
6	$26,658	$170,612	$40,654	$7,109	$66,645	$12,796	$28,791	$31,990	$18,661	$403,914
7	$27,458	$175,730	$41,873	$7,322	$68,645	$13,180	$29,654	$32,949	$19,220	$416,032
8	$28,282	$181,002	$43,129	$7,542	$70,704	$13,575	$30,544	$33,938	$19,797	$428,513
9	$29,130	$186,432	$44,423	$7,768	$72,825	$13,982	$31,460	$34,956	$20,391	$441,368
10	$30,004	$192,025	$45,756	$8,001	$75,010	$14,402	$32,404	$36,005	$21,003	$454,609
11	$30,904	$197,786	$47,129	$8,241	$77,260	$14,834	$33,376	$37,085	$21,633	$468,248
12	$31,831	$203,719	$48,543	$8,488	$79,578	$15,279	$34,378	$38,197	$22,282	$482,295
13	$32,786	$209,831	$49,999	$8,743	$81,965	$15,737	$35,409	$39,343	$22,950	$496,764
14	$33,770	$216,126	$51,499	$9,005	$84,424	$16,209	$36,471	$40,524	$23,639	$511,667
15	$34,783	$222,610	$53,044	$9,275	$86,957	$16,696	$37,565	$41,739	$24,348	$527,017
16	$35,826	$229,288	$54,635	$9,554	$89,566	$17,197	$38,692	$42,991	$25,078	$542,827
17	$36,901	$236,167	$56,274	$9,840	$92,253	$17,712	$39,853	$44,281	$25,831	$559,112

18	$38,008	$243,252	$57,962	$10,135	$95,020	$18,244	$41,049	$45,610	$26,606	$575,885
19	$39,148	$250,549	$59,701	$10,440	$97,871	$18,791	$42,280	$46,978	$27,404	$593,162
20	$40,323	$258,066	$61,492	$10,753	$100,807	$19,355	$43,549	$48,387	$28,226	$610,957
Total Costs	**$617,898**	**$3,954,545**	**$942,294**	**$164,773**	**$1,544,744**	**$296,591**	**$667,330**	**$741,477**	**$432,528**	**$9,362,180**

Livestock BMP Cost of Implementation Before Cost Share (3% Inflation)

Annual Cost of Implementing Livestock BMPs Before Cost Share						
Year	**Vegetative Filter Strip**	**Relocate Feedlot**	**Relocate Pasture Feeding Site**	**Off Stream Watering System**	**Rotational Grazing**	**Annual Cost**
1	$1,428	$13,242	$2,203	$11,385	$7,000	**$35,258**
2	$1,471	$13,639	$2,269	$11,727	$7,210	**$36,316**
3	$1,515	$14,048	$2,337	$12,078	$7,426	**$37,405**
4	$1,560	$14,470	$2,407	$12,441	$7,649	**$38,527**
5	$1,607	$14,904	$2,479	$12,814	$7,879	**$39,683**
6	$1,655	$15,351	$2,554	$13,198	$8,115	**$40,874**
7	$1,705	$15,812	$2,630	$13,594	$8,358	**$42,100**
8	$1,756	$16,286	$2,709	$14,002	$8,609	**$43,363**
9	$1,809	$16,775	$2,791	$14,422	$8,867	**$44,664**
10	$1,863	$17,278	$2,874	$14,855	$9,133	**$46,004**
11	$1,919	$17,796	$2,961	$15,300	$9,407	**$47,384**
12	$1,977	$18,330	$3,049	$15,760	$9,690	**$48,805**
13	$2,036	$18,880	$3,141	$16,232	$9,980	**$50,269**
14	$2,097	$19,446	$3,235	$16,719	$10,280	**$51,778**
15	$2,160	$20,030	$3,332	$17,221	$10,588	**$53,331**
16	$2,225	$20,631	$3,432	$17,737	$10,906	**$54,931**
17	$2,292	$21,250	$3,535	$18,270	$11,233	**$56,579**
18	$2,360	$21,887	$3,641	$18,818	$11,570	**$58,276**
19	$2,431	$22,544	$3,750	$19,382	$11,917	**$60,024**
20	$2,504	$23,220	$3,863	$19,964	$12,275	**$61,825**
Total Cost	**$38,371**	**$355,817**	**$59,195**	**$305,919**	**$188,093**	**$947,396**

Livestock BMP Cost of Implementation After Cost Share (3% Inflation)

Annual Cost of Implementing Livestock BMPs After Cost Share						
Year	**Vegetative Filter Strip**	**Relocate Feedlot**	**Relocate Pasture Feeding Site**	**Off Stream Watering System**	**Rotational Grazing**	**Annual Cost**
1	$714	$6,621	$1,102	$5,693	$3,500	**$17,629**
2	$735	$6,820	$1,135	$5,863	$3,605	**$18,158**
3	$757	$7,024	$1,169	$6,039	$3,713	**$18,703**
4	$780	$7,235	$1,204	$6,220	$3,825	**$19,264**
5	$804	$7,452	$1,240	$6,407	$3,939	**$19,842**
6	$828	$7,676	$1,277	$6,599	$4,057	**$20,437**
7	$853	$7,906	$1,315	$6,797	$4,179	**$21,050**
8	$878	$8,143	$1,355	$7,001	$4,305	**$21,681**
9	$904	$8,387	$1,395	$7,211	$4,434	**$22,332**
10	$932	$8,639	$1,437	$7,427	$4,567	**$23,002**
11	$960	$8,898	$1,480	$7,650	$4,704	**$23,692**
12	$988	$9,165	$1,525	$7,880	$4,845	**$24,403**
13	$1,018	$9,440	$1,570	$8,116	$4,990	**$25,135**
14	$1,049	$9,723	$1,618	$8,360	$5,140	**$25,889**
15	$1,080	$10,015	$1,666	$8,610	$5,294	**$26,665**
16	$1,112	$10,315	$1,716	$8,869	$5,453	**$27,465**
17	$1,146	$10,625	$1,768	$9,135	$5,616	**$28,289**
18	$1,180	$10,944	$1,821	$9,409	$5,785	**$29,138**
19	$1,216	$11,272	$1,875	$9,691	$5,959	**$30,012**
20	$1,252	$11,610	$1,931	$9,982	$6,137	**$30,913**
Total Cost	**$19,185**	**$177,909**	**$29,598**	**$152,960**	**$94,046**	**$473,698**

Table 12 Technical Assistance Needed to Implement BMPs.

BMP		***Technical Assistance***	***Projected Annual Cost***
Cropland	1. Conservation Crop Rotation	DoC Buffer Technician Watershed Specialist	NRCS District Conservationist No Charge Conservation District Soil Technician No Charge DoC Buffer Technician No Charge WRAPS Coordinator $25,000 Watershed Specialist
	2. Grassed Waterways	DoC Buffer Technician Watershed Specialist	
	3. No-till	WRAPS Coordinator Watershed Specialist	
	4. Buffers	DoC Buffer Technician WRAPS Coordinator Watershed Specialist	
	5. Nutrient Management Plans	Watershed Specialist	
Livestock	1. Vegetative filter strips	DoC Buffer Technician Watershed Specialist	
	2. Relocate feedlots	Watershed Specialist	

	3. Relocate pasture feeding sites	Watershed Specialist	$11,500 Kansas State Forester No Charge
	4. Establish off stream watering systems	Watershed Specialist	
	5. Rotational grazing	Watershed Specialist	
Streambank	4. Streambank restoration	DoC Buffer Technician WRAPS Coordinator Watershed Specialist	
Total			**$56,500**

Table 13 Total Annual Costs in Targeted Areas for Implementing Entire Watershed plan in Support of Attaining TMDLs and Improvement in Impairments on the 303d List.

Total Annual Costs of Implementing Cropland, Livestock, Streambank and Rangeland BMPs, in addition to Information and Education and Technical Assistance						
	BMPs Implemented			I&E and Technical Assistance		
Year	Cropland	Livestock	Streambank	I&E	Technical Assistance	Total
1	$157,241	$7,463	$20,830	$124,100	$56,500	$366,134
2	$161,958	$15,836	$21,455	$127,823	$58,195	$385,267
3	$166,817	$11,429	$22,099	$131,658	$59,941	$391,944
Total Annual Costs of Implementing Cropland, Livestock, Streambank and Rangeland BMPs, in addition to Information and Education and Technical Assistance, Cont.						
	BMPs Implemented			I&E and Technical Assistance		
Year	Cropland	Livestock	Streambank	I&E	Technical Assistance	Total
4	$171,822	$13,183	$22,762	$135,607	$61,739	$405,113
5	$176,976	$8,399	$23,444	$139,676	$63,591	$412,086
6	$182,286	$10,148	$24,148	$143,866	$65,499	$425,947
7	$187,754	$8,911	$24,872	$148,182	$67,464	$437,183
8	$193,387	$14,837	$25,618	$152,627	$69,488	$455,957
9	$199,188	$5,260	$26,387	$157,206	$71,573	$459,614
10	$205,164	$15,741	$27,178	$161,922	$73,720	$483,725
11	$211,319	$7,479	$27,994	$166,780	$75,931	$489,503
12	$217,659	$9,490	$28,834	$171,783	$78,209	$505,976
13	$224,188	$7,934	$29,699	$176,937	$80,555	$519,313
14	$230,914	$14,930	$30,590	$182,245	$82,972	$541,651
15	$237,841	$3,410	$31,507	$187,712	$85,461	$545,932

16	$244,977	$15,839	$32,452	$193,344	$88,025	$574,637
17	$252,326	$8,930	$33,426	$199,144	$90,666	$584,492
18	$259,896	$11,332	$34,429	$205,118	$93,386	$604,161
19	$267,693	$9,474	$35,462	$211,272	$96,187	$620,088
20	$275,723	$17,827	$36,526	$217,610	$99,073	$646,759

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

Table 14 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) Forestland Enhancement Program (FLEP) State Acres for Wildlife Enhancement (SAFE) Grassland Reserve Program (GRP) Farmable Wetlands Program (FWP) Kansas Forest Service RCPP
Funding Sources, Cont.	
Potential Funding Sources	**Potential Funding Programs**
EPA/KDHE	319 Funding Grants WRAPS Grants Clean Water Neighbor Grants
Kansas Department of Wildlife, Parks and Tourism	Partnering for Wildlife
Kansas Alliance for Wetlands and Streams	WRAPS
State Conservation Commission	State NPS Funds
Conservation Districts	State NPS Funds
No-till on the Plains	
Kansas Forest Service	RCPP
US Fish and Wildlife	

Table 15 Potential Service Providers for BMP Implementation

BMP	Services Needed to Implement BMP		Service Provider **
	Technical Assistance	***Information and Education***	

Cropland	1. Conservation Crop Rotation	Design, cost share and maintenance	BMP workshops, tours, field days	NRCS KRC DoC No-Till on the Plains KSRE CD RC&D KDWPT
	2. Grassed Waterways	Design, cost share and maintenance	BMP workshops, tours, field days	
	3. No-till	Design, cost share and maintenance	BMP workshops	
	4. Buffers	Design, cost share and maintenance	BMP workshops, field days, tours	
	5. Nutrient Management Plans	Design, cost share and maintenance	BMP workshops, field days, tours	
Livestock	1. Vegetative filter strips	Design, cost share and maintenance	BMP workshops, field days, tours	KSRE NRCS DoC KRC CD RC&D KDWPT
	2. Relocate feedlots	Design, cost share and maintenance	BMP workshops, field days, tours	
	3. Relocate pasture feeding sites	Design, cost share and maintenance	BMP workshops, field days, tours	
	4. Establish off stream watering systems	Design, cost share and maintenance	BMP workshops, field days, tours	
	5. Rotational grazing	Design, cost share and maintenance	BMP workshops, field days, tours	

Service Providers, Cont.				
BMP		**Services Needed to Implement BMP**		**Service Provider ****
		Technical Assistance	***Information and Education***	
Streambank	1. Streambank restoration	Design, cost share and maintenance	BMP workshops, field days, tours	KAWS NRCS KFS KSRE 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 SLT will request an update of monitoring data from KDHE and USACE every year; however, the plan will be reviewed every five years starting in 2015. In 2015, the SLT requested a review of data by KDHE for the Lower Republican Basin. The TMDL for eutrophication and dissolved oxygen was approved in 2014. The timeframe of this document for BMP implementation to meet sediment and nutrient TMDLs would be **twenty** years from the date of publication of this report**.** The SLT will review sediment and phosphorus concentrations in year 2020. They will examine BMP placement and implementation in 2015 and every subsequent five years after.

Table 16 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

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

- The timeframe for meeting the **sediment goal** will be first year of implementation. If all BMPs are installed, the 30% sediment reduction goal in Milford Reservoir will be met. **According to an evaluation by KDHE in 2016, during the years 2011 to 2014, 48,227 tons of sediment had been reduced through BMP implementation. Additional BMP implementation is still needed to achieve the goal.** In addition to meeting the sediment goal, the need for implementing new TMDLs for the Republican River at sampling sites #503 and #504 will be reduced. After the sediment goal is met, the BMPs directed at sediment will be considered "protection measures" instead of "restoration measures". At this point, the SLT may decide to redirect their funding to phosphorus related BMPs. The timeframe for meeting the **phosphorus goal** will be **twenty years.** If all BMPs are installed, the 88% phosphorus reduction goal in Milford Reservoir will be met. In addition to meeting the phosphorus goal, the dissolved oxygen TMDL in Salt Creek, and eutrophication TMDL in Belleville City Lake and Milford Reservoir will be addressed.
- The timeframe for meeting the **nitrogen goal** will be **twenty years.** If all BMPs are installed, the 76% reduction goal in Milford Reservoir will be met.

10.0 Interim Measureable Milestones

10.1 Adoption Rates

Milestones will be determined by number of acres treated, projects installed, contacts made to residents of the watershed or load reductions at the end of five, ten and twenty years. The SLT will examine the number of acres treated or the load reduction to determine if adequate progress has been made from the current BMP implementations.

Jamestown Wildlife Area Short, Medium and Long-Term Adoption Rates

Jamestown WA Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	292	1,168	730	584	584	584	584	876	1,460	**6,860**
2	292	1,168	730	584	584	584	584	876	1,460	**6,860**
3	292	1,168	730	584	584	584	584	876	1,460	**6,860**
4	292	1,168	730	584	584	584	584	876	1,460	**6,860**
5	292	1,168	730	584	584	584	584	876	1,460	**6,860**
Total	*1,460*	*5,838*	*3,649*	*2,919*	*2,919*	*2,919*	*2,919*	*4,379*	*7,298*	**34,299**
6	292	1,168	730	584	584	584	584	876	1,460	**6,860**
7	292	1,168	730	584	584	584	584	876	1,460	**6,860**
8	292	1,168	730	584	584	584	584	876	1,460	**6,860**
9	292	1,168	730	584	584	584	584	876	1,460	**6,860**
10	292	1,168	730	584	584	584	584	876	1,460	**6,860**
Total	*2,919*	*11,676*	*7,298*	*5,838*	*5,838*	*5,838*	*5,838*	*8,757*	*14,596*	**68,599**
11	292	1,168	730	584	584	584	584	876	1,460	**6,860**
12	292	1,168	730	584	584	584	584	876	1,460	**6,860**
13	292	1,168	730	584	584	584	584	876	1,460	**6,860**
14	292	1,168	730	584	584	584	584	876	1,460	**6,860**
15	292	1,168	730	584	584	584	584	876	1,460	**6,860**
Total	*4,379*	*17,515*	*10,947*	*8,757*	*8,757*	*8,757*	*8,757*	*13,136*	*21,893*	**102,898**
16	292	1,168	730	584	584	584	584	876	1,460	**6,860**
17	292	1,168	730	584	584	584	584	876	1,460	**6,860**
18	292	1,168	730	584	584	584	584	876	1,460	**6,860**
19	292	1,168	730	584	584	584	584	876	1,460	**6,860**
20	292	1,168	730	584	584	584	584	876	1,460	**6,860**
Total	***5,838***	***23,353***	***14,596***	***11,676***	***11,676***	***11,676***	***11,676***	***17,515***	***29,191***	**137,198**

Jamestown Wildlife Area Annual Adoption Rate, treated acres

Jamestown WA Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	292	1,168	730	584	584	584	584	876	1,460	6,860
2	292	1,168	730	584	584	584	584	876	1,460	6,860
3	292	1,168	730	584	584	584	584	876	1,460	6,860
4	292	1,168	730	584	584	584	584	876	1,460	6,860
5	292	1,168	730	584	584	584	584	876	1,460	6,860
6	292	1,168	730	584	584	584	584	876	1,460	6,860
7	292	1,168	730	584	584	584	584	876	1,460	6,860
8	292	1,168	730	584	584	584	584	876	1,460	6,860
9	292	1,168	730	584	584	584	584	876	1,460	6,860
10	292	1,168	730	584	584	584	584	876	1,460	6,860
11	292	1,168	730	584	584	584	584	876	1,460	6,860
12	292	1,168	730	584	584	584	584	876	1,460	6,860
13	292	1,168	730	584	584	584	584	876	1,460	6,860
14	292	1,168	730	584	584	584	584	876	1,460	6,860
15	292	1,168	730	584	584	584	584	876	1,460	6,860
16	292	1,168	730	584	584	584	584	876	1,460	6,860
17	292	1,168	730	584	584	584	584	876	1,460	6,860
18	292	1,168	730	584	584	584	584	876	1,460	6,860
19	292	1,168	730	584	584	584	584	876	1,460	6,860
20	292	1,168	730	584	584	584	584	876	1,460	6,860

Peat's Creek Short, Medium and Long-Term Adoption Rates

Peat's Creek Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
2	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
3	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
4	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
5	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
Total	*2,175*	*8,699*	*5,437*	*4,349*	*4,349*	*4,349*	*4,349*	*6,524*	*10,874*	**51,106**
6	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
7	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
8	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**

9	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
10	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
Total	*4,349*	*17,398*	*10,874*	*8,699*	*8,699*	*8,699*	*8,699*	*13,048*	*21,747*	**102,212**
11	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
12	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
13	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
14	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
15	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
Total	*6,524*	*26,097*	*16,310*	*13,048*	*13,048*	*13,048*	*13,048*	*19,573*	*32,621*	**153,318**
16	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
17	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
18	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
19	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
20	435	1,740	1,087	870	870	870	870	1,305	2,175	**10,221**
Total	***8,699***	***34,796***	***21,747***	***17,398***	***17,398***	***17,398***	***17,398***	***26,097***	***43,495***	**204,424**

Peat's Creek Annual Adoption Rates, treated acres

Peat's Creek Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
2	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
3	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
4	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
5	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
6	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
7	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
8	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
9	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
10	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
11	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
12	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
13	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
14	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
15	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
16	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
17	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
18	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221
19	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221

20	435	1,740	1,087	870	870	870	870	1,305	2,175	10,221

Lower Milford Short, Medium and Long-Term Adoption Rates

Lower Milford Annual Adoption (treated acres), Cropland BMPs										
Year	**Conservation Rotations**	**Grassed Waterways**	**No-Till**	**Buffers**	**Terraces**	**Grade Stabilization**	**Subsurface Fertilizer Application**	**Cover Crops**	**Nutrient Management Plan**	**Total**
1	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
2	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
3	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
4	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
5	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
Total	*2,300*	*9,198*	*5,749*	*4,599*	*4,599*	*4,599*	*4,599*	*6,899*	*11,498*	**54,039**
6	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
7	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
8	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
9	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
10	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
Total	*4,599*	*18,396*	*11,498*	*9,198*	*9,198*	*9,198*	*9,198*	*13,797*	*22,996*	**108,079**
11	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
12	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
13	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
14	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
15	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
Total	*6,899*	*27,595*	*17,247*	*13,797*	*13,797*	*13,797*	*13,797*	*20,696*	*34,493*	**162,118**
16	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
17	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
18	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
19	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
20	460	1,840	1,150	920	920	920	920	1,380	2,300	**10,808**
Total	***9,198***	***36,793***	***22,996***	***18,396***	***18,396***	***18,396***	***18,396***	***27,595***	***45,991***	**216,158**

Lower Milford Annual Adoption Rate, treated acres

Lower Milford Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
2	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
3	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
4	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
5	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
6	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
7	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
8	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
9	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
10	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
11	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
12	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
13	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
14	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
15	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
16	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
17	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
18	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
19	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808
20	460	1,840	1,150	920	920	920	920	1,380	2,300	10,808

Livestock BMP Adoption Rates for entire targeted watersheds

Short, Medium and Long-Term Livestock BMPs Adoption						
	Year	Vegetative Filter Strip	Relocate Feedlot	Relocate Pasture Feeding Site	Off Stream Watering System	Rotational Grazing
Short	1	2	2	1	3	1
	2	2	2	1	3	1
	3	2	2	1	3	1
	4	2	2	1	3	1
	5	2	2	1	3	1
	Total	*10*	*10*	*5*	*15*	*5*
Medium-Term	6	2	2	1	3	1
	7	2	2	1	3	1
	8	2	2	1	3	1
	9	2	2	1	3	1
	10	2	2	1	3	1

	Total	*20*	*20*	*10*	*30*	*10*
Long-Term	11	2	2	1	3	1
	12	2	2	1	3	1
	13	2	2	1	3	1
	14	2	2	1	3	1
	15	2	2	1	3	1
	Total	*30*	*30*	*15*	*45*	*15*
	16	2	2	1	3	1
	17	2	2	1	3	1
	18	2	2	1	3	1
	19	2	2	1	3	1
	20	2	2	1	3	1
	Total	*40*	*40*	*20*	*60*	*20*

Annual Adopted Livestock BMPS, projects

Livestock BMPs Adopted Annually					
Year	**Vegetative Filter Strip**	**Relocate Feedlot**	**Relocate Pasture Feeding Site**	**Off Stream Watering System**	**Rotational Grazing**
1	2	2	1	3	1
2	2	2	1	3	1
3	2	2	1	3	1
4	2	2	1	3	1
5	2	2	1	3	1
6	2	2	1	3	1
7	2	2	1	3	1
8	2	2	1	3	1
9	2	2	1	3	1
10	2	2	1	3	1
11	2	2	1	3	1
12	2	2	1	3	1
13	2	2	1	3	1
14	2	2	1	3	1
15	2	2	1	3	1
16	2	2	1	3	1
17	2	2	1	3	1
18	2	2	1	3	1
19	2	2	1	3	1
20	2	2	1	3	1
Total	*40*	*40*	*20*	*60*	*20*

Table 17 Short, Medium and Long-Term Goals for Information and Education Adoption Rates in the Entire Watershed to Address All TMDLs

	Year	Demo Projects	Workshops	Tours and Field Days	Presentations, Informational Meetings	Newsletter Inserts	Technical Assistance One on One	Conference Attendees	Educational Events	Media Campaign	Contacts made by Tech Assistance
Short Term	1	4	5	8	3	1	6	2	5	4	250
	2	4	5	8	3	1	6	2	5	4	250
	3	4	5	8	3	1	6	2	5	4	250
	4	4	5	8	3	1	6	2	5	4	250
	5	4	5	8	3	1	6	2	5	4	250
	Total	***20***	***25***	***40***	***15***	***5***	***30***	***10***	***25***	***20***	***1250***
Medium Term	6	4	5	8	3	1	6	2	5	4	250
	7	4	5	8	3	1	6	2	5	4	250
	8	4	5	8	3	1	6	2	5	4	250
	9	4	5	8	3	1	6	2	5	4	250
	10	4	5	8	3	1	6	2	5	4	250
	Total	***40***	***50***	***80***	***30***	***10***	***60***	***20***	***50***	***40***	***2500***

I&E Adoption Rates, Cont.											
	Year	Demo Projects	Workshops	Tours and Field Days	Presentations, Informational Meetings	Newsletter Inserts	Technical Assistance One on One	Conference Attendees	Educational Events	Media Campaign	Contacts made by Tech Assistance
Long Term	11	4	5	8	3	1	6	2	5	4	250
	12	4	5	8	3	1	6	2	5	4	250
	13	4	5	8	3	1	6	2	5	4	250
	14	4	5	8	3	1	6	2	5	4	250
	15	4	5	8	3	1	6	2	5	4	250
	Total	**60**	**75**	**120**	**45**	**15**	**90**	**30**	**75**	**60**	**3750**
	16	4	5	8	3	1	6	2	5	4	250
	17	4	5	8	3	1	6	2	5	4	250
	18	4	5	8	3	1	6	2	5	4	250
	19	4	5	8	3	1	6	2	5	4	250
	20	4	5	8	3	1	6	2	5	4	250
	Total	***80***	***100***	***160***	***60***	***20***	***120***	***40***	***100***	***80***	***5000***

Over a twenty year time frame, this WRAPS project hopes to improve water quality throughout the watershed and in Milford Reservoir. Measurements taken at Milford Reservoir are important because it is close to the drainage endpoint of the watershed.

Any water quality improvements will be observed by conducting tests in Milford Reservoir. Social indicators will also be examined by tracking traffic in Milford Reservoir parks. An example of a healthy lake ecosystem is frequent visits by the public to enjoy the outdoor recreation of the lake and park. After reviewing the benchmark criteria, the SLT will assess and revise the overall strategy plan for the watershed. New goals will be set and new BMPs will be implemented to achieve improved water quality.

Table 18. Benchmarks to Measure Water Quality Progress

Criteria to Measure Water Quality Progress	Information Source
No algal blooms in main lake basin	USACE
Bathymetric survey conducted every ten years	KBS
Fewer high event stream flow rates entering Milford Reservoir indicating better retention and slower release of storm water in the upper end of the watershed due to an increase in BMPs that slow flow (buffers, riparian areas, no-till, grassed waterways, etc.)	USGS
Beach closures at Milford Reservoir	KDHE
No fish kills on Republican River or tributaries	KDWPT
Milford Reservoir is not listed for eutrophication or siltation	KDHE
No health advisories against swimming in Republican River	KDHE
Benchmarks, Cont.	
Criteria to Measure Water Quality Progress	**Information Source**
No new listings for DO or E. coli bacteria	KDHE
Biological metrics on Republican River at Clay Center improve	KDHE
Social Indicators to Measure Water Quality Progress	**Information Source**
Visitor traffic to Milford Reservoir	KDWPT
Boating traffic in Milford Reservoir	KDWPT
Quantity and quality of fishing in Milford Reservoir	KDWPT
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

10.2 Phosphorus and Sediment Milestones [24]

At the end of ten years, the SLT will be able to examine water quality data for phosphorus (eutrophication, dissolved oxygen and aquatic plants determination) and TSS (total suspended solids – used as a determination of sediment) 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 related indicators) and sediment reduction in the waterways. KDHE has outlined water quality milestones for total phosphorus and TSS. These milestones are presented below.

1. No DO hits on Salt Creek or Buffalo Creek over 2010 – 2020
2. No more than one DO hit on unlisted streams over 2010 – 2020
3. Median Total Phosphorus (TP) and TSS declines by 10 – 20% over 2010 – 2020
4. Lower Republican River outlet loads entering Milford Reservoir declines by 15% by 2020 (284 T TP/yr. (-50 T/yr.) and 109,151 T TSS/yr. (-19,262 T/yr.)
5. Bacteria index profiles for Republican River at Rice and Clay Center decline over 2010 – 2020.
6. Note: The Republican River in the vicinity of Concordia is Primary Recreation B, the most stringent of recreation uses; the remainder of the river is Primary C down to Milford Reservoir. The river in northern Republic County is Secondary Recreation b, but there are high bacteria contributions coming from Nebraska that may influence the attainment of water quality standards at Concordia – Rice.
7. Note: Buffalo Creek is designated as Secondary Recreation b and is unlikely to violate water quality standards; Salt Creek is Primary Recreation C and five and seven routine samples taken during April – October since 2003 have been greater than the nominal criterion of 427.
8. Note: No analysis has been done on White Rock Creek since the monitoring station is located above Lovewell Reservoir and water released from Lovewell typically moves through the Kansas-Bostwick Irrigation District system before reaching the Republican River.

Table 19. Phosphorus and Total Suspended Solids 10 Year Milestones

10 year milestones	Current Condition	Improved Condition 2010-2020	Current Condition	Improved Condition 2010-2020
Stream	**TP (median of data collected during indicated period), ppm**		**TSS (median of data collected during indicated period), ppm**	
Buffalo Creek	0.370	0.310	81	65
Wolf Creek	0.365	0.292	35	31
Repub-Concordia/Rice	0.284	0.240	44	40
Salt Creek	0.331	0.265	60	48
Elm Creek	0.260	0.239	32	29
Peats Creek	0.298	0.246	38	34
Mulberry Creek	0.210	0.200	32	29
Five Creek	0.167	0.150	26	23
Repub-Clay Center	0.312	0.256	80	64

If a water quality milestone is not reached by the timeline listed, the SLT will assess the significance of the data to determine if outside factors (i.e. atmospheric loads or weather) contributed to this milestone not being met. If needed, the SLT will assess the effectiveness of the BMPs installed and determine if additional implementation is needed.

Water Quality Update

A water quality update was provided to the SLT in 2016. A summary of the data is presented below for KDHE sampling sites. These data indicate trends of attainment of water quality goals.

SC231 Republican River near Hardy, NE: Total phosphorus concentrations are relatively stable at SC231; TSS concentrations have declined; and TN concentrations have increased. This station reflects loads arriving from Nebraska.

SC509 Buffalo Creek near Concordia: TP concentrations have increased; TSS concentrations have decreased; and TN concentrations are generally stable. The number of Dissolved Oxygen violations have increased in the period from 2010-2015 and overall DO violations are observed in a similar percentage of samples from the 1990-1999 period compared to the samples collected from 2000-2015.

SC707 Wolf Creek near Concordia: The data set at SC707 is small since this is a rotational station. TP, TSS, and TN concentrations are relatively stable from 2000-2015. There have been two DO violations in the period from 2010-2015.

SC510 Republican River near Rice: TP concentrations are relatively stable overall but did increase from 2010-2015. TSS concentrations have decreased since the 1990-1999 period, but did increase from 2010-2015. TN concentrations also slightly increased from 2010-2015.

SC650 Salt Creek near Hollis: There were only four samples collected during the recent period from 2010-2015. TP concentrations have slightly increased from the 1990-1999 period; TSS concentrations show an increased average concentration and a lower median concentration from the 1990-1999 period; and TN concentrations are relatively stable.

SC709 Elm Creek near Ames: This a rotational station with a small data set. TP and TSS concentrations are higher in the 2000-2015 period compared to the 1990-1999 period. The four samples collected from 2010-2015 show lower TP and TN concentrations compared to the six samples collected from 2000-2009.

SC710 Mulberry Cr near Clifton: This is a rotational station with a smaller dataset. TP, TSS, and TN concentrations all decreased in the 2010-2015 period, but it may be attributed to the flow condition during this time period (lower flow condition).

SC649 Peats Cr near Clifton: This is a rotational station. TP concentrations are relatively stable; TSS concentrations have declined; and TN concentrations have increased.

SC504 Republican River near Clay Center: This is a rotational sampling station. TP and TN concentrations are generally stable and TSS concentrations have declined since the 1990-1999 period.

SC711 Five Creek near Clay Center: SC711 is a rotational station with a small data set. TP and TN concentrations are relatively stable but did decline for the four samples collected from 2010-2015. TSS concentrations remain low throughout the years.

SC503 Republican R near Clay Center above Milford: TP concentrations are stable; TSS concentrations have increased slightly; and TSS concentrations have declined from 1990-1999, but have been generally stable since.

Bacteria Index: SC650 on Salt Creek has been sampled for E.coli bacteria in 2005, 2009, and 2013. A total of 10 samples were collected during the primary recreation season of April to October. Six of the ten samples were over the nominal criterion value of 427 (index = 1), and elevated bacteria during the primary recreation season continues to be the norm. There were three samples collected in 2013, with one of these over the criterion. The 2013 sample that was over the criterion also has the largest bacteria count and corresponding index value on record. Values of this magnitude are typically related to high flow runoff events. The desired index should indicate less than 10 percent of the samples exceed the nominal criterion value and intensive sampling should commence to determine if Salt Creek complies with water quality standards.

Sediment Load Reductions for SC503 and SC504: TSS load reductions necessary to meet the long-term endpoint from the current condition for SC504 and SC503 require 39% and 27% TSS load reductions respectively. The focus should be on the meeting the reductions for SC504 since this station is upstream of SC503. Reductions are based on meeting the long term TSS median target from the current median TSS concentration at the current average flow condition.

LM019001, Milford Lake: The Milford Lake Eutrophication and Dissolved Oxygen TMDL was approved on July 14, 2014 by EPA Region 7. KDHE has not sampled the lake since 2012 as part of their routine lake network sampling. Hazardous Algal Blooms have continued to be an issue in Milford Lake since 2011.

10.3 BMP Implementation Milestones

The SLT will review the number of acres, projects or contacts made in the watershed every five years until the end of this Watershed plan, which is the year 2030**.** 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 twenty year period.

Table 20. BMP Implementation Milestones from 2015 to 2030 **May need to update**

	Cropland					Livestock					Stream-bank	Information and Education	
Year	Conservation Crop Rotation, acres	Waterways, acres	No-till, acres	Buffers, acres	Nutrient Management Plans, acres	Filter strips, number	Relocate Feedlots, number	Relocate Pasture Feeding Sites, number	Off-stream Watering Systems, number	Rotational Grazing, number	Restoration, feet	Demonstrations/Workshops/ Tours/Field Days. number	I&E and Technical Assistance Contacts/Participants
201	*471*	*9,417*	*7,063*	*4,807*	*20,247*	*5*	*7*	*2*	*10*	*2*	*2,500*	*85*	*1,250*
2020	*942*	*18,834*	*14,125*	*8,846*	*40,493*	*10*	*10*	*5*	*20*	*5*	*5,000*	*170*	*2,500*
2025	*1,413*	*28,251*	*21,188*	*12,885*	*60,740*	*15*	*13*	*7*	*25*	*7*	*7,500*	*255*	*3,750*
2030	*1,883*	*37,668*	*28,251*	*16,157*	*80,986*	*20*	*17*	*10*	*30*	*10*	*10,000*	*340*	*5,000*

11.0 Monitoring Water Quality Progress

In the year 2017, the plan was reviewed and revised according to results acquired from monitoring data and to incorporate the TMDL for Milford Reservoir. The SLT reviewed the following criteria:

1. The SLT requested a report from KDHE on water quality conditions in the watershed in 2015.
2. The SLT requested a report from KDHE concerning the revisions of the TMDLs from 2015.
3. The SLT requested a report from USACE and Kansas Department of Wildlife, Parks and Tourism on trends in water quality in Milford Reservoir.
4. The SLT with assistance from KDHE reported on progress towards achieving the adoption rates listed in Section 10.1 of this report.
5. The SLT with assistance from KDHE reported on progress towards achieving the benchmarks listed in Section 10.2 of this report.
6. The SLT with assistance from KDHE reported on progress towards achieving the BMP implementations in Section 10.3 of this report.
7. The SLT discussed impairments on the 303d list and the possibility of addressing these impairments prior to them being listed as TMDLs.
8. The SLT discussed the effect of implementing BMPs aimed at specific TMDLs on the impairments listed on the 303d list.
9. The SLT discussed necessary adjustments and revisions needed in the targets listed in this plan.
10. The SLT discussed the possible need for additional assessment data.

In the year 2020 the SLT will request additional information from KDHE:

1. The SLT will ask KDHE for a report on the milestone achievements in **sediment** load reductions according to Section 9.0.
2. The SLT will request from KDHE a report on the milestone achievements in **phosphorus** load reductions according to Section 9.0.
3. The SLT will ask KDHE for a report on the milestone achievements in **nitrogen** load reductions according to Section 9.0.

The KDHE and USACE sampling data will be reviewed by the SLT every year. Data collected in the Targeted Areas 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. 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.

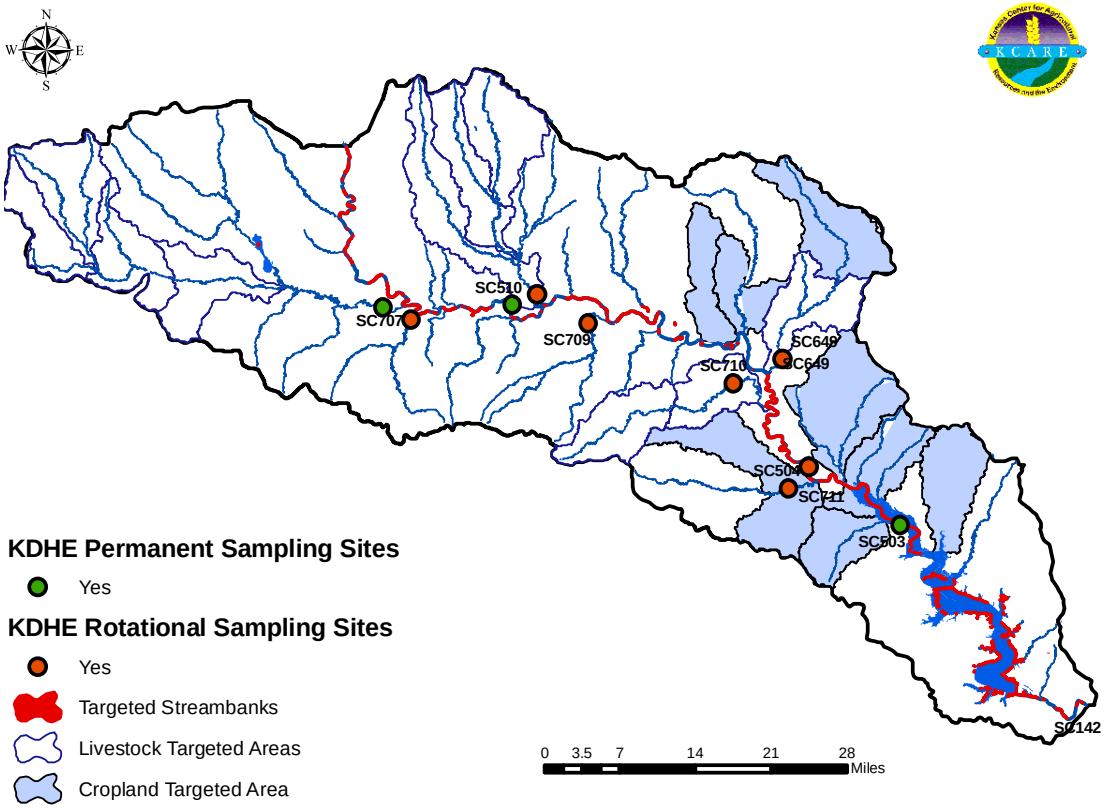

Figure 27 Current Monitoring Sites in the Watershed. [25]

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. For example, herbicide analysis would not be necessary in the winter months as there are no applications at that time.

The USACE has one sampling site on the Republican River near Clay Center, four sampling sites in Milford Reservoir and one site immediately below the dam. Samples are collected monthly from April to September. Samples taken are analyzed for

chlorophyll a, total nitrogen, total phosphorus, Secchi disk depth, atrazine, phytocyanins (blue green algae), iron, manganese, temperature, dissolved oxygen, alkalinity, pH, conductivity, ECB, and caffeine (human impacts resulting from failing septic systems, treatment plants or illicit dumping from boats). [26]

There are three USGS stream flow data stations in the watershed. The flow data derived from the gaging stations will assist the SLT in determining if streambank restoration sites can withstand pressure from high flow events.

Much of the evaluative information can be obtained through the existing networks and sampling plans of KDHE and the USACE, Kansas City District. Public engagement can be obtained through observations of lake clarity, ease of boating and the physical appearance of Milford Reservoir. Some communications with the Kansas Department of Wildlife, Parks and Tourism will supplement any information on the conditions in the Lower Republican Watershed drainage and on Milford Reservoir.

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.

Table 21. Monitoring Sites and Tests Needed to Direct SLT in Water Quality Evaluation. Proposed monitoring sites are indicated on the map below.

Cropland Targeted Area				
Agency	**Site Number or Name**	**Pollutant Target**	**River, Stream or Lake**	**Sampling Tests Needed**
KDHE	Proposed Site X2	Sediment, Nutrients	Parsons Creek	TSS, TP, DO, ECB
KDHE	711		Five Creek	TSS, TP, DO, ECB
KDHE	649		Peats Creek	TSS, TP, DO, ECB
KDHE	Proposed Site X3		Spring Creek	TSS, TP, DO, ECB
KDHE	Proposed Site X4		Finney Creek	TSS, TP, DO, ECB
KDHE	Proposed Site X5		Lincoln Creek	TSS, TP, DO, ECB
KDHE	Proposed Site X6		Otter Creek	TSS, TP, DO, ECB
KDHE	Proposed Site X7		Mall Creek	TSS, TP, DO, ECB
USACE	24		Republican River	TSS, TP, DO, ECB, Secchi Disk Depth
USACE	5		Milford Reservoir – upper Reservoir	TSS, TP, DO, ECB, Secchi Disk Depth
USACE	3		Milford Reservoir – mid-Reservoir	TSS, TP, DO, ECB, Secchi Disk Depth
USACE	1		Milford Reservoir – Dam Tower	TSS, TP, DO, ECB, Secchi Disk Depth

Monitoring Sites, Cont.				
Livestock Targeted Area				
Agency	**Site Number or Name**	**Pollutant Target**	**River, Stream or Lake**	**Sampling Tests Needed**
KDHE	Proposed Site X1	Nutrients	Buffalo Creek	TP, pH, DO, TN
KDHE	650		Salt Creek	TP, pH, DO, TN
KDHE	710		Mulberry Creek	TP, pH, DO, TN
KDHE	649		Peats Creek	TP, pH, DO, TN, TSS
Streambank Targeted Area				
Agency	**Site Number or Name**	**Pollutant Target**	**River, Stream or Lake**	**Sampling Tests Needed**
KDHE	503	Sediment	Republican River	TSS
KDHE	241		Republican River	TSS
KDHE	504		Republican River	TSS
KDHE	510		Republican River	TSS
KDHE	003		Republican River	TSS
USACE	24		Republican River	TSS, Secchi Disk Depth
USACE	5		Milford Reservoir – upper Reservoir	TSS, Secchi Disk Depth
USACE	3		Milford Reservoir – mid-Reservoir	TSS, Secchi Disk Depth
USACE	1		Milford Reservoir – Dam Tower	TSS, Secchi Disk Depth

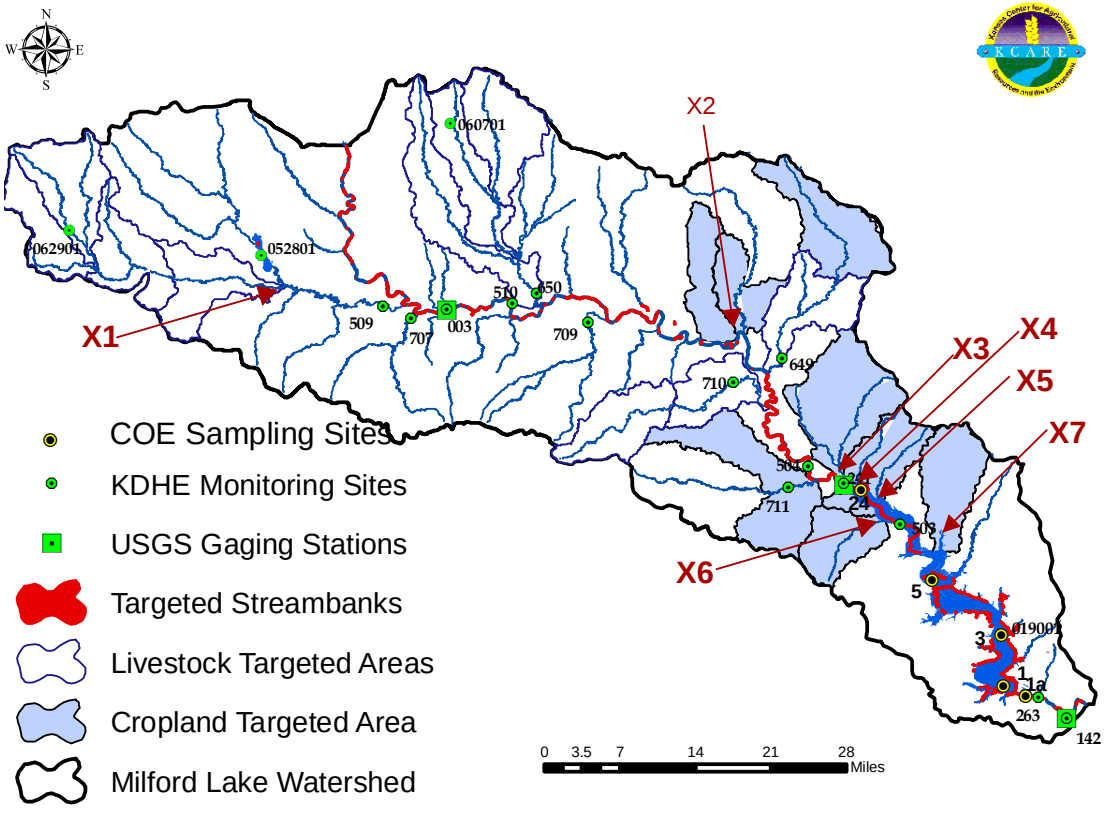

Figure 28 Proposed Monitoring Sites in the Watershed

Monitoring site data that is being generated at this time will be helpful to the SLT. Many of the existing monitoring sites will benefit multiple Targeted Areas. However, additional monitoring site placement to support BMP evaluation could be used in the targeted areas:

- The Cropland Targeted Area could benefit with additional monitoring sites on
  a) Parsons Creek (site X2 on Figure 36),
  b) Spring Creek (site X3 on Figure 36),
  c) Finney Creek (site X4 on Figure 36),
  d) Lincoln Creek (site X5 on Figure 36)
  e) Otter Creek (site X6 on Figure 36) and
  f) Mall Creek (site X7 on Figure 36).
- The Livestock Targeted Area could benefit from a monitoring site at
  a) Buffalo Creek (site X1 on Figure 36).
- The Streambank Targeted Area has monitoring sites along the Republican River and they should be sufficient at this time.

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, USACE and USGS 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 and USACE 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 Watershed plan will be discussed with KDHE immediately after each update of the 303d list and subsequent TMDL designation. The upcoming years for this in the Lower Republican Watershed 2020 and 2015. 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 2015

In the year 2015, the plan was reviewed and revised according to results acquired from monitoring data and to incorporate the TMDL for Milford Reservoir. The SLT reviewed the following criteria:

1. The SLT requested a report from KDHE on water quality conditions in the watershed in 2015.
2. The SLT requested a report from KDHE concerning the revisions of the TMDLs from 2015.
3. The SLT requested a report from USACE and Kansas Department of Wildlife, Parks and Tourism on trends in water quality in Milford Reservoir.
4. The SLT with assistance from KDHE reported on progress towards achieving the adoption rates listed in Section 10.1 of this report.
5. The SLT with assistance from KDHE reported on progress towards achieving the benchmarks listed in Section 10.2 of this report.
6. The SLT with assistance from KDHE reported on progress towards achieving the BMP implementations in Section 10.3 of this report.
7. The SLT discussed impairments on the 303d list and the possibility of addressing these impairments prior to them being listed as TMDLs.
8. The SLT discussed the effect of implementing BMPs aimed at specific TMDLs on the impairments listed on the 303d list.
9. The SLT discussed necessary adjustments and revisions needed in the targets listed in this plan.
10. The SLT discussed the possible need for additional assessment data.

In the year 2025 the SLT will request additional information from KDHE:

1. The SLT will ask KDHE for a report on the milestone achievements in **sediment** load reductions according to Section 9.0.
2. The SLT will request from KDHE a report on the milestone achievements in **phosphorus** load reductions according to Section 9.0.
3. The SLT will ask KDHE for a report on the milestone achievements in **nitrogen** load reductions according to Section 9.0.

13.0 Appendix

13.1 Service Providers

Table 22. Potential Service Provider Listing

Organization	Programs	Purpose	Technical or Financial Assistance	Website address
Environmental Protection Agency	Clean Water State Revolving Fund Program Watershed Protection	Provides low cost loans to communities for water pollution control activities. To conduct holistic strategies for restoring and protecting aquatic resources based on hydrology rather than political boundaries.	Financial	www.epa.gov
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	www.kaws.org
Kansas Dept. of Agriculture	Watershed structures permitting.	Available for watershed districts and multipurpose small lakes development.	Technical and Financial	www.ksda.gov

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

Kansas Department of Wildlife, Parks and Tourism	**Land and Water Conservation Funds** Conservation Easements for Riparian and Wetland Areas Wildlife Habitat Improvement Program North American Waterfowl Conservation Act MARSH program in coordination with Ducks Unlimited Chickadee Checkoff Walk In Hunting Program F.I.S.H. Program	Provides funds to preserve develop and assure access to outdoor recreation. To provide easements to secure and enhance quality areas in the state. To provide limited assistance for development of wildlife habitat. To provide up to 50 percent cost share for the purchase and/or development of wetlands and wildlife habitat. May provide up to 100 percent of funding for small wetland projects. 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. Landowners receive a payment incentive to allow public hunting on their property. Landowners receive a payment incentive to allow public fishing access to their ponds and streams.	Technical and Financial	www.kdwp.state.ks.us/

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Website address
Kansas Forest Service	Conservation Tree Planting Program Riparian and Wetland Protection Program Regional Conservation Partnership Program	Provides low cost trees and shrubs for conservation plantings. Work closely with other agencies to promote and assist with establishment of riparian forestland and manage existing stands.	Technical	www.kansasforests.org
Kansas Rural Center	The Heartland Network Sustainable Food Systems Project Cost share programs	The Center is committed to economically viable, environmentally sound and socially sustainable rural culture.	Technical and Financial	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	http://www.krwa.net

Kansas State Research and Extension	Kansas Center for Agricultural Resources and Environment (KCARE) Watershed Specialists Kansas Environmental Leadership Program (KELP) Kansas Local Government Water Quality Planning and Management Rangeland and Natural Area Services (RNAS) WaterLINK Kansas Pride: Healthy Ecosystems/Healthy Communities Citizen Science EARTH (Earth Awareness Researchers for Tomorrow's Habitat) Watershed Specialists	*Provide programs, expertise and educational materials that relate to minimizing the impact of rural and urban activities on water quality. *Educational program to develop leadership for improved water quality. *Provide guidance to local governments on water protection programs. *Reduce non-point source pollution emanating from Kansas grasslands. *Service-learning projects available to college and university faculty and community watersheds in Kansas. *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. *Education combined with volunteer soil and water testing for enhanced natural resource stewardship. Environmental education program designed for Kansas middle schools Provide assistance with WRAPS projects and assistance to farmers and ranchers with implementing BMPs	Technical	www.ksre.ksu.edu

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Website address
Kansas Water Office	Public Information and Education	Provide information and education to the public on Kansas Water Resources	Technical and Financial	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	www.notill.org

Organization	Programs and Technical Assistance	Purpose	Technical or Financial Assistance	Website address
Division of Conservation and Conservation Districts	Water Resources Cost Share	Provide cost share assistance to landowners for establishment of water conservation practices.	Technical and Financial	www.accesskansas.org/kscc http://www.kacdnet.org/
	Nonpoint Source Pollution Control Fund	Provides financial assistance for nonpoint pollution control projects which help restore water quality.		
	Riparian and Wetland Protection Program	Funds to assist with wetland and riparian development and enhancement.		
	Stream Rehabilitation Program	Assist with streams that have been adversely altered by channel modifications.		
	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**	**Website address**
US Army Corps of Engineers	Planning Assistance to States Environmental Restoration	Assistance in development of plans for development, utilization and conservation of water and related land resources of drainage Funding assistance for aquatic ecosystem restoration.	Technical	www.usace.army.mil
US Geological Survey	National Streamflow Information Program Water Cooperative Program	Provide streamflow data Provide cooperative studies and water-quality information	Technical	http://water.usgs.gov/
US Fish and Wildlife Service	Fish and Wildlife Enhancement Program Private Lands Program	Supports field operations which include technical assistance on wetland design. Contracts to restore, enhance, or create wetlands.	Technical	www.fws.gov

Organization	**Programs and Technical Assistance**	**Purpose**	Technical or Financial Assistance	**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	www.ks.nrcs.usda.gov
	Conservation Operations	To provide technical assistance on private land for development and application of Resource Management Plans.		
	Watershed Planning and Operations	Primarily focused on high priority areas where agricultural improvements will meet water quality objectives.		
	Wetland Reserve Program	Cost share and easements to restore wetlands.		
	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

Cover Crop

A **cover crop** is a **crop** planted primarily to manage soil erosion, soil fertility, soil quality, water, weeds, pests, diseases, biodiversity and wildlife in an agroecosystem (Lu et al. 2000), an ecological system managed and largely shaped by humans across a range of intensities to produce food, feed, or fiber. To be eligible for cost share:

- it must be the first time for cover crops to be planted on this field by this operator, or must be planted for demonstration purposes.
- A plan that includes species mix, seeding rates and dates and a Milford WRAPS grazing management plan (if applicable) must be followed.
- Grazing is allowed as prescribed by the Milford WRAPS grazing management plan. No-Till is required.

Vegetative Buffer

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

Grassed Waterway

- Grassed strip used as an outlet to prevent silt and gully formation.
- Can also be used as outlets for water from terraces.
- On average for Kansas fields, 1 acre waterway will treat 10 acres of cropland.
- 40% erosion reduction efficiency, 40% phosphorous reduction efficiency.
- $800 an acre, 50% cost-share available from NRCS.
- $5,000 project limit, not to exceed 70% of total cost

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% erosion reduction efficiency, 40% phosphorous reduction efficiency.
- WRAPS groups and KSU Ag Economists have decided $10 an acre for 10 years is an adequate payment to entice producers to convert, 50% cost-share available from NRCS. Conversion for 10 yrs required

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% Erosion Reduction Efficiency, 25% 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% Erosion Reduction Efficiency, 30% phosphorous reduction efficiency
- $1.00 per linear foot, 50% cost-share available from NRCS

Nutrient Management Plan

- Managing the amount, source, placement, form and timing of the application of nutrients and soil amendments.
- Intensive soil testing
- 25% erosion and 25% P reduction efficiency.
- WRAPS groups and KSU Ag Economists have decided $7.30 an acre for 10 years 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% soil and 50% 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% 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%.
- $1,000/acre, $5,000 project limit

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 $$8,000 per unit.
- Average P reduction: 30-80%

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% of the time.
- 10-25 year lifespan, average P reduction: 30-98% with greater efficiencies for limited stream access.
- $3,795 installed for solar system, including present value of maintenance costs.

Pond

- Water impoundment made by constructing an earthen dam.
- Traps sediment and nutrients from leaving edge of pasture.
- Provides source of water.
- 50% 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% P Reduction.
- Approximately $7,000 with complex systems significantly more expensive.

Stream Fencing

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

3.3 Appendix Tables – Load Reductions for Sediment, Phosphorus and Nitrogen by Cropland Targeted Sub Watershed

3.3.1 Jamestown

Sub-Watershed 104 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	78	498	584	311	187	311	0	373	0	2,342
2	156	996	1,167	622	373	622	0	747	0	4,684
3	233	1,494	1,751	934	560	934	0	1,120	0	7,026
4	311	1,992	2,334	1,245	747	1,245	0	1,494	0	9,368
5	389	2,490	2,918	1,556	934	1,556	0	1,867	0	11,710
6	467	2,988	3,501	1,867	1,120	1,867	0	2,241	0	14,052
7	545	3,486	4,085	2,179	1,307	2,179	0	2,614	0	16,394
8	622	3,984	4,668	2,490	1,494	2,490	0	2,988	0	18,736
9	700	4,482	5,252	2,801	1,681	2,801	0	3,361	0	21,078
10	778	4,980	5,835	3,112	1,867	3,112	0	3,735	0	23,420
11	856	5,478	6,419	3,423	2,054	3,423	0	4,108	0	25,762
12	934	5,976	7,003	3,735	2,241	3,735	0	4,482	0	28,104
13	1,011	6,473	7,586	4,046	2,428	4,046	0	4,855	0	30,446
14	1,089	6,971	8,170	4,357	2,614	4,357	0	5,229	0	32,788
15	1,167	7,469	8,753	4,668	2,801	4,668	0	5,602	0	35,129
16	1,245	7,967	9,337	4,980	2,988	4,980	0	5,976	0	37,471
17	1,323	8,465	9,920	5,291	3,174	5,291	0	6,349	0	39,813
18	1,401	8,963	10,504	5,602	3,361	5,602	0	6,722	0	42,155
19	1,478	9,461	11,087	5,913	3,548	5,913	0	7,096	0	44,497
20	1,556	9,959	11,671	6,224	3,735	6,224	0	7,469	0	46,839

Sub-Watershed 105 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	65	415	487	260	156	260	0	311	0	1,953
2	130	830	973	519	311	519	0	623	0	3,906
3	195	1,246	1,460	779	467	779	0	934	0	5,859

4	260	1,661	1,946	1,038	623	1,038	0	1,246	0	7,811
5	324	2,076	2,433	1,298	779	1,298	0	1,557	0	9,764
6	389	2,491	2,920	1,557	934	1,557	0	1,869	0	11,717
7	454	2,907	3,406	1,817	1,090	1,817	0	2,180	0	13,670
8	519	3,322	3,893	2,076	1,246	2,076	0	2,491	0	15,623
9	584	3,737	4,379	2,336	1,401	2,336	0	2,803	0	17,576
10	649	4,152	4,866	2,595	1,557	2,595	0	3,114	0	19,528
11	714	4,567	5,352	2,855	1,713	2,855	0	3,426	0	21,481
12	779	4,983	5,839	3,114	1,869	3,114	0	3,737	0	23,434
13	843	5,398	6,326	3,374	2,024	3,374	0	4,048	0	25,387
14	908	5,813	6,812	3,633	2,180	3,633	0	4,360	0	27,340
15	973	6,228	7,299	3,893	2,336	3,893	0	4,671	0	29,293
16	1,038	6,644	7,785	4,152	2,491	4,152	0	4,983	0	31,246
17	1,103	7,059	8,272	4,412	2,647	4,412	0	5,294	0	33,198
18	1,168	7,474	8,759	4,671	2,803	4,671	0	5,606	0	35,151
19	1,233	7,889	9,245	4,931	2,958	4,931	0	5,917	0	37,104
20	1,298	8,304	9,732	5,190	3,114	5,190	0	6,228	0	39,057

Sub-Watershed 106 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	39	248	290	155	93	155	0	186	0	1,165
2	77	495	580	310	186	310	0	372	0	2,330
3	116	743	871	464	279	464	0	557	0	3,494
4	155	991	1,161	619	372	619	0	743	0	4,659
5	193	1,238	1,451	774	464	774	0	929	0	5,824
6	232	1,486	1,741	929	557	929	0	1,115	0	6,989
7	271	1,734	2,032	1,084	650	1,084	0	1,300	0	8,154
8	310	1,981	2,322	1,238	743	1,238	0	1,486	0	9,318
9	348	2,229	2,612	1,393	836	1,393	0	1,672	0	10,483
10	387	2,477	2,902	1,548	929	1,548	0	1,858	0	11,648
11	426	2,724	3,193	1,703	1,022	1,703	0	2,043	0	12,813
12	464	2,972	3,483	1,858	1,115	1,858	0	2,229	0	13,978
13	503	3,220	3,773	2,012	1,207	2,012	0	2,415	0	15,143
14	542	3,467	4,063	2,167	1,300	2,167	0	2,601	0	16,307
15	580	3,715	4,354	2,322	1,393	2,322	0	2,786	0	17,472
16	619	3,963	4,644	2,477	1,486	2,477	0	2,972	0	18,637
17	658	4,210	4,934	2,631	1,579	2,631	0	3,158	0	19,802

18	697	4,458	5,224	2,786	1,672	2,786	0	3,344	0	20,967
19	735	4,706	5,514	2,941	1,765	2,941	0	3,529	0	22,131
20	774	4,953	5,805	3,096	1,858	3,096	0	3,715	0	23,296

Sub-Watershed 104 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	50	319	200	200	120	200	200	300	250	1,837
2	100	639	399	399	240	399	399	599	499	3,674
3	150	958	599	599	359	599	599	899	749	5,511
4	200	1,278	799	799	479	799	799	1,198	998	7,348
5	250	1,597	998	998	599	998	998	1,498	1,248	9,185
6	300	1,917	1,198	1,198	719	1,198	1,198	1,797	1,498	11,022
7	349	2,236	1,398	1,398	839	1,398	1,398	2,097	1,747	12,859
8	399	2,556	1,597	1,597	958	1,597	1,597	2,396	1,997	14,696
9	449	2,875	1,797	1,797	1,078	1,797	1,797	2,696	2,246	16,533
10	499	3,195	1,997	1,997	1,198	1,997	1,997	2,995	2,496	18,370
11	549	3,514	2,196	2,196	1,318	2,196	2,196	3,295	2,746	20,207
12	599	3,834	2,396	2,396	1,438	2,396	2,396	3,594	2,995	22,044
13	649	4,153	2,596	2,596	1,557	2,596	2,596	3,894	3,245	23,881
14	699	4,473	2,795	2,795	1,677	2,795	2,795	4,193	3,494	25,718
15	749	4,792	2,995	2,995	1,797	2,995	2,995	4,493	3,744	27,555
16	799	5,112	3,195	3,195	1,917	3,195	3,195	4,792	3,993	29,392
17	849	5,431	3,394	3,394	2,037	3,394	3,394	5,092	4,243	31,229
18	899	5,751	3,594	3,594	2,156	3,594	3,594	5,391	4,493	33,066
19	948	6,070	3,794	3,794	2,276	3,794	3,794	5,691	4,742	34,903
20	998	6,390	3,993	3,993	2,396	3,993	3,993	5,990	4,992	36,740

Sub-Watershed 105 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	53	336	210	210	126	210	210	315	263	1,935
2	105	673	421	421	252	421	421	631	526	3,869
3	158	1,009	631	631	379	631	631	946	789	5,804

4	210	1,346	841	841	505	841	841	1,262	1,051	7,738
5	263	1,682	1,051	1,051	631	1,051	1,051	1,577	1,314	9,673
6	315	2,019	1,262	1,262	757	1,262	1,262	1,893	1,577	11,607
7	368	2,355	1,472	1,472	883	1,472	1,472	2,208	1,840	13,542
8	421	2,692	1,682	1,682	1,009	1,682	1,682	2,523	2,103	15,477
9	473	3,028	1,893	1,893	1,136	1,893	1,893	2,839	2,366	17,411
10	526	3,364	2,103	2,103	1,262	2,103	2,103	3,154	2,628	19,346
11	578	3,701	2,313	2,313	1,388	2,313	2,313	3,470	2,891	21,280
12	631	4,037	2,523	2,523	1,514	2,523	2,523	3,785	3,154	23,215
13	683	4,374	2,734	2,734	1,640	2,734	2,734	4,100	3,417	25,149
14	736	4,710	2,944	2,944	1,766	2,944	2,944	4,416	3,680	27,084
15	789	5,047	3,154	3,154	1,893	3,154	3,154	4,731	3,943	29,018
16	841	5,383	3,364	3,364	2,019	3,364	3,364	5,047	4,206	30,953
17	894	5,720	3,575	3,575	2,145	3,575	3,575	5,362	4,468	32,888
18	946	6,056	3,785	3,785	2,271	3,785	3,785	5,678	4,731	34,822
19	999	6,392	3,995	3,995	2,397	3,995	3,995	5,993	4,994	36,757
20	1,051	6,729	4,206	4,206	2,523	4,206	4,206	6,308	5,257	38,691

Sub-Watershed 106 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	38	244	152	152	91	152	152	229	191	1,403
2	76	488	305	305	183	305	305	457	381	2,805
3	114	732	457	457	274	457	457	686	572	4,208
4	152	976	610	610	366	610	610	915	762	5,610
5	191	1,220	762	762	457	762	762	1,143	953	7,013
6	229	1,464	915	915	549	915	915	1,372	1,143	8,416
7	267	1,708	1,067	1,067	640	1,067	1,067	1,601	1,334	9,818
8	305	1,951	1,220	1,220	732	1,220	1,220	1,830	1,525	11,221
9	343	2,195	1,372	1,372	823	1,372	1,372	2,058	1,715	12,624
10	381	2,439	1,525	1,525	915	1,525	1,525	2,287	1,906	14,026
11	419	2,683	1,677	1,677	1,006	1,677	1,677	2,516	2,096	15,429
12	457	2,927	1,830	1,830	1,098	1,830	1,830	2,744	2,287	16,831
13	495	3,171	1,982	1,982	1,189	1,982	1,982	2,973	2,477	18,234
14	534	3,415	2,134	2,134	1,281	2,134	2,134	3,202	2,668	19,637
15	572	3,659	2,287	2,287	1,372	2,287	2,287	3,430	2,859	21,039
16	610	3,903	2,439	2,439	1,464	2,439	2,439	3,659	3,049	22,442
17	648	4,147	2,592	2,592	1,555	2,592	2,592	3,888	3,240	23,845

18	686	4,391	2,744	2,744	1,647	2,744	2,744	4,116	3,430	25,247
19	724	4,635	2,897	2,897	1,738	2,897	2,897	4,345	3,621	26,650
20	762	4,879	3,049	3,049	1,830	3,049	3,049	4,574	3,811	28,052

Sub-Watershed 104 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	309	1,979	773	619	742	1,237	1,732	928	1,546	9,866
2	619	3,959	1,546	1,237	1,485	2,474	3,464	1,856	3,093	19,732
3	928	5,938	2,320	1,856	2,227	3,711	5,196	2,783	4,639	29,597
4	1,237	7,917	3,093	2,474	2,969	4,948	6,928	3,711	6,185	39,463
5	1,546	9,897	3,866	3,093	3,711	6,185	8,660	4,639	7,732	49,329
6	1,856	11,876	4,639	3,711	4,454	7,423	10,392	5,567	9,278	59,195
7	2,165	13,855	5,412	4,330	5,196	8,660	12,123	6,495	10,825	69,061
8	2,474	15,835	6,185	4,948	5,938	9,897	13,855	7,423	12,371	78,926
9	2,783	17,814	6,959	5,567	6,680	11,134	15,587	8,350	13,917	88,792
10	3,093	19,793	7,732	6,185	7,423	12,371	17,319	9,278	15,464	98,658
11	3,402	21,773	8,505	6,804	8,165	13,608	19,051	10,206	17,010	108,524
12	3,711	23,752	9,278	7,423	8,907	14,845	20,783	11,134	18,556	118,389
13	4,021	25,731	10,051	8,041	9,649	16,082	22,515	12,062	20,103	128,255
14	4,330	27,711	10,825	8,660	10,392	17,319	24,247	12,989	21,649	138,121
15	4,639	29,690	11,598	9,278	11,134	18,556	25,979	13,917	23,195	147,987
16	4,948	31,669	12,371	9,897	11,876	19,793	27,711	14,845	24,742	157,853
17	5,258	33,649	13,144	10,515	12,618	21,031	29,443	15,773	26,288	167,718
18	5,567	35,628	13,917	11,134	13,361	22,268	31,175	16,701	27,835	177,584
19	5,876	37,608	14,690	11,752	14,103	23,505	32,907	17,629	29,381	187,450
20	6,185	39,587	15,464	12,371	14,845	24,742	34,639	18,556	30,927	197,316

Sub-Watershed 105 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	337	2,160	844	675	810	1,350	1,890	1,012	1,687	10,765
2	675	4,320	1,687	1,350	1,620	2,700	3,780	2,025	3,375	21,531
3	1,012	6,479	2,531	2,025	2,430	4,050	5,670	3,037	5,062	32,296

4	1,350	8,639	3,375	2,700	3,240	5,400	7,559	4,050	6,749	43,061
5	1,687	10,799	4,218	3,375	4,050	6,749	9,449	5,062	8,437	53,827
6	2,025	12,959	5,062	4,050	4,860	8,099	11,339	6,074	10,124	64,592
7	2,362	15,119	5,906	4,725	5,670	9,449	13,229	7,087	11,812	75,357
8	2,700	17,279	6,749	5,400	6,479	10,799	15,119	8,099	13,499	86,123
9	3,037	19,438	7,593	6,074	7,289	12,149	17,009	9,112	15,186	96,888
10	3,375	21,598	8,437	6,749	8,099	13,499	18,898	10,124	16,874	107,653
11	3,712	23,758	9,280	7,424	8,909	14,849	20,788	11,137	18,561	118,419
12	4,050	25,918	10,124	8,099	9,719	16,199	22,678	12,149	20,248	129,184
13	4,387	28,078	10,968	8,774	10,529	17,549	24,568	13,161	21,936	139,950
14	4,725	30,237	11,812	9,449	11,339	18,898	26,458	14,174	23,623	150,715
15	5,062	32,397	12,655	10,124	12,149	20,248	28,348	15,186	25,310	161,480
16	5,400	34,557	13,499	10,799	12,959	21,598	30,237	16,199	26,998	172,246
17	5,737	36,717	14,343	11,474	13,769	22,948	32,127	17,211	28,685	183,011
18	6,074	38,877	15,186	12,149	14,579	24,298	34,017	18,223	30,372	193,776
19	6,412	41,037	16,030	12,824	15,389	25,648	35,907	19,236	32,060	204,542
20	6,749	43,196	16,874	13,499	16,199	26,998	37,797	20,248	33,747	215,307

Sub-Watershed 106 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	232	1,486	580	464	557	929	1,300	697	1,161	7,407
2	464	2,972	1,161	929	1,115	1,858	2,601	1,393	2,322	14,814
3	697	4,458	1,741	1,393	1,672	2,786	3,901	2,090	3,483	22,220
4	929	5,944	2,322	1,858	2,229	3,715	5,201	2,786	4,644	29,627
5	1,161	7,430	2,902	2,322	2,786	4,644	6,501	3,483	5,805	37,034
6	1,393	8,916	3,483	2,786	3,344	5,573	7,802	4,179	6,966	44,441
7	1,625	10,402	4,063	3,251	3,901	6,501	9,102	4,876	8,127	51,848
8	1,858	11,888	4,644	3,715	4,458	7,430	10,402	5,573	9,288	59,254
9	2,090	13,374	5,224	4,179	5,015	8,359	11,702	6,269	10,448	66,661
10	2,322	14,860	5,805	4,644	5,573	9,288	13,003	6,966	11,609	74,068
11	2,554	16,346	6,385	5,108	6,130	10,216	14,303	7,662	12,770	81,475
12	2,786	17,832	6,966	5,573	6,687	11,145	15,603	8,359	13,931	88,882
13	3,018	19,318	7,546	6,037	7,244	12,074	16,903	9,055	15,092	96,288
14	3,251	20,804	8,127	6,501	7,802	13,003	18,204	9,752	16,253	103,695
15	3,483	22,290	8,707	6,966	8,359	13,931	19,504	10,448	17,414	111,102
16	3,715	23,776	9,288	7,430	8,916	14,860	20,804	11,145	18,575	118,509
17	3,947	25,262	9,868	7,894	9,473	15,789	22,104	11,842	19,736	125,916

18	4,179	26,748	10,448	8,359	10,031	16,718	23,405	12,538	20,897	133,322
19	4,412	28,234	11,029	8,823	10,588	17,646	24,705	13,235	22,058	140,729
20	4,644	29,720	11,609	9,288	11,145	18,575	26,005	13,931	23,219	148,136

3.3.2 Peat's Creek

Sub-Watershed 406 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	50	317	372	198	119	198	0	238	0	1,493
2	99	635	744	397	238	397	0	476	0	2,986
3	149	952	1,116	595	357	595	0	714	0	4,480
4	198	1,270	1,488	794	476	794	0	952	0	5,973
5	248	1,587	1,860	992	595	992	0	1,191	0	7,466
6	298	1,905	2,232	1,191	714	1,191	0	1,429	0	8,959
7	347	2,222	2,604	1,389	833	1,389	0	1,667	0	10,453
8	397	2,540	2,977	1,587	952	1,587	0	1,905	0	11,946
9	446	2,857	3,349	1,786	1,072	1,786	0	2,143	0	13,439
10	496	3,175	3,721	1,984	1,191	1,984	0	2,381	0	14,932
11	546	3,492	4,093	2,183	1,310	2,183	0	2,619	0	16,425
12	595	3,810	4,465	2,381	1,429	2,381	0	2,857	0	17,919
13	645	4,127	4,837	2,580	1,548	2,580	0	3,096	0	19,412
14	695	4,445	5,209	2,778	1,667	2,778	0	3,334	0	20,905
15	744	4,762	5,581	2,977	1,786	2,977	0	3,572	0	22,398
16	794	5,080	5,953	3,175	1,905	3,175	0	3,810	0	23,891
17	843	5,397	6,325	3,373	2,024	3,373	0	4,048	0	25,385
18	893	5,715	6,697	3,572	2,143	3,572	0	4,286	0	26,878
19	943	6,032	7,069	3,770	2,262	3,770	0	4,524	0	28,371
20	992	6,350	7,441	3,969	2,381	3,969	0	4,762	0	29,864

Sub-Watershed 408 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	54	347	407	217	130	217	0	261	0	1,634
2	109	695	814	434	261	434	0	521	0	3,269

3	163	1,042	1,222	652	391	652	0	782	0	4,903
4	217	1,390	1,629	869	521	869	0	1,042	0	6,537
5	271	1,737	2,036	1,086	652	1,086	0	1,303	0	8,171
6	326	2,085	2,443	1,303	782	1,303	0	1,564	0	9,806
7	380	2,432	2,850	1,520	912	1,520	0	1,824	0	11,440
8	434	2,780	3,258	1,737	1,042	1,737	0	2,085	0	13,074
9	489	3,127	3,665	1,955	1,173	1,955	0	2,346	0	14,708
10	543	3,475	4,072	2,172	1,303	2,172	0	2,606	0	16,343
11	597	3,822	4,479	2,389	1,433	2,389	0	2,867	0	17,977
12	652	4,170	4,886	2,606	1,564	2,606	0	3,127	0	19,611
13	706	4,517	5,294	2,823	1,694	2,823	0	3,388	0	21,245
14	760	4,865	5,701	3,040	1,824	3,040	0	3,649	0	22,880
15	814	5,212	6,108	3,258	1,955	3,258	0	3,909	0	24,514
16	869	5,560	6,515	3,475	2,085	3,475	0	4,170	0	26,148
17	923	5,907	6,923	3,692	2,215	3,692	0	4,430	0	27,782
18	977	6,255	7,330	3,909	2,346	3,909	0	4,691	0	29,417
19	1,032	6,602	7,737	4,126	2,476	4,126	0	4,952	0	31,051
20	1,086	6,950	8,144	4,344	2,606	4,344	0	5,212	0	32,685

Sub-Watershed 409 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	71	457	536	286	171	286	0	343	0	2,149
2	143	914	1,071	571	343	571	0	686	0	4,299
3	214	1,371	1,607	857	514	857	0	1,028	0	6,448
4	286	1,828	2,142	1,143	686	1,143	0	1,371	0	8,598
5	357	2,285	2,678	1,428	857	1,428	0	1,714	0	10,747
6	428	2,742	3,214	1,714	1,028	1,714	0	2,057	0	12,897
7	500	3,199	3,749	2,000	1,200	2,000	0	2,399	0	15,046
8	571	3,656	4,285	2,285	1,371	2,285	0	2,742	0	17,196
9	643	4,113	4,820	2,571	1,542	2,571	0	3,085	0	19,345
10	714	4,570	5,356	2,856	1,714	2,856	0	3,428	0	21,495
11	786	5,027	5,891	3,142	1,885	3,142	0	3,771	0	23,644
12	857	5,484	6,427	3,428	2,057	3,428	0	4,113	0	25,794
13	928	5,941	6,963	3,713	2,228	3,713	0	4,456	0	27,943
14	1,000	6,398	7,498	3,999	2,399	3,999	0	4,799	0	30,093
15	1,071	6,855	8,034	4,285	2,571	4,285	0	5,142	0	32,242
16	1,143	7,313	8,569	4,570	2,742	4,570	0	5,484	0	34,392

17	1,214	7,770	9,105	4,856	2,914	4,856	0	5,827	0	36,541
18	1,285	8,227	9,641	5,142	3,085	5,142	0	6,170	0	38,691
19	1,357	8,684	10,176	5,427	3,256	5,427	0	6,513	0	40,840
20	1,428	9,141	10,712	5,713	3,428	5,713	0	6,855	0	42,990

Sub-Watershed 501 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	111	708	829	442	265	442	0	531	0	3,329
2	221	1,416	1,659	885	531	885	0	1,062	0	6,657
3	332	2,123	2,488	1,327	796	1,327	0	1,592	0	9,986
4	442	2,831	3,318	1,769	1,062	1,769	0	2,123	0	13,315
5	553	3,539	4,147	2,212	1,327	2,212	0	2,654	0	16,644
6	664	4,247	4,977	2,654	1,592	2,654	0	3,185	0	19,972
7	774	4,954	5,806	3,096	1,858	3,096	0	3,716	0	23,301
8	885	5,662	6,635	3,539	2,123	3,539	0	4,247	0	26,630
9	995	6,370	7,465	3,981	2,389	3,981	0	4,777	0	29,959
10	1,106	7,078	8,294	4,424	2,654	4,424	0	5,308	0	33,287
11	1,216	7,785	9,124	4,866	2,920	4,866	0	5,839	0	36,616
12	1,327	8,493	9,953	5,308	3,185	5,308	0	6,370	0	39,945
13	1,438	9,201	10,782	5,751	3,450	5,751	0	6,901	0	43,274
14	1,548	9,909	11,612	6,193	3,716	6,193	0	7,432	0	46,602
15	1,659	10,617	12,441	6,635	3,981	6,635	0	7,962	0	49,931
16	1,769	11,324	13,271	7,078	4,247	7,078	0	8,493	0	53,260
17	1,880	12,032	14,100	7,520	4,512	7,520	0	9,024	0	56,588
18	1,991	12,740	14,930	7,962	4,777	7,962	0	9,555	0	59,917
19	2,101	13,448	15,759	8,405	5,043	8,405	0	10,086	0	63,246
20	2,212	14,155	16,588	8,847	5,308	8,847	0	10,617	0	66,575

Sub-Watershed 502 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	57	366	429	229	137	229	0	275	0	1,722
2	114	732	858	458	275	458	0	549	0	3,444
3	172	1,098	1,287	687	412	687	0	824	0	5,166

4	229	1,465	1,716	915	549	915	0	1,098	0	6,888
5	286	1,831	2,145	1,144	687	1,144	0	1,373	0	8,610
6	343	2,197	2,574	1,373	824	1,373	0	1,648	0	10,332
7	400	2,563	3,004	1,602	961	1,602	0	1,922	0	12,054
8	458	2,929	3,433	1,831	1,098	1,831	0	2,197	0	13,776
9	515	3,295	3,862	2,060	1,236	2,060	0	2,471	0	15,498
10	572	3,661	4,291	2,288	1,373	2,288	0	2,746	0	17,220
11	629	4,028	4,720	2,517	1,510	2,517	0	3,021	0	18,942
12	687	4,394	5,149	2,746	1,648	2,746	0	3,295	0	20,664
13	744	4,760	5,578	2,975	1,785	2,975	0	3,570	0	22,386
14	801	5,126	6,007	3,204	1,922	3,204	0	3,845	0	24,109
15	858	5,492	6,436	3,433	2,060	3,433	0	4,119	0	25,831
16	915	5,858	6,865	3,661	2,197	3,661	0	4,394	0	27,553
17	973	6,225	7,294	3,890	2,334	3,890	0	4,668	0	29,275
18	1,030	6,591	7,723	4,119	2,471	4,119	0	4,943	0	30,997
19	1,087	6,957	8,152	4,348	2,609	4,348	0	5,218	0	32,719
20	1,144	7,323	8,582	4,577	2,746	4,577	0	5,492	0	34,441

Sub-Watershed 406 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	46	296	185	185	111	185	185	277	231	1,701
2	92	592	370	370	222	370	370	555	462	3,402
3	139	887	555	555	333	555	555	832	693	5,103
4	185	1,183	740	740	444	740	740	1,109	924	6,804
5	231	1,479	924	924	555	924	924	1,387	1,156	8,505
6	277	1,775	1,109	1,109	666	1,109	1,109	1,664	1,387	10,206
7	324	2,071	1,294	1,294	777	1,294	1,294	1,941	1,618	11,907
8	370	2,367	1,479	1,479	887	1,479	1,479	2,219	1,849	13,608
9	416	2,662	1,664	1,664	998	1,664	1,664	2,496	2,080	15,309
10	462	2,958	1,849	1,849	1,109	1,849	1,849	2,773	2,311	17,010
11	508	3,254	2,034	2,034	1,220	2,034	2,034	3,051	2,542	18,711
12	555	3,550	2,219	2,219	1,331	2,219	2,219	3,328	2,773	20,412
13	601	3,846	2,404	2,404	1,442	2,404	2,404	3,605	3,004	22,113
14	647	4,142	2,588	2,588	1,553	2,588	2,588	3,883	3,236	23,814
15	693	4,437	2,773	2,773	1,664	2,773	2,773	4,160	3,467	25,515
16	740	4,733	2,958	2,958	1,775	2,958	2,958	4,437	3,698	27,216
17	786	5,029	3,143	3,143	1,886	3,143	3,143	4,715	3,929	28,917
18	832	5,325	3,328	3,328	1,997	3,328	3,328	4,992	4,160	30,618
19	878	5,621	3,513	3,513	2,108	3,513	3,513	5,269	4,391	32,319

20	924	5,916	3,698	3,698	2,219	3,698	3,698	5,547	4,622	34,020
Sub-Watershed 408 Annual Phosphorous Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	46	297	186	186	111	186	186	279	232	1,709
2	93	594	371	371	223	371	371	557	464	3,417
3	139	891	557	557	334	557	557	836	696	5,126
4	186	1,189	743	743	446	743	743	1,114	929	6,834
5	232	1,486	929	929	557	929	929	1,393	1,161	8,543
6	279	1,783	1,114	1,114	669	1,114	1,114	1,671	1,393	10,252
7	325	2,080	1,300	1,300	780	1,300	1,300	1,950	1,625	11,960
8	371	2,377	1,486	1,486	891	1,486	1,486	2,229	1,857	13,669
9	418	2,674	1,671	1,671	1,003	1,671	1,671	2,507	2,089	15,378
10	464	2,972	1,857	1,857	1,114	1,857	1,857	2,786	2,321	17,086
11	511	3,269	2,043	2,043	1,226	2,043	2,043	3,064	2,554	18,795
12	557	3,566	2,229	2,229	1,337	2,229	2,229	3,343	2,786	20,503
13	604	3,863	2,414	2,414	1,449	2,414	2,414	3,622	3,018	22,212
14	650	4,160	2,600	2,600	1,560	2,600	2,600	3,900	3,250	23,921
15	696	4,457	2,786	2,786	1,671	2,786	2,786	4,179	3,482	25,629
16	743	4,754	2,972	2,972	1,783	2,972	2,972	4,457	3,714	27,338
17	789	5,052	3,157	3,157	1,894	3,157	3,157	4,736	3,947	29,047
18	836	5,349	3,343	3,343	2,006	3,343	3,343	5,014	4,179	30,755
19	882	5,646	3,529	3,529	2,117	3,529	3,529	5,293	4,411	32,464
20	929	5,943	3,714	3,714	2,229	3,714	3,714	5,572	4,643	34,172
Sub-Watershed 409 Annual Phosphorous Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	67	429	268	268	161	268	268	403	336	2,469
2	134	859	537	537	322	537	537	805	671	4,939
3	201	1,288	805	805	483	805	805	1,208	1,007	7,408
4	268	1,718	1,074	1,074	644	1,074	1,074	1,611	1,342	9,878
5	336	2,147	1,342	1,342	805	1,342	1,342	2,013	1,678	12,347

6	403	2,577	1,611	1,611	966	1,611	1,611	2,416	2,013	14,817
7	470	3,006	1,879	1,879	1,127	1,879	1,879	2,818	2,349	17,286
8	537	3,436	2,147	2,147	1,288	2,147	2,147	3,221	2,684	19,756
9	604	3,865	2,416	2,416	1,449	2,416	2,416	3,624	3,020	22,225
10	671	4,295	2,684	2,684	1,611	2,684	2,684	4,026	3,355	24,695
11	738	4,724	2,953	2,953	1,772	2,953	2,953	4,429	3,691	27,164
12	805	5,154	3,221	3,221	1,933	3,221	3,221	4,832	4,026	29,634
13	872	5,583	3,489	3,489	2,094	3,489	3,489	5,234	4,362	32,103
14	939	6,013	3,758	3,758	2,255	3,758	3,758	5,637	4,697	34,572
15	1,007	6,442	4,026	4,026	2,416	4,026	4,026	6,039	5,033	37,042
16	1,074	6,872	4,295	4,295	2,577	4,295	4,295	6,442	5,368	39,511
17	1,141	7,301	4,563	4,563	2,738	4,563	4,563	6,845	5,704	41,981
18	1,208	7,730	4,832	4,832	2,899	4,832	4,832	7,247	6,039	44,450
19	1,275	8,160	5,100	5,100	3,060	5,100	5,100	7,650	6,375	46,920
20	1,342	8,589	5,368	5,368	3,221	5,368	5,368	8,053	6,710	49,389

Sub-Watershed 501 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	70	450	281	281	169	281	281	422	352	2,590
2	141	901	563	563	338	563	563	844	704	5,180
3	211	1,351	844	844	507	844	844	1,267	1,056	7,769
4	281	1,802	1,126	1,126	676	1,126	1,126	1,689	1,407	10,359
5	352	2,252	1,407	1,407	844	1,407	1,407	2,111	1,759	12,949
6	422	2,702	1,689	1,689	1,013	1,689	1,689	2,533	2,111	15,539
7	493	3,153	1,970	1,970	1,182	1,970	1,970	2,956	2,463	18,129
8	563	3,603	2,252	2,252	1,351	2,252	2,252	3,378	2,815	20,718
9	633	4,054	2,533	2,533	1,520	2,533	2,533	3,800	3,167	23,308
10	704	4,504	2,815	2,815	1,689	2,815	2,815	4,222	3,519	25,898
11	774	4,954	3,096	3,096	1,858	3,096	3,096	4,645	3,871	28,488
12	844	5,405	3,378	3,378	2,027	3,378	3,378	5,067	4,222	31,078
13	915	5,855	3,659	3,659	2,196	3,659	3,659	5,489	4,574	33,667
14	985	6,306	3,941	3,941	2,365	3,941	3,941	5,911	4,926	36,257
15	1,056	6,756	4,222	4,222	2,533	4,222	4,222	6,334	5,278	38,847
16	1,126	7,206	4,504	4,504	2,702	4,504	4,504	6,756	5,630	41,437
17	1,196	7,657	4,785	4,785	2,871	4,785	4,785	7,178	5,982	44,027
18	1,267	8,107	5,067	5,067	3,040	5,067	5,067	7,600	6,334	46,616
19	1,337	8,558	5,348	5,348	3,209	5,348	5,348	8,023	6,686	49,206

20	1,407	9,008	5,630	5,630	3,378	5,630	5,630	8,445	7,037	51,796
Sub-Watershed 502 Annual Phosphorous Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	44	285	178	178	107	178	178	267	222	1,637
2	89	569	356	356	213	356	356	534	445	3,273
3	133	854	534	534	320	534	534	801	667	4,910
4	178	1,139	712	712	427	712	712	1,067	890	6,547
5	222	1,423	890	890	534	890	890	1,334	1,112	8,184
6	267	1,708	1,067	1,067	640	1,067	1,067	1,601	1,334	9,820
7	311	1,993	1,245	1,245	747	1,245	1,245	1,868	1,557	11,457
8	356	2,277	1,423	1,423	854	1,423	1,423	2,135	1,779	13,094
9	400	2,562	1,601	1,601	961	1,601	1,601	2,402	2,001	14,731
10	445	2,846	1,779	1,779	1,067	1,779	1,779	2,669	2,224	16,367
11	489	3,131	1,957	1,957	1,174	1,957	1,957	2,935	2,446	18,004
12	534	3,416	2,135	2,135	1,281	2,135	2,135	3,202	2,669	19,641
13	578	3,700	2,313	2,313	1,388	2,313	2,313	3,469	2,891	21,278
14	623	3,985	2,491	2,491	1,494	2,491	2,491	3,736	3,113	22,914
15	667	4,270	2,669	2,669	1,601	2,669	2,669	4,003	3,336	24,551
16	712	4,554	2,846	2,846	1,708	2,846	2,846	4,270	3,558	26,188
17	756	4,839	3,024	3,024	1,815	3,024	3,024	4,537	3,781	27,825
18	801	5,124	3,202	3,202	1,921	3,202	3,202	4,803	4,003	29,461
19	845	5,408	3,380	3,380	2,028	3,380	3,380	5,070	4,225	31,098
20	890	5,693	3,558	3,558	2,135	3,558	3,558	5,337	4,448	32,735
Sub-Watershed 406 Annual Nitrogen Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	294	1,882	735	588	706	1,176	1,647	882	1,470	9,382
2	588	3,764	1,470	1,176	1,412	2,353	3,294	1,765	2,941	18,763
3	882	5,647	2,206	1,765	2,117	3,529	4,941	2,647	4,411	28,145
4	1,176	7,529	2,941	2,353	2,823	4,706	6,588	3,529	5,882	37,527
5	1,470	9,411	3,676	2,941	3,529	5,882	8,235	4,411	7,352	46,908
6	1,765	11,293	4,411	3,529	4,235	7,058	9,882	5,294	8,823	56,290
7	2,059	13,175	5,147	4,117	4,941	8,235	11,529	6,176	10,293	65,672

8	2,353	15,058	5,882	4,706	5,647	9,411	13,175	7,058	11,764	75,053
9	2,647	16,940	6,617	5,294	6,352	10,587	14,822	7,941	13,234	84,435
10	2,941	18,822	7,352	5,882	7,058	11,764	16,469	8,823	14,705	93,817
11	3,235	20,704	8,088	6,470	7,764	12,940	18,116	9,705	16,175	103,198
12	3,529	22,587	8,823	7,058	8,470	14,117	19,763	10,587	17,646	112,580
13	3,823	24,469	9,558	7,646	9,176	15,293	21,410	11,470	19,116	121,962
14	4,117	26,351	10,293	8,235	9,882	16,469	23,057	12,352	20,587	131,343
15	4,411	28,233	11,029	8,823	10,587	17,646	24,704	13,234	22,057	140,725
16	4,706	30,115	11,764	9,411	11,293	18,822	26,351	14,117	23,528	150,107
17	5,000	31,998	12,499	9,999	11,999	19,999	27,998	14,999	24,998	159,488
18	5,294	33,880	13,234	10,587	12,705	21,175	29,645	15,881	26,469	168,870
19	5,588	35,762	13,970	11,176	13,411	22,351	31,292	16,763	27,939	178,251
20	5,882	37,644	14,705	11,764	14,117	23,528	32,939	17,646	29,410	187,633

Sub-Watershed 408 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	295	1,886	737	590	707	1,179	1,651	884	1,474	9,403
2	590	3,773	1,474	1,179	1,415	2,358	3,301	1,769	2,948	18,806
3	884	5,659	2,211	1,769	2,122	3,537	4,952	2,653	4,421	28,209
4	1,179	7,546	2,948	2,358	2,830	4,716	6,603	3,537	5,895	37,612
5	1,474	9,432	3,685	2,948	3,537	5,895	8,253	4,421	7,369	47,015
6	1,769	11,319	4,421	3,537	4,245	7,074	9,904	5,306	8,843	56,417
7	2,063	13,205	5,158	4,127	4,952	8,253	11,555	6,190	10,317	65,820
8	2,358	15,092	5,895	4,716	5,659	9,432	13,205	7,074	11,790	75,223
9	2,653	16,978	6,632	5,306	6,367	10,611	14,856	7,959	13,264	84,626
10	2,948	18,865	7,369	5,895	7,074	11,790	16,507	8,843	14,738	94,029
11	3,242	20,751	8,106	6,485	7,782	12,970	18,157	9,727	16,212	103,432
12	3,537	22,638	8,843	7,074	8,489	14,149	19,808	10,611	17,686	112,835
13	3,832	24,524	9,580	7,664	9,197	15,328	21,459	11,496	19,160	122,238

14	4,127	26,411	10,317	8,253	9,904	16,507	23,109	12,380	20,633	131,641
15	4,421	28,297	11,054	8,843	10,611	17,686	24,760	13,264	22,107	141,044
16	4,716	30,184	11,790	9,432	11,319	18,865	26,411	14,149	23,581	150,446
17	5,011	32,070	12,527	10,022	12,026	20,044	28,061	15,033	25,055	159,849
18	5,306	33,957	13,264	10,611	12,734	21,223	29,712	15,917	26,529	169,252
19	5,600	35,843	14,001	11,201	13,441	22,402	31,363	16,801	28,002	178,655
20	5,895	37,730	14,738	11,790	14,149	23,581	33,013	17,686	29,476	188,058

Sub-Watershed 409 Annual Nitrogen Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	416	2,662	1,040	832	998	1,664	2,329	1,248	2,080	13,267
2	832	5,324	2,080	1,664	1,996	3,327	4,658	2,495	4,159	26,535
3	1,248	7,985	3,119	2,495	2,995	4,991	6,987	3,743	6,239	39,802
4	1,664	10,647	4,159	3,327	3,993	6,655	9,316	4,991	8,318	53,070
5	2,080	13,309	5,199	4,159	4,991	8,318	11,645	6,239	10,398	66,337
6	2,495	15,971	6,239	4,991	5,989	9,982	13,974	7,486	12,477	79,605
7	2,911	18,633	7,278	5,823	6,987	11,645	16,304	8,734	14,557	92,872
8	3,327	21,294	8,318	6,655	7,985	13,309	18,633	9,982	16,636	106,140
9	3,743	23,956	9,358	7,486	8,984	14,973	20,962	11,229	18,716	119,407
10	4,159	26,618	10,398	8,318	9,982	16,636	23,291	12,477	20,795	132,674
11	4,575	29,280	11,437	9,150	10,980	18,300	25,620	13,725	22,875	145,942
12	4,991	31,942	12,477	9,982	11,978	19,964	27,949	14,973	24,954	159,209
13	5,407	34,603	13,517	10,814	12,976	21,627	30,278	16,220	27,034	172,477
14	5,823	37,265	14,557	11,645	13,974	23,291	32,607	17,468	29,114	185,744
15	6,239	39,927	15,597	12,477	14,973	24,954	34,936	18,716	31,193	199,012
16	6,655	42,589	16,636	13,309	15,971	26,618	37,265	19,964	33,273	212,279
17	7,070	45,251	17,676	14,141	16,969	28,282	39,594	21,211	35,352	225,546

18	7,486	47,913	18,716	14,973	17,967	29,945	41,923	22,459	37,432	238,814
19	7,902	50,574	19,756	15,804	18,965	31,609	44,253	23,707	39,511	252,081
20	8,318	53,236	20,795	16,636	19,964	33,273	46,582	24,954	41,591	265,349

Sub-Watershed 501 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	404	2,585	1,010	808	969	1,616	2,262	1,212	2,020	12,885
2	808	5,170	2,020	1,616	1,939	3,231	4,524	2,424	4,039	25,771
3	1,212	7,755	3,029	2,424	2,908	4,847	6,786	3,635	6,059	38,656
4	1,616	10,341	4,039	3,231	3,878	6,463	9,048	4,847	8,079	51,541
5	2,020	12,926	5,049	4,039	4,847	8,079	11,310	6,059	10,098	64,427
6	2,424	15,511	6,059	4,847	5,817	9,694	13,572	7,271	12,118	77,312
7	2,828	18,096	7,069	5,655	6,786	11,310	15,834	8,483	14,138	90,198
8	3,231	20,681	8,079	6,463	7,755	12,926	18,096	9,694	16,157	103,083
9	3,635	23,266	9,088	7,271	8,725	14,541	20,358	10,906	18,177	115,968
10	4,039	25,852	10,098	8,079	9,694	16,157	22,620	12,118	20,196	128,854
11	4,443	28,437	11,108	8,886	10,664	17,773	24,882	13,330	22,216	141,739
12	4,847	31,022	12,118	9,694	11,633	19,389	27,144	14,541	24,236	154,624
13	5,251	33,607	13,128	10,502	12,603	21,004	29,406	15,753	26,255	167,510
14	5,655	36,192	14,138	11,310	13,572	22,620	31,668	16,965	28,275	180,395
15	6,059	38,777	15,147	12,118	14,541	24,236	33,930	18,177	30,295	193,280
16	6,463	41,362	16,157	12,926	15,511	25,852	36,192	19,389	32,314	206,166
17	6,867	43,948	17,167	13,734	16,480	27,467	38,454	20,600	34,334	219,051
18	7,271	46,533	18,177	14,541	17,450	29,083	40,716	21,812	36,354	231,936
19	7,675	49,118	19,187	15,349	18,419	30,699	42,978	23,024	38,373	244,822
20	8,079	51,703	20,196	16,157	19,389	32,314	45,240	24,236	40,393	257,707

Sub-Watershed 502 Annual Nitrogen Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	281	1,795	701	561	673	1,122	1,571	842	1,403	8,948
2	561	3,591	1,403	1,122	1,346	2,244	3,142	1,683	2,805	17,897
3	842	5,386	2,104	1,683	2,020	3,366	4,713	2,525	4,208	26,845
4	1,122	7,181	2,805	2,244	2,693	4,488	6,284	3,366	5,610	35,794
5	1,403	8,977	3,506	2,805	3,366	5,610	7,854	4,208	7,013	44,742
6	1,683	10,772	4,208	3,366	4,039	6,732	9,425	5,049	8,415	53,691
7	1,964	12,567	4,909	3,927	4,713	7,854	10,996	5,891	9,818	62,639
8	2,244	14,362	5,610	4,488	5,386	8,977	12,567	6,732	11,221	71,588
9	2,525	16,158	6,312	5,049	6,059	10,099	14,138	7,574	12,623	80,536
10	2,805	17,953	7,013	5,610	6,732	11,221	15,709	8,415	14,026	89,485
11	3,086	19,748	7,714	6,171	7,406	12,343	17,280	9,257	15,428	98,433
12	3,366	21,544	8,415	6,732	8,079	13,465	18,851	10,099	16,831	107,382
13	3,647	23,339	9,117	7,293	8,752	14,587	20,422	10,940	18,234	116,330
14	3,927	25,134	9,818	7,854	9,425	15,709	21,992	11,782	19,636	125,278
15	4,208	26,930	10,519	8,415	10,099	16,831	23,563	12,623	21,039	134,227
16	4,488	28,725	11,221	8,977	10,772	17,953	25,134	13,465	22,441	143,175
17	4,769	30,520	11,922	9,538	11,445	19,075	26,705	14,306	23,844	152,124
18	5,049	32,315	12,623	10,099	12,118	20,197	28,276	15,148	25,246	161,072
19	5,330	34,111	13,325	10,660	12,792	21,319	29,847	15,989	26,649	170,021
20	5,610	35,906	14,026	11,221	13,465	22,441	31,418	16,831	28,052	178,969

3.3.3 Lower Milford

Sub-Watershed 506 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	132	846	992	529	317	529	0	635	0	3,980
2	264	1,692	1,983	1,058	635	1,058	0	1,269	0	7,959

3	397	2,538	2,975	1,587	952	1,587	0	1,904	0	11,939
4	529	3,385	3,966	2,115	1,269	2,115	0	2,538	0	15,918
5	661	4,231	4,958	2,644	1,587	2,644	0	3,173	0	19,898
6	793	5,077	5,950	3,173	1,904	3,173	0	3,808	0	23,878
7	925	5,923	6,941	3,702	2,221	3,702	0	4,442	0	27,857
8	1,058	6,769	7,933	4,231	2,538	4,231	0	5,077	0	31,837
9	1,190	7,615	8,924	4,760	2,856	4,760	0	5,712	0	35,816
10	1,322	8,462	9,916	5,288	3,173	5,288	0	6,346	0	39,796
11	1,454	9,308	10,908	5,817	3,490	5,817	0	6,981	0	43,775
12	1,587	10,154	11,899	6,346	3,808	6,346	0	7,615	0	47,755
13	1,719	11,000	12,891	6,875	4,125	6,875	0	8,250	0	51,735
14	1,851	11,846	13,882	7,404	4,442	7,404	0	8,885	0	55,714
15	1,983	12,692	14,874	7,933	4,760	7,933	0	9,519	0	59,694
16	2,115	13,539	15,865	8,462	5,077	8,462	0	10,154	0	63,673
17	2,248	14,385	16,857	8,990	5,394	8,990	0	10,789	0	67,653
18	2,380	15,231	17,849	9,519	5,712	9,519	0	11,423	0	71,633
19	2,512	16,077	18,840	10,048	6,029	10,048	0	12,058	0	75,612
20	2,644	16,923	19,832	10,577	6,346	10,577	0	12,692	0	79,592

Sub-Watershed 507 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	143	915	1,072	572	343	572	0	686	0	4,303
2	286	1,830	2,144	1,144	686	1,144	0	1,372	0	8,605
3	429	2,745	3,216	1,715	1,029	1,715	0	2,058	0	12,908
4	572	3,659	4,288	2,287	1,372	2,287	0	2,745	0	17,211
5	715	4,574	5,360	2,859	1,715	2,859	0	3,431	0	21,513
6	858	5,489	6,433	3,431	2,058	3,431	0	4,117	0	25,816
7	1,001	6,404	7,505	4,002	2,401	4,002	0	4,803	0	30,119
8	1,144	7,319	8,577	4,574	2,745	4,574	0	5,489	0	34,421
9	1,287	8,234	9,649	5,146	3,088	5,146	0	6,175	0	38,724
10	1,429	9,149	10,721	5,718	3,431	5,718	0	6,861	0	43,027
11	1,572	10,063	11,793	6,290	3,774	6,290	0	7,548	0	47,329
12	1,715	10,978	12,865	6,861	4,117	6,861	0	8,234	0	51,632
13	1,858	11,893	13,937	7,433	4,460	7,433	0	8,920	0	55,935
14	2,001	12,808	15,009	8,005	4,803	8,005	0	9,606	0	60,237
15	2,144	13,723	16,081	8,577	5,146	8,577	0	10,292	0	64,540
16	2,287	14,638	17,153	9,149	5,489	9,149	0	10,978	0	68,843

17	2,430	15,552	18,226	9,720	5,832	9,720	0	11,664	0	73,145
18	2,573	16,467	19,298	10,292	6,175	10,292	0	12,350	0	77,448
19	2,716	17,382	20,370	10,864	6,518	10,864	0	13,037	0	81,751
20	2,859	18,297	21,442	11,436	6,861	11,436	0	13,723	0	86,053

Sub-Watershed 601 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	51	330	386	206	124	206	0	247	0	1,550
2	103	659	772	412	247	412	0	494	0	3,100
3	154	989	1,159	618	371	618	0	742	0	4,650
4	206	1,318	1,545	824	494	824	0	989	0	6,200
5	257	1,648	1,931	1,030	618	1,030	0	1,236	0	7,750
6	309	1,978	2,317	1,236	742	1,236	0	1,483	0	9,301
7	360	2,307	2,704	1,442	865	1,442	0	1,730	0	10,851
8	412	2,637	3,090	1,648	989	1,648	0	1,978	0	12,401
9	463	2,966	3,476	1,854	1,112	1,854	0	2,225	0	13,951
10	515	3,296	3,862	2,060	1,236	2,060	0	2,472	0	15,501
11	566	3,625	4,249	2,266	1,360	2,266	0	2,719	0	17,051
12	618	3,955	4,635	2,472	1,483	2,472	0	2,966	0	18,601
13	669	4,285	5,021	2,678	1,607	2,678	0	3,213	0	20,151
14	721	4,614	5,407	2,884	1,730	2,884	0	3,461	0	21,701
15	772	4,944	5,794	3,090	1,854	3,090	0	3,708	0	23,251
16	824	5,273	6,180	3,296	1,978	3,296	0	3,955	0	24,802
17	875	5,603	6,566	3,502	2,101	3,502	0	4,202	0	26,352
18	927	5,933	6,952	3,708	2,225	3,708	0	4,449	0	27,902
19	978	6,262	7,339	3,914	2,348	3,914	0	4,697	0	29,452
20	1,030	6,592	7,725	4,120	2,472	4,120	0	4,944	0	31,002

Sub-Watershed 602 Annual Soil Erosion Reduction (tons), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	88	565	662	353	212	353	0	424	0	2,656
2	176	1,129	1,323	706	424	706	0	847	0	5,311

3	265	1,694	1,985	1,059	635	1,059	0	1,271	0	7,967
4	353	2,259	2,647	1,412	847	1,412	0	1,694	0	10,623
5	441	2,823	3,309	1,765	1,059	1,765	0	2,118	0	13,279
6	529	3,388	3,970	2,118	1,271	2,118	0	2,541	0	15,934
7	618	3,953	4,632	2,470	1,482	2,470	0	2,965	0	18,590
8	706	4,517	5,294	2,823	1,694	2,823	0	3,388	0	21,246
9	794	5,082	5,956	3,176	1,906	3,176	0	3,812	0	23,902
10	882	5,647	6,617	3,529	2,118	3,529	0	4,235	0	26,557
11	971	6,211	7,279	3,882	2,329	3,882	0	4,659	0	29,213
12	1,059	6,776	7,941	4,235	2,541	4,235	0	5,082	0	31,869
13	1,147	7,341	8,602	4,588	2,753	4,588	0	5,506	0	34,525
14	1,235	7,905	9,264	4,941	2,965	4,941	0	5,929	0	37,180
15	1,323	8,470	9,926	5,294	3,176	5,294	0	6,353	0	39,836
16	1,412	9,035	10,588	5,647	3,388	5,647	0	6,776	0	42,492
17	1,500	9,600	11,249	6,000	3,600	6,000	0	7,200	0	45,148
18	1,588	10,164	11,911	6,353	3,812	6,353	0	7,623	0	47,803
19	1,676	10,729	12,573	6,706	4,023	6,706	0	8,047	0	50,459
20	1,765	11,294	13,235	7,058	4,235	7,058	0	8,470	0	53,115

Sub-Watershed 603 Annual Soil Erosion Reduction (tons), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	75	480	562	300	180	300	0	360	0	2,255
2	150	959	1,124	599	360	599	0	719	0	4,510
3	225	1,439	1,686	899	539	899	0	1,079	0	6,766
4	300	1,918	2,248	1,199	719	1,199	0	1,439	0	9,021
5	375	2,398	2,810	1,498	899	1,498	0	1,798	0	11,276
6	450	2,877	3,372	1,798	1,079	1,798	0	2,158	0	13,531
7	524	3,357	3,934	2,098	1,259	2,098	0	2,517	0	15,787
8	599	3,836	4,495	2,398	1,439	2,398	0	2,877	0	18,042
9	674	4,316	5,057	2,697	1,618	2,697	0	3,237	0	20,297
10	749	4,795	5,619	2,997	1,798	2,997	0	3,596	0	22,552
11	824	5,275	6,181	3,297	1,978	3,297	0	3,956	0	24,808
12	899	5,754	6,743	3,596	2,158	3,596	0	4,316	0	27,063
13	974	6,234	7,305	3,896	2,338	3,896	0	4,675	0	29,318
14	1,049	6,713	7,867	4,196	2,517	4,196	0	5,035	0	31,573
15	1,124	7,193	8,429	4,495	2,697	4,495	0	5,395	0	33,828
16	1,199	7,672	8,991	4,795	2,877	4,795	0	5,754	0	36,084

17	1,274	8,152	9,553	5,095	3,057	5,095	0	6,114	0	38,339
18	1,349	8,631	10,115	5,395	3,237	5,395	0	6,473	0	40,594
19	1,424	9,111	10,677	5,694	3,417	5,694	0	6,833	0	42,849
20	1,498	9,590	11,239	5,994	3,596	5,994	0	7,193	0	45,105

Sub-Watershed 506 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	93	597	373	373	224	373	373	560	467	3,434
2	187	1,195	747	747	448	747	747	1,120	933	6,869
3	280	1,792	1,120	1,120	672	1,120	1,120	1,680	1,400	10,303
4	373	2,389	1,493	1,493	896	1,493	1,493	2,240	1,867	13,738
5	467	2,986	1,867	1,867	1,120	1,867	1,867	2,800	2,333	17,172
6	560	3,584	2,240	2,240	1,344	2,240	2,240	3,360	2,800	20,606
7	653	4,181	2,613	2,613	1,568	2,613	2,613	3,920	3,266	24,041
8	747	4,778	2,986	2,986	1,792	2,986	2,986	4,480	3,733	27,475
9	840	5,376	3,360	3,360	2,016	3,360	3,360	5,040	4,200	30,910
10	933	5,973	3,733	3,733	2,240	3,733	3,733	5,600	4,666	34,344
11	1,027	6,570	4,106	4,106	2,464	4,106	4,106	6,160	5,133	37,778
12	1,120	7,167	4,480	4,480	2,688	4,480	4,480	6,719	5,600	41,213
13	1,213	7,765	4,853	4,853	2,912	4,853	4,853	7,279	6,066	44,647
14	1,307	8,362	5,226	5,226	3,136	5,226	5,226	7,839	6,533	48,082
15	1,400	8,959	5,600	5,600	3,360	5,600	5,600	8,399	6,999	51,516
16	1,493	9,557	5,973	5,973	3,584	5,973	5,973	8,959	7,466	54,950
17	1,587	10,154	6,346	6,346	3,808	6,346	6,346	9,519	7,933	58,385
18	1,680	10,751	6,719	6,719	4,032	6,719	6,719	10,079	8,399	61,819
19	1,773	11,348	7,093	7,093	4,256	7,093	7,093	10,639	8,866	65,254
20	1,867	11,946	7,466	7,466	4,480	7,466	7,466	11,199	9,333	68,688

Sub-Watershed 507 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	99	635	397	397	238	397	397	596	496	3,653
2	199	1,271	794	794	476	794	794	1,191	993	7,305

3	298	1,906	1,191	1,191	715	1,191	1,191	1,787	1,489	10,958
4	397	2,541	1,588	1,588	953	1,588	1,588	2,382	1,985	14,611
5	496	3,176	1,985	1,985	1,191	1,985	1,985	2,978	2,481	18,263
6	596	3,812	2,382	2,382	1,429	2,382	2,382	3,573	2,978	21,916
7	695	4,447	2,779	2,779	1,668	2,779	2,779	4,169	3,474	25,569
8	794	5,082	3,176	3,176	1,906	3,176	3,176	4,764	3,970	29,222
9	893	5,717	3,573	3,573	2,144	3,573	3,573	5,360	4,467	32,874
10	993	6,353	3,970	3,970	2,382	3,970	3,970	5,955	4,963	36,527
11	1,092	6,988	4,367	4,367	2,620	4,367	4,367	6,551	5,459	40,180
12	1,191	7,623	4,764	4,764	2,859	4,764	4,764	7,147	5,955	43,832
13	1,290	8,258	5,161	5,161	3,097	5,161	5,161	7,742	6,452	47,485
14	1,390	8,894	5,558	5,558	3,335	5,558	5,558	8,338	6,948	51,138
15	1,489	9,529	5,955	5,955	3,573	5,955	5,955	8,933	7,444	54,790
16	1,588	10,164	6,353	6,353	3,812	6,353	6,353	9,529	7,941	58,443
17	1,687	10,799	6,750	6,750	4,050	6,750	6,750	10,124	8,437	62,096
18	1,787	11,435	7,147	7,147	4,288	7,147	7,147	10,720	8,933	65,748
19	1,886	12,070	7,544	7,544	4,526	7,544	7,544	11,315	9,430	69,401
20	1,985	12,705	7,941	7,941	4,764	7,941	7,941	11,911	9,926	73,054

Sub-Watershed 601 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	42	266	166	166	100	166	166	250	208	1,532
2	83	533	333	333	200	333	333	499	416	3,064
3	125	799	499	499	300	499	499	749	624	4,595
4	166	1,066	666	666	400	666	666	999	832	6,127
5	208	1,332	832	832	499	832	832	1,249	1,041	7,659
6	250	1,598	999	999	599	999	999	1,498	1,249	9,191
7	291	1,865	1,165	1,165	699	1,165	1,165	1,748	1,457	10,722
8	333	2,131	1,332	1,332	799	1,332	1,332	1,998	1,665	12,254
9	375	2,398	1,498	1,498	899	1,498	1,498	2,248	1,873	13,786
10	416	2,664	1,665	1,665	999	1,665	1,665	2,497	2,081	15,318
11	458	2,930	1,831	1,831	1,099	1,831	1,831	2,747	2,289	16,849
12	499	3,197	1,998	1,998	1,199	1,998	1,998	2,997	2,497	18,381
13	541	3,463	2,164	2,164	1,299	2,164	2,164	3,247	2,706	19,913
14	583	3,730	2,331	2,331	1,399	2,331	2,331	3,496	2,914	21,445
15	624	3,996	2,497	2,497	1,498	2,497	2,497	3,746	3,122	22,976
16	666	4,262	2,664	2,664	1,598	2,664	2,664	3,996	3,330	24,508

17	708	4,529	2,830	2,830	1,698	2,830	2,830	4,246	3,538	26,040
18	749	4,795	2,997	2,997	1,798	2,997	2,997	4,495	3,746	27,572
19	791	5,061	3,163	3,163	1,898	3,163	3,163	4,745	3,954	29,104
20	832	5,328	3,330	3,330	1,998	3,330	3,330	4,995	4,162	30,635

Sub-Watershed 602 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	53	341	213	213	128	213	213	320	267	1,962
2	107	682	427	427	256	427	427	640	533	3,924
3	160	1,024	640	640	384	640	640	960	800	5,886
4	213	1,365	853	853	512	853	853	1,280	1,066	7,848
5	267	1,706	1,066	1,066	640	1,066	1,066	1,599	1,333	9,810
6	320	2,047	1,280	1,280	768	1,280	1,280	1,919	1,599	11,772
7	373	2,388	1,493	1,493	896	1,493	1,493	2,239	1,866	13,734
8	427	2,730	1,706	1,706	1,024	1,706	1,706	2,559	2,133	15,696
9	480	3,071	1,919	1,919	1,152	1,919	1,919	2,879	2,399	17,658
10	533	3,412	2,133	2,133	1,280	2,133	2,133	3,199	2,666	19,620
11	586	3,753	2,346	2,346	1,407	2,346	2,346	3,519	2,932	21,581
12	640	4,095	2,559	2,559	1,535	2,559	2,559	3,839	3,199	23,543
13	693	4,436	2,772	2,772	1,663	2,772	2,772	4,158	3,465	25,505
14	746	4,777	2,986	2,986	1,791	2,986	2,986	4,478	3,732	27,467
15	800	5,118	3,199	3,199	1,919	3,199	3,199	4,798	3,999	29,429
16	853	5,459	3,412	3,412	2,047	3,412	3,412	5,118	4,265	31,391
17	906	5,801	3,625	3,625	2,175	3,625	3,625	5,438	4,532	33,353
18	960	6,142	3,839	3,839	2,303	3,839	3,839	5,758	4,798	35,315
19	1,013	6,483	4,052	4,052	2,431	4,052	4,052	6,078	5,065	37,277
20	1,066	6,824	4,265	4,265	2,559	4,265	4,265	6,398	5,331	39,239

Sub-Watershed 603 Annual Phosphorous Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	38	240	150	150	90	150	150	225	188	1,381
2	75	480	300	300	180	300	300	450	375	2,763

3	113	721	450	450	270	450	450	676	563	4,144
4	150	961	601	601	360	601	601	901	751	5,525
5	188	1,201	751	751	450	751	751	1,126	938	6,907
6	225	1,441	901	901	541	901	901	1,351	1,126	8,288
7	263	1,682	1,051	1,051	631	1,051	1,051	1,577	1,314	9,670
8	300	1,922	1,201	1,201	721	1,201	1,201	1,802	1,501	11,051
9	338	2,162	1,351	1,351	811	1,351	1,351	2,027	1,689	12,432
10	375	2,402	1,501	1,501	901	1,501	1,501	2,252	1,877	13,814
11	413	2,643	1,652	1,652	991	1,652	1,652	2,477	2,065	15,195
12	450	2,883	1,802	1,802	1,081	1,802	1,802	2,703	2,252	16,576
13	488	3,123	1,952	1,952	1,171	1,952	1,952	2,928	2,440	17,958
14	526	3,363	2,102	2,102	1,261	2,102	2,102	3,153	2,628	19,339
15	563	3,604	2,252	2,252	1,351	2,252	2,252	3,378	2,815	20,720
16	601	3,844	2,402	2,402	1,441	2,402	2,402	3,604	3,003	22,102
17	638	4,084	2,553	2,553	1,532	2,553	2,553	3,829	3,191	23,483
18	676	4,324	2,703	2,703	1,622	2,703	2,703	4,054	3,378	24,865
19	713	4,565	2,853	2,853	1,712	2,853	2,853	4,279	3,566	26,246
20	751	4,805	3,003	3,003	1,802	3,003	3,003	4,504	3,754	27,627

Sub-Watershed 506 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	561	3,592	1,403	1,122	1,347	2,245	3,143	1,684	2,806	17,902
2	1,122	7,183	2,806	2,245	2,694	4,490	6,285	3,367	5,612	35,805
3	1,684	10,775	4,209	3,367	4,041	6,734	9,428	5,051	8,418	53,707
4	2,245	14,367	5,612	4,490	5,388	8,979	12,571	6,734	11,224	71,609
5	2,806	17,958	7,015	5,612	6,734	11,224	15,714	8,418	14,030	89,512
6	3,367	21,550	8,418	6,734	8,081	13,469	18,856	10,102	16,836	107,414
7	3,928	25,142	9,821	7,857	9,428	15,714	21,999	11,785	19,642	125,316
8	4,490	28,734	11,224	8,979	10,775	17,958	25,142	13,469	22,448	143,219
9	5,051	32,325	12,627	10,102	12,122	20,203	28,285	15,152	25,254	161,121
10	5,612	35,917	14,030	11,224	13,469	22,448	31,427	16,836	28,060	179,023
11	6,173	39,509	15,433	12,346	14,816	24,693	34,570	18,520	30,866	196,926
12	6,734	43,100	16,836	13,469	16,163	26,938	37,713	20,203	33,672	214,828
13	7,296	46,692	18,239	14,591	17,509	29,182	40,855	21,887	36,478	232,730
14	7,857	50,284	19,642	15,714	18,856	31,427	43,998	23,570	39,284	250,633
15	8,418	53,875	21,045	16,836	20,203	33,672	47,141	25,254	42,090	268,535

16	8,979	57,467	22,448	17,958	21,550	35,917	50,284	26,938	44,896	286,437
17	9,540	61,059	23,851	19,081	22,897	38,162	53,426	28,621	47,702	304,340
18	10,102	64,650	25,254	20,203	24,244	40,407	56,569	30,305	50,508	322,242
19	10,663	68,242	26,657	21,326	25,591	42,651	59,712	31,989	53,314	340,144
20	11,224	71,834	28,060	22,448	26,938	44,896	62,855	33,672	56,120	358,047

Sub-Watershed 507 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	585	3,744	1,463	1,170	1,404	2,340	3,276	1,755	2,925	18,664
2	1,170	7,489	2,925	2,340	2,808	4,681	6,553	3,510	5,851	37,327
3	1,755	11,233	4,388	3,510	4,212	7,021	9,829	5,266	8,776	55,991
4	2,340	14,978	5,851	4,681	5,617	9,361	13,105	7,021	11,701	74,654
5	2,925	18,722	7,313	5,851	7,021	11,701	16,382	8,776	14,627	93,318
6	3,510	22,466	8,776	7,021	8,425	14,042	19,658	10,531	17,552	111,981
7	4,095	26,211	10,239	8,191	9,829	16,382	22,934	12,286	20,477	130,645
8	4,681	29,955	11,701	9,361	11,233	18,722	26,211	14,042	23,403	149,308
9	5,266	33,700	13,164	10,531	12,637	21,062	29,487	15,797	26,328	167,972
10	5,851	37,444	14,627	11,701	14,042	23,403	32,764	17,552	29,253	186,635
11	6,436	41,188	16,089	12,871	15,446	25,743	36,040	19,307	32,178	205,299
12	7,021	44,933	17,552	14,042	16,850	28,083	39,316	21,062	35,104	223,962
13	7,606	48,677	19,015	15,212	18,254	30,423	42,593	22,817	38,029	242,626
14	8,191	52,422	20,477	16,382	19,658	32,764	45,869	24,573	40,954	261,289
15	8,776	56,166	21,940	17,552	21,062	35,104	49,145	26,328	43,880	279,953
16	9,361	59,910	23,403	18,722	22,466	37,444	52,422	28,083	46,805	298,616
17	9,946	63,655	24,865	19,892	23,871	39,784	55,698	29,838	49,730	317,280
18	10,531	67,399	26,328	21,062	25,275	42,125	58,974	31,593	52,656	335,943
19	11,116	71,144	27,790	22,232	26,679	44,465	62,251	33,349	55,581	354,607
20	11,701	74,888	29,253	23,403	28,083	46,805	65,527	35,104	58,506	373,270

Sub-Watershed 601 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	250	1,597	624	499	599	998	1,398	749	1,248	7,962

2	499	3,195	1,248	998	1,198	1,997	2,795	1,498	2,496	15,924
3	749	4,792	1,872	1,498	1,797	2,995	4,193	2,246	3,744	23,886
4	998	6,390	2,496	1,997	2,396	3,993	5,591	2,995	4,992	31,848
5	1,248	7,987	3,120	2,496	2,995	4,992	6,989	3,744	6,240	39,810
6	1,498	9,584	3,744	2,995	3,594	5,990	8,386	4,493	7,488	47,772
7	1,747	11,182	4,368	3,494	4,193	6,989	9,784	5,241	8,736	55,734
8	1,997	12,779	4,992	3,993	4,792	7,987	11,182	5,990	9,984	63,696
9	2,246	14,377	5,616	4,493	5,391	8,985	12,579	6,739	11,232	71,658
10	2,496	15,974	6,240	4,992	5,990	9,984	13,977	7,488	12,480	79,620
11	2,746	17,571	6,864	5,491	6,589	10,982	15,375	8,237	13,728	87,582
12	2,995	19,169	7,488	5,990	7,188	11,980	16,773	8,985	14,976	95,544
13	3,245	20,766	8,112	6,489	7,787	12,979	18,170	9,734	16,223	103,506
14	3,494	22,363	8,736	6,989	8,386	13,977	19,568	10,483	17,471	111,468
15	3,744	23,961	9,360	7,488	8,985	14,976	20,966	11,232	18,719	119,430
16	3,993	25,558	9,984	7,987	9,584	15,974	22,363	11,980	19,967	127,392
17	4,243	27,156	10,608	8,486	10,183	16,972	23,761	12,729	21,215	135,354
18	4,493	28,753	11,232	8,985	10,782	17,971	25,159	13,478	22,463	143,316
19	4,742	30,350	11,856	9,485	11,381	18,969	26,557	14,227	23,711	151,278
20	4,992	31,948	12,480	9,984	11,980	19,967	27,954	14,976	24,959	159,240

Sub-Watershed 602 Annual Nitrogen Reduction (lbs.), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	314	2,009	785	628	753	1,256	1,758	942	1,569	10,013
2	628	4,018	1,569	1,256	1,507	2,511	3,515	1,883	3,139	20,025
3	942	6,026	2,354	1,883	2,260	3,767	5,273	2,825	4,708	30,038
4	1,256	8,035	3,139	2,511	3,013	5,022	7,031	3,767	6,278	40,051
5	1,569	10,044	3,923	3,139	3,767	6,278	8,789	4,708	7,847	50,063
6	1,883	12,053	4,708	3,767	4,520	7,533	10,546	5,650	9,416	60,076
7	2,197	14,062	5,493	4,394	5,273	8,789	12,304	6,591	10,986	70,089
8	2,511	16,070	6,278	5,022	6,026	10,044	14,062	7,533	12,555	80,101
9	2,825	18,079	7,062	5,650	6,780	11,300	15,819	8,475	14,124	90,114
10	3,139	20,088	7,847	6,278	7,533	12,555	17,577	9,416	15,694	100,127
11	3,453	22,097	8,632	6,905	8,286	13,811	19,335	10,358	17,263	110,139
12	3,767	24,106	9,416	7,533	9,040	15,066	21,092	11,300	18,833	120,152
13	4,080	26,114	10,201	8,161	9,793	16,322	22,850	12,241	20,402	130,164
14	4,394	28,123	10,986	8,789	10,546	17,577	24,608	13,183	21,971	140,177
15	4,708	30,132	11,770	9,416	11,300	18,833	26,366	14,124	23,541	150,190

16	5,022	32,141	12,555	10,044	12,053	20,088	28,123	15,066	25,110	160,202
17	5,336	34,150	13,340	10,672	12,806	21,344	29,881	16,008	26,679	170,215
18	5,650	36,159	14,124	11,300	13,559	22,599	31,639	16,949	28,249	180,228
19	5,964	38,167	14,909	11,927	14,313	23,855	33,396	17,891	29,818	190,240
20	6,278	40,176	15,694	12,555	15,066	25,110	35,154	18,833	31,388	200,253

Sub-Watershed 603 Annual Nitrogen Reduction (lbs.), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total Load Reduction
1	226	1,448	566	453	543	905	1,267	679	1,131	7,218
2	453	2,896	1,131	905	1,086	1,810	2,534	1,358	2,263	14,436
3	679	4,344	1,697	1,358	1,629	2,715	3,801	2,036	3,394	21,654
4	905	5,792	2,263	1,810	2,172	3,620	5,068	2,715	4,525	28,872
5	1,131	7,241	2,828	2,263	2,715	4,525	6,336	3,394	5,657	36,090
6	1,358	8,689	3,394	2,715	3,258	5,430	7,603	4,073	6,788	43,308
7	1,584	10,137	3,960	3,168	3,801	6,336	8,870	4,752	7,919	50,526
8	1,810	11,585	4,525	3,620	4,344	7,241	10,137	5,430	9,051	57,744
9	2,036	13,033	5,091	4,073	4,887	8,146	11,404	6,109	10,182	64,962
10	2,263	14,481	5,657	4,525	5,430	9,051	12,671	6,788	11,313	72,180
11	2,489	15,929	6,222	4,978	5,974	9,956	13,938	7,467	12,445	79,398
12	2,715	17,377	6,788	5,430	6,517	10,861	15,205	8,146	13,576	86,616
13	2,941	18,826	7,354	5,883	7,060	11,766	16,472	8,824	14,707	93,834
14	3,168	20,274	7,919	6,336	7,603	12,671	17,740	9,503	15,839	101,052
15	3,394	21,722	8,485	6,788	8,146	13,576	19,007	10,182	16,970	108,270
16	3,620	23,170	9,051	7,241	8,689	14,481	20,274	10,861	18,102	115,488
17	3,847	24,618	9,616	7,693	9,232	15,386	21,541	11,540	19,233	122,706
18	4,073	26,066	10,182	8,146	9,775	16,291	22,808	12,219	20,364	129,924
19	4,299	27,514	10,748	8,598	10,318	17,196	24,075	12,897	21,496	137,142
20	4,525	28,962	11,313	9,051	10,861	18,102	25,342	13,576	22,627	144,360

3.4 Appendix Tables – Short, medium and long term implementation schedule

3.4.1 Jamestown

Sub-Watershed 104 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	112	446	279	223	223	223	223	335	558	2,621
2	112	446	279	223	223	223	223	335	558	2,621
3	112	446	279	223	223	223	223	335	558	2,621
4	112	446	279	223	223	223	223	335	558	2,621
5	112	446	279	223	223	223	223	335	558	2,621
Total	558	2,231	1,394	1,116	1,116	1,116	1,116	1,673	2,789	13,107
6	112	446	279	223	223	223	223	335	558	2,621
7	112	446	279	223	223	223	223	335	558	2,621
8	112	446	279	223	223	223	223	335	558	2,621
9	112	446	279	223	223	223	223	335	558	2,621
10	112	446	279	223	223	223	223	335	558	2,621
Total	1,116	4,462	2,789	2,231	2,231	2,231	2,231	3,347	5,578	26,214
11	112	446	279	223	223	223	223	335	558	2,621
12	112	446	279	223	223	223	223	335	558	2,621
13	112	446	279	223	223	223	223	335	558	2,621
14	112	446	279	223	223	223	223	335	558	2,621
15	112	446	279	223	223	223	223	335	558	2,621
Total	1,673	6,693	4,183	3,347	3,347	3,347	3,347	5,020	8,366	39,321
16	112	446	279	223	223	223	223	335	558	2,621
17	112	446	279	223	223	223	223	335	558	2,621
18	112	446	279	223	223	223	223	335	558	2,621
19	112	446	279	223	223	223	223	335	558	2,621
20	112	446	279	223	223	223	223	335	558	2,621
Total	2,231	8,924	5,578	4,462	4,462	4,462	4,462	6,693	11,155	52,429
Sub-Watershed 105 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	103	410	256	205	205	205	205	308	513	2,411

2	103	410	256	205	205	205	205	308	513	2,411
3	103	410	256	205	205	205	205	308	513	2,411
4	103	410	256	205	205	205	205	308	513	2,411
5	103	410	256	205	205	205	205	308	513	2,411
Total	513	2,052	1,282	1,026	1,026	1,026	1,026	1,539	2,564	12,053
6	103	410	256	205	205	205	205	308	513	2,411
7	103	410	256	205	205	205	205	308	513	2,411
8	103	410	256	205	205	205	205	308	513	2,411
9	103	410	256	205	205	205	205	308	513	2,411
10	103	410	256	205	205	205	205	308	513	2,411
Total	1,026	4,103	2,564	2,052	2,052	2,052	2,052	3,077	5,129	24,105
11	103	410	256	205	205	205	205	308	513	2,411
12	103	410	256	205	205	205	205	308	513	2,411
13	103	410	256	205	205	205	205	308	513	2,411
14	103	410	256	205	205	205	205	308	513	2,411
15	103	410	256	205	205	205	205	308	513	2,411
Total	1,539	6,155	3,847	3,077	3,077	3,077	3,077	4,616	7,693	36,158
16	103	410	256	205	205	205	205	308	513	2,411
17	103	410	256	205	205	205	205	308	513	2,411
18	103	410	256	205	205	205	205	308	513	2,411
19	103	410	256	205	205	205	205	308	513	2,411
20	103	410	256	205	205	205	205	308	513	2,411
Total	2,052	8,206	5,129	4,103	4,103	4,103	4,103	6,155	10,258	48,210

Sub-Watershed 106 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	78	311	194	156	156	156	156	233	389	1,828
2	78	311	194	156	156	156	156	233	389	1,828
3	78	311	194	156	156	156	156	233	389	1,828
4	78	311	194	156	156	156	156	233	389	1,828
5	78	311	194	156	156	156	156	233	389	1,828
Total	389	1,556	972	778	778	778	778	1,167	1,945	9,140
6	78	311	194	156	156	156	156	233	389	1,828
7	78	311	194	156	156	156	156	233	389	1,828
8	78	311	194	156	156	156	156	233	389	1,828
9	78	311	194	156	156	156	156	233	389	1,828

10	78	311	194	156	156	156	156	233	389	1,828
Total	778	3,111	1,945	1,556	1,556	1,556	1,556	2,334	3,889	18,279
11	78	311	194	156	156	156	156	233	389	1,828
12	78	311	194	156	156	156	156	233	389	1,828
13	78	311	194	156	156	156	156	233	389	1,828
14	78	311	194	156	156	156	156	233	389	1,828
15	78	311	194	156	156	156	156	233	389	1,828
Total	1,167	4,667	2,917	2,334	2,334	2,334	2,334	3,500	5,834	27,419
16	78	311	194	156	156	156	156	233	389	1,828
17	78	311	194	156	156	156	156	233	389	1,828
18	78	311	194	156	156	156	156	233	389	1,828
19	78	311	194	156	156	156	156	233	389	1,828
20	78	311	194	156	156	156	156	233	389	1,828
Total	1,556	6,223	3,889	3,111	3,111	3,111	3,111	4,667	7,779	36,559

3.4.2 Peat's Creek

Sub-Watershed 406 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	68	271	169	135	135	135	135	203	339	1,592
2	68	271	169	135	135	135	135	203	339	1,592
3	68	271	169	135	135	135	135	203	339	1,592
4	68	271	169	135	135	135	135	203	339	1,592
5	68	271	169	135	135	135	135	203	339	1,592
Total	339	1,355	847	677	677	677	677	1,016	1,693	7,958
6	68	271	169	135	135	135	135	203	339	1,592
7	68	271	169	135	135	135	135	203	339	1,592
8	68	271	169	135	135	135	135	203	339	1,592
9	68	271	169	135	135	135	135	203	339	1,592
10	68	271	169	135	135	135	135	203	339	1,592
Total	677	2,709	1,693	1,355	1,355	1,355	1,355	2,032	3,386	15,915
11	68	271	169	135	135	135	135	203	339	1,592
12	68	271	169	135	135	135	135	203	339	1,592
13	68	271	169	135	135	135	135	203	339	1,592
14	68	271	169	135	135	135	135	203	339	1,592

15	68	271	169	135	135	135	135	203	339	1,592
Total	1,016	4,064	2,540	2,032	2,032	2,032	2,032	3,048	5,079	23,873
16	68	271	169	135	135	135	135	203	339	1,592
17	68	271	169	135	135	135	135	203	339	1,592
18	68	271	169	135	135	135	135	203	339	1,592
19	68	271	169	135	135	135	135	203	339	1,592
20	68	271	169	135	135	135	135	203	339	1,592
Total	1,355	5,418	3,386	2,709	2,709	2,709	2,709	4,064	6,773	31,831

Sub-Watershed 408 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	60	242	151	121	121	121	121	181	302	1,422
2	60	242	151	121	121	121	121	181	302	1,422
3	60	242	151	121	121	121	121	181	302	1,422
4	60	242	151	121	121	121	121	181	302	1,422
5	60	242	151	121	121	121	121	181	302	1,422
Total	302	1,210	756	605	605	605	605	907	1,512	7,108
6	60	242	151	121	121	121	121	181	302	1,422
7	60	242	151	121	121	121	121	181	302	1,422
8	60	242	151	121	121	121	121	181	302	1,422
9	60	242	151	121	121	121	121	181	302	1,422
10	60	242	151	121	121	121	121	181	302	1,422
Total	605	2,420	1,512	1,210	1,210	1,210	1,210	1,815	3,025	14,216
11	60	242	151	121	121	121	121	181	302	1,422
12	60	242	151	121	121	121	121	181	302	1,422
13	60	242	151	121	121	121	121	181	302	1,422
14	60	242	151	121	121	121	121	181	302	1,422
15	60	242	151	121	121	121	121	181	302	1,422
Total	907	3,630	2,269	1,815	1,815	1,815	1,815	2,722	4,537	21,324
16	60	242	151	121	121	121	121	181	302	1,422
17	60	242	151	121	121	121	121	181	302	1,422
18	60	242	151	121	121	121	121	181	302	1,422
19	60	242	151	121	121	121	121	181	302	1,422
20	60	242	151	121	121	121	121	181	302	1,422
Total	1,210	4,840	3,025	2,420	2,420	2,420	2,420	3,630	6,050	28,433

Sub-Watershed 409 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	144	574	359	287	287	287	287	431	718	3,373
2	144	574	359	287	287	287	287	431	718	3,373
3	144	574	359	287	287	287	287	431	718	3,373
4	144	574	359	287	287	287	287	431	718	3,373
5	144	574	359	287	287	287	287	431	718	3,373
Total	718	2,871	1,794	1,435	1,435	1,435	1,435	2,153	3,589	16,866
6	144	574	359	287	287	287	287	431	718	3,373
7	144	574	359	287	287	287	287	431	718	3,373
8	144	574	359	287	287	287	287	431	718	3,373
9	144	574	359	287	287	287	287	431	718	3,373
10	144	574	359	287	287	287	287	431	718	3,373
Total	1,435	5,742	3,589	2,871	2,871	2,871	2,871	4,306	7,177	33,732
11	144	574	359	287	287	287	287	431	718	3,373
12	144	574	359	287	287	287	287	431	718	3,373
13	144	574	359	287	287	287	287	431	718	3,373
14	144	574	359	287	287	287	287	431	718	3,373
15	144	574	359	287	287	287	287	431	718	3,373
Total	2,153	8,612	5,383	4,306	4,306	4,306	4,306	6,459	10,766	50,598
16	144	574	359	287	287	287	287	431	718	3,373
17	144	574	359	287	287	287	287	431	718	3,373
18	144	574	359	287	287	287	287	431	718	3,373
19	144	574	359	287	287	287	287	431	718	3,373
20	144	574	359	287	287	287	287	431	718	3,373
Total	2,871	11,483	7,177	5,742	5,742	5,742	5,742	8,612	14,354	67,464
Sub-Watershed 501 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	89	357	223	179	179	179	179	268	447	2,100
2	89	357	223	179	179	179	179	268	447	2,100

3	89	357	223	179	179	179	179	268	447	2,100
4	89	357	223	179	179	179	179	268	447	2,100
5	89	357	223	179	179	179	179	268	447	2,100
Total	447	1,787	1,117	894	894	894	894	1,340	2,234	10,500
6	89	357	223	179	179	179	179	268	447	2,100
7	89	357	223	179	179	179	179	268	447	2,100
8	89	357	223	179	179	179	179	268	447	2,100
9	89	357	223	179	179	179	179	268	447	2,100
10	89	357	223	179	179	179	179	268	447	2,100
Total	894	3,575	2,234	1,787	1,787	1,787	1,787	2,681	4,468	21,001
11	89	357	223	179	179	179	179	268	447	2,100
12	89	357	223	179	179	179	179	268	447	2,100
13	89	357	223	179	179	179	179	268	447	2,100
14	89	357	223	179	179	179	179	268	447	2,100
15	89	357	223	179	179	179	179	268	447	2,100
Total	1,340	5,362	3,351	2,681	2,681	2,681	2,681	4,021	6,702	31,501
16	89	357	223	179	179	179	179	268	447	2,100
17	89	357	223	179	179	179	179	268	447	2,100
18	89	357	223	179	179	179	179	268	447	2,100
19	89	357	223	179	179	179	179	268	447	2,100
20	89	357	223	179	179	179	179	268	447	2,100
Total	1,787	7,149	4,468	3,575	3,575	3,575	3,575	5,362	8,937	42,002
Sub-Watershed 502 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	74	295	185	148	148	148	148	221	369	1,735
2	74	295	185	148	148	148	148	221	369	1,735
3	74	295	185	148	148	148	148	221	369	1,735
4	74	295	185	148	148	148	148	221	369	1,735
5	74	295	185	148	148	148	148	221	369	1,735
Total	369	1,476	923	738	738	738	738	1,107	1,846	8,674
6	74	295	185	148	148	148	148	221	369	1,735
7	74	295	185	148	148	148	148	221	369	1,735
8	74	295	185	148	148	148	148	221	369	1,735
9	74	295	185	148	148	148	148	221	369	1,735
10	74	295	185	148	148	148	148	221	369	1,735

Total	738	2,953	1,846	1,476	1,476	1,476	1,476	2,215	3,691	17,348
11	74	295	185	148	148	148	148	221	369	1,735
12	74	295	185	148	148	148	148	221	369	1,735
13	74	295	185	148	148	148	148	221	369	1,735
14	74	295	185	148	148	148	148	221	369	1,735
15	74	295	185	148	148	148	148	221	369	1,735
Total	1,107	4,429	2,768	2,215	2,215	2,215	2,215	3,322	5,537	26,022
16	74	295	185	148	148	148	148	221	369	1,735
17	74	295	185	148	148	148	148	221	369	1,735
18	74	295	185	148	148	148	148	221	369	1,735
19	74	295	185	148	148	148	148	221	369	1,735
20	74	295	185	148	148	148	148	221	369	1,735
Total	1,476	5,906	3,691	2,953	2,953	2,953	2,953	4,429	7,382	34,695

3.4.3 Lower Milford

Sub-Watershed 506 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	124	498	311	249	249	249	249	373	622	2,924
2	124	498	311	249	249	249	249	373	622	2,924
3	124	498	311	249	249	249	249	373	622	2,924
4	124	498	311	249	249	249	249	373	622	2,924
5	124	498	311	249	249	249	249	373	622	2,924
Total	622	2,489	1,555	1,244	1,244	1,244	1,244	1,867	3,111	14,621
6	124	498	311	249	249	249	249	373	622	2,924
7	124	498	311	249	249	249	249	373	622	2,924
8	124	498	311	249	249	249	249	373	622	2,924
9	124	498	311	249	249	249	249	373	622	2,924
10	124	498	311	249	249	249	249	373	622	2,924
Total	1,244	4,977	3,111	2,489	2,489	2,489	2,489	3,733	6,222	29,242
11	124	498	311	249	249	249	249	373	622	2,924
12	124	498	311	249	249	249	249	373	622	2,924
13	124	498	311	249	249	249	249	373	622	2,924
14	124	498	311	249	249	249	249	373	622	2,924
15	124	498	311	249	249	249	249	373	622	2,924

Total	1,867	7,466	4,666	3,733	3,733	3,733	3,733	5,600	9,333	43,863
16	124	498	311	249	249	249	249	373	622	2,924
17	124	498	311	249	249	249	249	373	622	2,924
18	124	498	311	249	249	249	249	373	622	2,924
19	124	498	311	249	249	249	249	373	622	2,924
20	124	498	311	249	249	249	249	373	622	2,924
Total	2,489	9,955	6,222	4,977	4,977	4,977	4,977	7,466	12,444	58,484
Sub-Watershed 507 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	140	559	350	280	280	280	280	419	699	3,285
2	140	559	350	280	280	280	280	419	699	3,285
3	140	559	350	280	280	280	280	419	699	3,285
4	140	559	350	280	280	280	280	419	699	3,285
5	140	559	350	280	280	280	280	419	699	3,285
Total	699	2,796	1,748	1,398	1,398	1,398	1,398	2,097	3,495	16,427
6	140	559	350	280	280	280	280	419	699	3,285
7	140	559	350	280	280	280	280	419	699	3,285
8	140	559	350	280	280	280	280	419	699	3,285
9	140	559	350	280	280	280	280	419	699	3,285
10	140	559	350	280	280	280	280	419	699	3,285
Total	1,398	5,592	3,495	2,796	2,796	2,796	2,796	4,194	6,990	32,853
11	140	559	350	280	280	280	280	419	699	3,285
12	140	559	350	280	280	280	280	419	699	3,285
13	140	559	350	280	280	280	280	419	699	3,285
14	140	559	350	280	280	280	280	419	699	3,285
15	140	559	350	280	280	280	280	419	699	3,285
Total	2,097	8,388	5,243	4,194	4,194	4,194	4,194	6,291	10,485	49,280
16	140	559	350	280	280	280	280	419	699	3,285
17	140	559	350	280	280	280	280	419	699	3,285
18	140	559	350	280	280	280	280	419	699	3,285
19	140	559	350	280	280	280	280	419	699	3,285
20	140	559	350	280	280	280	280	419	699	3,285
Total	2,796	11,184	6,990	5,592	5,592	5,592	5,592	8,388	13,980	65,706

Sub-Watershed 601 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	61	243	152	122	122	122	122	182	304	1,428
2	61	243	152	122	122	122	122	182	304	1,428
3	61	243	152	122	122	122	122	182	304	1,428
4	61	243	152	122	122	122	122	182	304	1,428
5	61	243	152	122	122	122	122	182	304	1,428
Total	304	1,215	760	608	608	608	608	911	1,519	7,140
6	61	243	152	122	122	122	122	182	304	1,428
7	61	243	152	122	122	122	122	182	304	1,428
8	61	243	152	122	122	122	122	182	304	1,428
9	61	243	152	122	122	122	122	182	304	1,428
10	61	243	152	122	122	122	122	182	304	1,428
Total	608	2,431	1,519	1,215	1,215	1,215	1,215	1,823	3,038	14,280
11	61	243	152	122	122	122	122	182	304	1,428
12	61	243	152	122	122	122	122	182	304	1,428
13	61	243	152	122	122	122	122	182	304	1,428
14	61	243	152	122	122	122	122	182	304	1,428
15	61	243	152	122	122	122	122	182	304	1,428
Total	911	3,646	2,279	1,823	1,823	1,823	1,823	2,734	4,557	21,420
16	61	243	152	122	122	122	122	182	304	1,428
17	61	243	152	122	122	122	122	182	304	1,428
18	61	243	152	122	122	122	122	182	304	1,428
19	61	243	152	122	122	122	122	182	304	1,428
20	61	243	152	122	122	122	122	182	304	1,428
Total	1,215	4,861	3,038	2,431	2,431	2,431	2,431	3,646	6,077	28,560
Sub-Watershed 602 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total

1	75	300	188	150	150	150	150	225	375	1,765
2	75	300	188	150	150	150	150	225	375	1,765
3	75	300	188	150	150	150	150	225	375	1,765
4	75	300	188	150	150	150	150	225	375	1,765
5	75	300	188	150	150	150	150	225	375	1,765
Total	375	1,502	939	751	751	751	751	1,126	1,877	8,823
6	75	300	188	150	150	150	150	225	375	1,765
7	75	300	188	150	150	150	150	225	375	1,765
8	75	300	188	150	150	150	150	225	375	1,765
9	75	300	188	150	150	150	150	225	375	1,765
10	75	300	188	150	150	150	150	225	375	1,765
Total	751	3,004	1,877	1,502	1,502	1,502	1,502	2,253	3,755	17,646
11	75	300	188	150	150	150	150	225	375	1,765
12	75	300	188	150	150	150	150	225	375	1,765
13	75	300	188	150	150	150	150	225	375	1,765
14	75	300	188	150	150	150	150	225	375	1,765
15	75	300	188	150	150	150	150	225	375	1,765
Total	1,126	4,505	2,816	2,253	2,253	2,253	2,253	3,379	5,632	26,469
16	75	300	188	150	150	150	150	225	375	1,765
17	75	300	188	150	150	150	150	225	375	1,765
18	75	300	188	150	150	150	150	225	375	1,765
19	75	300	188	150	150	150	150	225	375	1,765
20	75	300	188	150	150	150	150	225	375	1,765
Total	1,502	6,007	3,755	3,004	3,004	3,004	3,004	4,505	7,509	35,292

Sub-Watershed 603 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plan	Total
1	60	239	150	120	120	120	120	179	299	1,406
2	60	239	150	120	120	120	120	179	299	1,406
3	60	239	150	120	120	120	120	179	299	1,406
4	60	239	150	120	120	120	120	179	299	1,406
5	60	239	150	120	120	120	120	179	299	1,406
Total	299	1,196	748	598	598	598	598	897	1,496	7,029
6	60	239	150	120	120	120	120	179	299	1,406
7	60	239	150	120	120	120	120	179	299	1,406
8	60	239	150	120	120	120	120	179	299	1,406

9	60	239	150	120	120	120	120	179	299	1,406
10	60	239	150	120	120	120	120	179	299	1,406
Total	598	2,393	1,496	1,196	1,196	1,196	1,196	1,795	2,991	14,058
11	60	239	150	120	120	120	120	179	299	1,406
12	60	239	150	120	120	120	120	179	299	1,406
13	60	239	150	120	120	120	120	179	299	1,406
14	60	239	150	120	120	120	120	179	299	1,406
15	60	239	150	120	120	120	120	179	299	1,406
Total	897	3,589	2,243	1,795	1,795	1,795	1,795	2,692	4,487	21,087
16	60	239	150	120	120	120	120	179	299	1,406
17	60	239	150	120	120	120	120	179	299	1,406
18	60	239	150	120	120	120	120	179	299	1,406
19	60	239	150	120	120	120	120	179	299	1,406
20	60	239	150	120	120	120	120	179	299	1,406
Total	1,196	4,786	2,991	2,393	2,393	2,393	2,393	3,589	5,982	28,115

3.5 Appendix Tables – Adoption Rates

3.5.1 Jamestown

Sub-Watershed 104 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	112	446	279	223	223	223	223	335	558	2,621
2	112	446	279	223	223	223	223	335	558	2,621
3	112	446	279	223	223	223	223	335	558	2,621
4	112	446	279	223	223	223	223	335	558	2,621
5	112	446	279	223	223	223	223	335	558	2,621
6	112	446	279	223	223	223	223	335	558	2,621
7	112	446	279	223	223	223	223	335	558	2,621
8	112	446	279	223	223	223	223	335	558	2,621
9	112	446	279	223	223	223	223	335	558	2,621
10	112	446	279	223	223	223	223	335	558	2,621
11	112	446	279	223	223	223	223	335	558	2,621
12	112	446	279	223	223	223	223	335	558	2,621
13	112	446	279	223	223	223	223	335	558	2,621
14	112	446	279	223	223	223	223	335	558	2,621
15	112	446	279	223	223	223	223	335	558	2,621

16	112	446	279	223	223	223	223	335	558	2,621
17	112	446	279	223	223	223	223	335	558	2,621
18	112	446	279	223	223	223	223	335	558	2,621
19	112	446	279	223	223	223	223	335	558	2,621
20	112	446	279	223	223	223	223	335	558	2,621

Sub-Watershed 105 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	103	410	256	205	205	205	205	308	513	2,411
2	103	410	256	205	205	205	205	308	513	2,411
3	103	410	256	205	205	205	205	308	513	2,411
4	103	410	256	205	205	205	205	308	513	2,411
5	103	410	256	205	205	205	205	308	513	2,411
6	103	410	256	205	205	205	205	308	513	2,411
7	103	410	256	205	205	205	205	308	513	2,411
8	103	410	256	205	205	205	205	308	513	2,411
9	103	410	256	205	205	205	205	308	513	2,411
10	103	410	256	205	205	205	205	308	513	2,411
11	103	410	256	205	205	205	205	308	513	2,411
12	103	410	256	205	205	205	205	308	513	2,411
13	103	410	256	205	205	205	205	308	513	2,411
14	103	410	256	205	205	205	205	308	513	2,411
15	103	410	256	205	205	205	205	308	513	2,411
16	103	410	256	205	205	205	205	308	513	2,411
17	103	410	256	205	205	205	205	308	513	2,411
18	103	410	256	205	205	205	205	308	513	2,411
19	103	410	256	205	205	205	205	308	513	2,411
20	103	410	256	205	205	205	205	308	513	2,411

Sub-Watershed 106 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total

1	78	311	194	156	156	156	156	233	389	1,828
2	78	311	194	156	156	156	156	233	389	1,828
3	78	311	194	156	156	156	156	233	389	1,828
4	78	311	194	156	156	156	156	233	389	1,828
5	78	311	194	156	156	156	156	233	389	1,828
6	78	311	194	156	156	156	156	233	389	1,828
7	78	311	194	156	156	156	156	233	389	1,828
8	78	311	194	156	156	156	156	233	389	1,828
9	78	311	194	156	156	156	156	233	389	1,828
10	78	311	194	156	156	156	156	233	389	1,828
11	78	311	194	156	156	156	156	233	389	1,828
12	78	311	194	156	156	156	156	233	389	1,828
13	78	311	194	156	156	156	156	233	389	1,828
14	78	311	194	156	156	156	156	233	389	1,828
15	78	311	194	156	156	156	156	233	389	1,828
16	78	311	194	156	156	156	156	233	389	1,828
17	78	311	194	156	156	156	156	233	389	1,828
18	78	311	194	156	156	156	156	233	389	1,828
19	78	311	194	156	156	156	156	233	389	1,828
20	78	311	194	156	156	156	156	233	389	1,828

3.5.2 Peat's Creek

Sub-Watershed 406 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	68	271	169	135	135	135	135	203	339	1,592
2	68	271	169	135	135	135	135	203	339	1,592
3	68	271	169	135	135	135	135	203	339	1,592
4	68	271	169	135	135	135	135	203	339	1,592
5	68	271	169	135	135	135	135	203	339	1,592
6	68	271	169	135	135	135	135	203	339	1,592
7	68	271	169	135	135	135	135	203	339	1,592
8	68	271	169	135	135	135	135	203	339	1,592
9	68	271	169	135	135	135	135	203	339	1,592
10	68	271	169	135	135	135	135	203	339	1,592
11	68	271	169	135	135	135	135	203	339	1,592
12	68	271	169	135	135	135	135	203	339	1,592
13	68	271	169	135	135	135	135	203	339	1,592

14	68	271	169	135	135	135	135	203	339	1,592
15	68	271	169	135	135	135	135	203	339	1,592
16	68	271	169	135	135	135	135	203	339	1,592
17	68	271	169	135	135	135	135	203	339	1,592
18	68	271	169	135	135	135	135	203	339	1,592
19	68	271	169	135	135	135	135	203	339	1,592
20	68	271	169	135	135	135	135	203	339	1,592

Sub-Watershed 408 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	60	242	151	121	121	121	121	181	302	1,422
2	60	242	151	121	121	121	121	181	302	1,422
3	60	242	151	121	121	121	121	181	302	1,422
4	60	242	151	121	121	121	121	181	302	1,422
5	60	242	151	121	121	121	121	181	302	1,422
6	60	242	151	121	121	121	121	181	302	1,422
7	60	242	151	121	121	121	121	181	302	1,422
8	60	242	151	121	121	121	121	181	302	1,422
9	60	242	151	121	121	121	121	181	302	1,422
10	60	242	151	121	121	121	121	181	302	1,422
11	60	242	151	121	121	121	121	181	302	1,422
12	60	242	151	121	121	121	121	181	302	1,422
13	60	242	151	121	121	121	121	181	302	1,422
14	60	242	151	121	121	121	121	181	302	1,422
15	60	242	151	121	121	121	121	181	302	1,422
16	60	242	151	121	121	121	121	181	302	1,422
17	60	242	151	121	121	121	121	181	302	1,422
18	60	242	151	121	121	121	121	181	302	1,422
19	60	242	151	121	121	121	121	181	302	1,422
20	60	242	151	121	121	121	121	181	302	1,422

Sub-Watershed 409 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	144	574	359	287	287	287	287	431	718	3,373
2	144	574	359	287	287	287	287	431	718	3,373
3	144	574	359	287	287	287	287	431	718	3,373
4	144	574	359	287	287	287	287	431	718	3,373
5	144	574	359	287	287	287	287	431	718	3,373
6	144	574	359	287	287	287	287	431	718	3,373
7	144	574	359	287	287	287	287	431	718	3,373
8	144	574	359	287	287	287	287	431	718	3,373
9	144	574	359	287	287	287	287	431	718	3,373
10	144	574	359	287	287	287	287	431	718	3,373
11	144	574	359	287	287	287	287	431	718	3,373
12	144	574	359	287	287	287	287	431	718	3,373
13	144	574	359	287	287	287	287	431	718	3,373
14	144	574	359	287	287	287	287	431	718	3,373
15	144	574	359	287	287	287	287	431	718	3,373
16	144	574	359	287	287	287	287	431	718	3,373
17	144	574	359	287	287	287	287	431	718	3,373
18	144	574	359	287	287	287	287	431	718	3,373
19	144	574	359	287	287	287	287	431	718	3,373
20	144	574	359	287	287	287	287	431	718	3,373

Sub-Watershed 501 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	89	357	223	179	179	179	179	268	447	2,100
2	89	357	223	179	179	179	179	268	447	2,100
3	89	357	223	179	179	179	179	268	447	2,100
4	89	357	223	179	179	179	179	268	447	2,100
5	89	357	223	179	179	179	179	268	447	2,100
6	89	357	223	179	179	179	179	268	447	2,100

7	89	357	223	179	179	179	179	268	447	2,100
8	89	357	223	179	179	179	179	268	447	2,100
9	89	357	223	179	179	179	179	268	447	2,100
10	89	357	223	179	179	179	179	268	447	2,100
11	89	357	223	179	179	179	179	268	447	2,100
12	89	357	223	179	179	179	179	268	447	2,100
13	89	357	223	179	179	179	179	268	447	2,100
14	89	357	223	179	179	179	179	268	447	2,100
15	89	357	223	179	179	179	179	268	447	2,100
16	89	357	223	179	179	179	179	268	447	2,100
17	89	357	223	179	179	179	179	268	447	2,100
18	89	357	223	179	179	179	179	268	447	2,100
19	89	357	223	179	179	179	179	268	447	2,100
20	89	357	223	179	179	179	179	268	447	2,100

Sub-Watershed 502 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	74	295	185	148	148	148	148	221	369	1,735
2	74	295	185	148	148	148	148	221	369	1,735
3	74	295	185	148	148	148	148	221	369	1,735
4	74	295	185	148	148	148	148	221	369	1,735
5	74	295	185	148	148	148	148	221	369	1,735
6	74	295	185	148	148	148	148	221	369	1,735
7	74	295	185	148	148	148	148	221	369	1,735
8	74	295	185	148	148	148	148	221	369	1,735
9	74	295	185	148	148	148	148	221	369	1,735
10	74	295	185	148	148	148	148	221	369	1,735
11	74	295	185	148	148	148	148	221	369	1,735
12	74	295	185	148	148	148	148	221	369	1,735
13	74	295	185	148	148	148	148	221	369	1,735
14	74	295	185	148	148	148	148	221	369	1,735
15	74	295	185	148	148	148	148	221	369	1,735
16	74	295	185	148	148	148	148	221	369	1,735
17	74	295	185	148	148	148	148	221	369	1,735
18	74	295	185	148	148	148	148	221	369	1,735
19	74	295	185	148	148	148	148	221	369	1,735

20	74	295	185	148	148	148	148	221	369	1,735

3.5.3 Lower Milford

Sub-Watershed 506 Annual Adoption (treated acres), Cropland BMPs Before										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	124	498	311	249	249	249	249	373	622	2,924
2	124	498	311	249	249	249	249	373	622	2,924
3	124	498	311	249	249	249	249	373	622	2,924
4	124	498	311	249	249	249	249	373	622	2,924
5	124	498	311	249	249	249	249	373	622	2,924
6	124	498	311	249	249	249	249	373	622	2,924
7	124	498	311	249	249	249	249	373	622	2,924
8	124	498	311	249	249	249	249	373	622	2,924
9	124	498	311	249	249	249	249	373	622	2,924
10	124	498	311	249	249	249	249	373	622	2,924
11	124	498	311	249	249	249	249	373	622	2,924
12	124	498	311	249	249	249	249	373	622	2,924
13	124	498	311	249	249	249	249	373	622	2,924
14	124	498	311	249	249	249	249	373	622	2,924
15	124	498	311	249	249	249	249	373	622	2,924
16	124	498	311	249	249	249	249	373	622	2,924
17	124	498	311	249	249	249	249	373	622	2,924
18	124	498	311	249	249	249	249	373	622	2,924
19	124	498	311	249	249	249	249	373	622	2,924
20	124	498	311	249	249	249	249	373	622	2,924
Sub-Watershed 507 Annual Adoption (treated acres), Cropland BMPs										

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	140	559	350	280	280	280	280	419	699	3,285
2	140	559	350	280	280	280	280	419	699	3,285
3	140	559	350	280	280	280	280	419	699	3,285
4	140	559	350	280	280	280	280	419	699	3,285
5	140	559	350	280	280	280	280	419	699	3,285
6	140	559	350	280	280	280	280	419	699	3,285
7	140	559	350	280	280	280	280	419	699	3,285
8	140	559	350	280	280	280	280	419	699	3,285
9	140	559	350	280	280	280	280	419	699	3,285
10	140	559	350	280	280	280	280	419	699	3,285
11	140	559	350	280	280	280	280	419	699	3,285
12	140	559	350	280	280	280	280	419	699	3,285
13	140	559	350	280	280	280	280	419	699	3,285
14	140	559	350	280	280	280	280	419	699	3,285
15	140	559	350	280	280	280	280	419	699	3,285
16	140	559	350	280	280	280	280	419	699	3,285
17	140	559	350	280	280	280	280	419	699	3,285
18	140	559	350	280	280	280	280	419	699	3,285
19	140	559	350	280	280	280	280	419	699	3,285
20	140	559	350	280	280	280	280	419	699	3,285

Sub-Watershed 601 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	61	243	152	122	122	122	122	182	304	1,428
2	61	243	152	122	122	122	122	182	304	1,428
3	61	243	152	122	122	122	122	182	304	1,428

4	61	243	152	122	122	122	122	182	304	1,428
5	61	243	152	122	122	122	122	182	304	1,428
6	61	243	152	122	122	122	122	182	304	1,428
7	61	243	152	122	122	122	122	182	304	1,428
8	61	243	152	122	122	122	122	182	304	1,428
9	61	243	152	122	122	122	122	182	304	1,428
10	61	243	152	122	122	122	122	182	304	1,428
11	61	243	152	122	122	122	122	182	304	1,428
12	61	243	152	122	122	122	122	182	304	1,428
13	61	243	152	122	122	122	122	182	304	1,428
14	61	243	152	122	122	122	122	182	304	1,428
15	61	243	152	122	122	122	122	182	304	1,428
16	61	243	152	122	122	122	122	182	304	1,428
17	61	243	152	122	122	122	122	182	304	1,428
18	61	243	152	122	122	122	122	182	304	1,428
19	61	243	152	122	122	122	122	182	304	1,428
20	61	243	152	122	122	122	122	182	304	1,428

Sub-Watershed 602 Annual Adoption (treated acres), Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	75	300	188	150	150	150	150	225	375	1,765
2	75	300	188	150	150	150	150	225	375	1,765
3	75	300	188	150	150	150	150	225	375	1,765
4	75	300	188	150	150	150	150	225	375	1,765
5	75	300	188	150	150	150	150	225	375	1,765
6	75	300	188	150	150	150	150	225	375	1,765
7	75	300	188	150	150	150	150	225	375	1,765
8	75	300	188	150	150	150	150	225	375	1,765
9	75	300	188	150	150	150	150	225	375	1,765
10	75	300	188	150	150	150	150	225	375	1,765
11	75	300	188	150	150	150	150	225	375	1,765
12	75	300	188	150	150	150	150	225	375	1,765
13	75	300	188	150	150	150	150	225	375	1,765
14	75	300	188	150	150	150	150	225	375	1,765

15	75	300	188	150	150	150	150	225	375	1,765
16	75	300	188	150	150	150	150	225	375	1,765
17	75	300	188	150	150	150	150	225	375	1,765
18	75	300	188	150	150	150	150	225	375	1,765
19	75	300	188	150	150	150	150	225	375	1,765
20	75	300	188	150	150	150	150	225	375	1,765

Sub-Watershed 603 Annual Adoption (treated acres), Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	60	239	150	120	120	120	120	179	299	1,406
2	60	239	150	120	120	120	120	179	299	1,406
3	60	239	150	120	120	120	120	179	299	1,406
4	60	239	150	120	120	120	120	179	299	1,406
5	60	239	150	120	120	120	120	179	299	1,406
6	60	239	150	120	120	120	120	179	299	1,406
7	60	239	150	120	120	120	120	179	299	1,406
8	60	239	150	120	120	120	120	179	299	1,406
9	60	239	150	120	120	120	120	179	299	1,406
10	60	239	150	120	120	120	120	179	299	1,406
11	60	239	150	120	120	120	120	179	299	1,406
12	60	239	150	120	120	120	120	179	299	1,406
13	60	239	150	120	120	120	120	179	299	1,406
14	60	239	150	120	120	120	120	179	299	1,406
15	60	239	150	120	120	120	120	179	299	1,406
16	60	239	150	120	120	120	120	179	299	1,406
17	60	239	150	120	120	120	120	179	299	1,406
18	60	239	150	120	120	120	120	179	299	1,406
19	60	239	150	120	120	120	120	179	299	1,406
20	60	239	150	120	120	120	120	179	299	1,406

3.6. Appendix Tables – Costs Before and After Cost share

3.6.1 Jamestown

Sub-Watershed 104 Annual Cost Before Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$5,578	$71,392	$13,944	$14,873	$27,888	$5,354	$6,024	$16,733	$3,904	$165,689
2	$5,745	$73,534	$14,362	$15,320	$28,724	$5,515	$6,204	$17,234	$4,021	$170,660
3	$5,917	$75,740	$14,793	$15,779	$29,586	$5,680	$6,391	$17,752	$4,142	$175,779
4	$6,095	$78,012	$15,237	$16,252	$30,473	$5,851	$6,582	$18,284	$4,266	$181,053
5	$6,278	$80,352	$15,694	$16,740	$31,388	$6,026	$6,780	$18,833	$4,394	$186,484
6	$6,466	$82,763	$16,165	$17,242	$32,329	$6,207	$6,983	$19,398	$4,526	$192,079
7	$6,660	$85,246	$16,650	$17,760	$33,299	$6,393	$7,193	$19,979	$4,662	$197,841
8	$6,860	$87,803	$17,149	$18,292	$34,298	$6,585	$7,408	$20,579	$4,802	$203,776
9	$7,065	$90,437	$17,664	$18,841	$35,327	$6,783	$7,631	$21,196	$4,946	$209,890
10	$7,277	$93,150	$18,193	$19,406	$36,387	$6,986	$7,860	$21,832	$5,094	$216,186
11	$7,496	$95,945	$18,739	$19,989	$37,478	$7,196	$8,095	$22,487	$5,247	$222,672
12	$7,721	$98,823	$19,301	$20,588	$38,603	$7,412	$8,338	$23,162	$5,404	$229,352
13	$7,952	$101,788	$19,880	$21,206	$39,761	$7,634	$8,588	$23,857	$5,567	$236,233
14	$8,191	$104,842	$20,477	$21,842	$40,954	$7,863	$8,846	$24,572	$5,734	$243,320
15	$8,436	$107,987	$21,091	$22,497	$42,182	$8,099	$9,111	$25,309	$5,906	$250,619
16	$8,690	$111,226	$21,724	$23,172	$43,448	$8,342	$9,385	$26,069	$6,083	$258,138
17	$8,950	$114,563	$22,376	$23,867	$44,751	$8,592	$9,666	$26,851	$6,265	$265,882
18	$9,219	$118,000	$23,047	$24,583	$46,094	$8,850	$9,956	$27,656	$6,453	$273,859
19	$9,495	$121,540	$23,738	$25,321	$47,477	$9,116	$10,255	$28,486	$6,647	$282,074
20	$9,780	$125,186	$24,450	$26,080	$48,901	$9,389	$10,563	$29,341	$6,846	$290,537

Sub-Watershed 105 Annual Cost Before Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$5,129	$65,648	$12,822	$13,677	$25,644	$4,924	$5,539	$15,386	$3,590	$152,358
2	$5,283	$67,617	$13,207	$14,087	$26,413	$5,071	$5,705	$15,848	$3,698	$156,929
3	$5,441	$69,646	$13,603	$14,510	$27,205	$5,223	$5,876	$16,323	$3,809	$161,637
4	$5,604	$71,735	$14,011	$14,945	$28,022	$5,380	$6,053	$16,813	$3,923	$166,486
5	$5,772	$73,887	$14,431	$15,393	$28,862	$5,542	$6,234	$17,317	$4,041	$171,480
6	$5,946	$76,104	$14,864	$15,855	$29,728	$5,708	$6,421	$17,837	$4,162	$176,625
7	$6,124	$78,387	$15,310	$16,331	$30,620	$5,879	$6,614	$18,372	$4,287	$181,923
8	$6,308	$80,739	$15,769	$16,821	$31,539	$6,055	$6,812	$18,923	$4,415	$187,381
9	$6,497	$83,161	$16,242	$17,325	$32,485	$6,237	$7,017	$19,491	$4,548	$193,003
10	$6,692	$85,656	$16,730	$17,845	$33,459	$6,424	$7,227	$20,076	$4,684	$198,793

11	$6,893	$88,225	$17,232	$18,380	$34,463	$6,617	$7,444	$20,678	$4,825	$204,757
12	$7,099	$90,872	$17,748	$18,932	$35,497	$6,815	$7,667	$21,298	$4,970	$210,899
13	$7,312	$93,598	$18,281	$19,500	$36,562	$7,020	$7,897	$21,937	$5,119	$217,226
14	$7,532	$96,406	$18,829	$20,085	$37,659	$7,230	$8,134	$22,595	$5,272	$223,743
15	$7,758	$99,298	$19,394	$20,687	$38,788	$7,447	$8,378	$23,273	$5,430	$230,455
16	$7,990	$102,277	$19,976	$21,308	$39,952	$7,671	$8,630	$23,971	$5,593	$237,369
17	$8,230	$105,346	$20,575	$21,947	$41,151	$7,901	$8,889	$24,690	$5,761	$244,490
18	$8,477	$108,506	$21,193	$22,605	$42,385	$8,138	$9,155	$25,431	$5,934	$251,825
19	$8,731	$111,761	$21,828	$23,284	$43,657	$8,382	$9,430	$26,194	$6,112	$259,379
20	$8,993	$115,114	$22,483	$23,982	$44,966	$8,634	$9,713	$26,980	$6,295	$267,161

Sub-Watershed 106 Annual Cost Before Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,889	$49,782	$9,723	$10,371	$19,446	$3,734	$4,200	$11,668	$2,722	$115,537
2	$4,006	$51,276	$10,015	$10,682	$20,030	$3,846	$4,326	$12,018	$2,804	$119,003
3	$4,126	$52,814	$10,315	$11,003	$20,631	$3,961	$4,456	$12,378	$2,888	$122,573
4	$4,250	$54,399	$10,625	$11,333	$21,249	$4,080	$4,590	$12,750	$2,975	$126,250
5	$4,377	$56,031	$10,943	$11,673	$21,887	$4,202	$4,728	$13,132	$3,064	$130,038
6	$4,509	$57,711	$11,272	$12,023	$22,544	$4,328	$4,869	$13,526	$3,156	$133,939
7	$4,644	$59,443	$11,610	$12,384	$23,220	$4,458	$5,015	$13,932	$3,251	$137,957
8	$4,783	$61,226	$11,958	$12,755	$23,916	$4,592	$5,166	$14,350	$3,348	$142,096
9	$4,927	$63,063	$12,317	$13,138	$24,634	$4,730	$5,321	$14,780	$3,449	$146,358
10	$5,075	$64,955	$12,686	$13,532	$25,373	$4,872	$5,481	$15,224	$3,552	$150,749
11	$5,227	$66,903	$13,067	$13,938	$26,134	$5,018	$5,645	$15,680	$3,659	$155,272
12	$5,384	$68,910	$13,459	$14,356	$26,918	$5,168	$5,814	$16,151	$3,769	$159,930
13	$5,545	$70,978	$13,863	$14,787	$27,726	$5,323	$5,989	$16,635	$3,882	$164,728
14	$5,711	$73,107	$14,279	$15,231	$28,557	$5,483	$6,168	$17,134	$3,998	$169,669
15	$5,883	$75,300	$14,707	$15,688	$29,414	$5,648	$6,353	$17,649	$4,118	$174,760
16	$6,059	$77,559	$15,148	$16,158	$30,297	$5,817	$6,544	$18,178	$4,242	$180,002
17	$6,241	$79,886	$15,603	$16,643	$31,206	$5,991	$6,740	$18,723	$4,369	$185,402
18	$6,428	$82,283	$16,071	$17,142	$32,142	$6,171	$6,943	$19,285	$4,500	$190,964
19	$6,621	$84,751	$16,553	$17,657	$33,106	$6,356	$7,151	$19,864	$4,635	$196,693
20	$6,820	$87,294	$17,050	$18,186	$34,099	$6,547	$7,365	$20,459	$4,774	$202,594

Sub-Watershed 104 Annual Cost After Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$5,578	$35,696	$8,506	$1,487	$13,944	$2,677	$6,024	$6,693	$3,904	$84,508
2	$5,745	$36,767	$8,761	$1,532	$14,362	$2,758	$6,204	$6,894	$4,021	$87,044
3	$5,917	$37,870	$9,024	$1,578	$14,793	$2,840	$6,391	$7,101	$4,142	$89,655
4	$6,095	$39,006	$9,294	$1,625	$15,237	$2,925	$6,582	$7,314	$4,266	$92,345
5	$6,278	$40,176	$9,573	$1,674	$15,694	$3,013	$6,780	$7,533	$4,394	$95,115
6	$6,466	$41,381	$9,860	$1,724	$16,165	$3,104	$6,983	$7,759	$4,526	$97,968
7	$6,660	$42,623	$10,156	$1,776	$16,650	$3,197	$7,193	$7,992	$4,662	$100,907
8	$6,860	$43,902	$10,461	$1,829	$17,149	$3,293	$7,408	$8,232	$4,802	$103,935
9	$7,065	$45,219	$10,775	$1,884	$17,664	$3,391	$7,631	$8,478	$4,946	$107,053
10	$7,277	$46,575	$11,098	$1,941	$18,193	$3,493	$7,860	$8,733	$5,094	$110,264
11	$7,496	$47,972	$11,431	$1,999	$18,739	$3,598	$8,095	$8,995	$5,247	$113,572
12	$7,721	$49,412	$11,774	$2,059	$19,301	$3,706	$8,338	$9,265	$5,404	$116,979
13	$7,952	$50,894	$12,127	$2,121	$19,880	$3,817	$8,588	$9,543	$5,567	$120,489
14	$8,191	$52,421	$12,491	$2,184	$20,477	$3,932	$8,846	$9,829	$5,734	$124,103
15	$8,436	$53,993	$12,866	$2,250	$21,091	$4,050	$9,111	$10,124	$5,906	$127,827
16	$8,690	$55,613	$13,252	$2,317	$21,724	$4,171	$9,385	$10,427	$6,083	$131,661
17	$8,950	$57,282	$13,649	$2,387	$22,376	$4,296	$9,666	$10,740	$6,265	$135,611
18	$9,219	$59,000	$14,059	$2,458	$23,047	$4,425	$9,956	$11,063	$6,453	$139,680
19	$9,495	$60,770	$14,480	$2,532	$23,738	$4,558	$10,255	$11,394	$6,647	$143,870
20	$9,780	$62,593	$14,915	$2,608	$24,450	$4,694	$10,563	$11,736	$6,846	$148,186

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Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$5,129	$32,824	$7,821	$1,368	$12,822	$2,462	$5,539	$6,155	$3,590	$77,709
2	$5,283	$33,809	$8,056	$1,409	$13,207	$2,536	$5,705	$6,339	$3,698	$80,040
3	$5,441	$34,823	$8,298	$1,451	$13,603	$2,612	$5,876	$6,529	$3,809	$82,442
4	$5,604	$35,868	$8,547	$1,494	$14,011	$2,690	$6,053	$6,725	$3,923	$84,915
5	$5,772	$36,944	$8,803	$1,539	$14,431	$2,771	$6,234	$6,927	$4,041	$87,462
6	$5,946	$38,052	$9,067	$1,586	$14,864	$2,854	$6,421	$7,135	$4,162	$90,086
7	$6,124	$39,194	$9,339	$1,633	$15,310	$2,940	$6,614	$7,349	$4,287	$92,789
8	$6,308	$40,369	$9,619	$1,682	$15,769	$3,028	$6,812	$7,569	$4,415	$95,572

9	$6,497	$41,580	$9,908	$1,733	$16,242	$3,119	$7,017	$7,796	$4,548	$98,440
10	$6,692	$42,828	$10,205	$1,784	$16,730	$3,212	$7,227	$8,030	$4,684	$101,393
11	$6,893	$44,113	$10,511	$1,838	$17,232	$3,308	$7,444	$8,271	$4,825	$104,435
12	$7,099	$45,436	$10,827	$1,893	$17,748	$3,408	$7,667	$8,519	$4,970	$107,568
13	$7,312	$46,799	$11,151	$1,950	$18,281	$3,510	$7,897	$8,775	$5,119	$110,795
14	$7,532	$48,203	$11,486	$2,008	$18,829	$3,615	$8,134	$9,038	$5,272	$114,118
15	$7,758	$49,649	$11,830	$2,069	$19,394	$3,724	$8,378	$9,309	$5,430	$117,542
16	$7,990	$51,139	$12,185	$2,131	$19,976	$3,835	$8,630	$9,589	$5,593	$121,068
17	$8,230	$52,673	$12,551	$2,195	$20,575	$3,950	$8,889	$9,876	$5,761	$124,700
18	$8,477	$54,253	$12,927	$2,261	$21,193	$4,069	$9,155	$10,172	$5,934	$128,441
19	$8,731	$55,881	$13,315	$2,328	$21,828	$4,191	$9,430	$10,478	$6,112	$132,295
20	$8,993	$57,557	$13,715	$2,398	$22,483	$4,317	$9,713	$10,792	$6,295	$136,263

Sub-Watershed 106 Annual Cost After Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,889	$24,891	$5,931	$1,037	$9,723	$1,867	$4,200	$4,667	$2,722	$58,929
2	$4,006	$25,638	$6,109	$1,068	$10,015	$1,923	$4,326	$4,807	$2,804	$60,696
3	$4,126	$26,407	$6,292	$1,100	$10,315	$1,981	$4,456	$4,951	$2,888	$62,517
4	$4,250	$27,199	$6,481	$1,133	$10,625	$2,040	$4,590	$5,100	$2,975	$64,393
5	$4,377	$28,015	$6,676	$1,167	$10,943	$2,101	$4,728	$5,253	$3,064	$66,325
6	$4,509	$28,856	$6,876	$1,202	$11,272	$2,164	$4,869	$5,410	$3,156	$68,314
7	$4,644	$29,721	$7,082	$1,238	$11,610	$2,229	$5,015	$5,573	$3,251	$70,364
8	$4,783	$30,613	$7,295	$1,276	$11,958	$2,296	$5,166	$5,740	$3,348	$72,475
9	$4,927	$31,531	$7,513	$1,314	$12,317	$2,365	$5,321	$5,912	$3,449	$74,649
10	$5,075	$32,477	$7,739	$1,353	$12,686	$2,436	$5,481	$6,090	$3,552	$76,888
11	$5,227	$33,452	$7,971	$1,394	$13,067	$2,509	$5,645	$6,272	$3,659	$79,195
12	$5,384	$34,455	$8,210	$1,436	$13,459	$2,584	$5,814	$6,460	$3,769	$81,571
13	$5,545	$35,489	$8,456	$1,479	$13,863	$2,662	$5,989	$6,654	$3,882	$84,018
14	$5,711	$36,554	$8,710	$1,523	$14,279	$2,742	$6,168	$6,854	$3,998	$86,539
15	$5,883	$37,650	$8,971	$1,569	$14,707	$2,824	$6,353	$7,059	$4,118	$89,135
16	$6,059	$38,780	$9,240	$1,616	$15,148	$2,908	$6,544	$7,271	$4,242	$91,809
17	$6,241	$39,943	$9,518	$1,664	$15,603	$2,996	$6,740	$7,489	$4,369	$94,563
18	$6,428	$41,141	$9,803	$1,714	$16,071	$3,086	$6,943	$7,714	$4,500	$97,400
19	$6,621	$42,376	$10,097	$1,766	$16,553	$3,178	$7,151	$7,945	$4,635	$100,322
20	$6,820	$43,647	$10,400	$1,819	$17,050	$3,274	$7,365	$8,184	$4,774	$103,332

3.6.2 Peat's Creek

Sub-Watershed 406 Annual Cost Before Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,386	$43,344	$8,466	$9,030	$16,931	$3,251	$3,657	$10,159	$2,370	$100,594
2	$3,488	$44,644	$8,720	$9,301	$17,439	$3,348	$3,767	$10,464	$2,441	$103,612
3	$3,592	$45,984	$8,981	$9,580	$17,962	$3,449	$3,880	$10,777	$2,515	$106,720
4	$3,700	$47,363	$9,251	$9,867	$18,501	$3,552	$3,996	$11,101	$2,590	$109,922
5	$3,811	$48,784	$9,528	$10,163	$19,056	$3,659	$4,116	$11,434	$2,668	$113,220
6	$3,926	$50,248	$9,814	$10,468	$19,628	$3,769	$4,240	$11,777	$2,748	$116,616
7	$4,043	$51,755	$10,108	$10,782	$20,217	$3,882	$4,367	$12,130	$2,830	$120,115
8	$4,165	$53,308	$10,412	$11,106	$20,823	$3,998	$4,498	$12,494	$2,915	$123,718
9	$4,290	$54,907	$10,724	$11,439	$21,448	$4,118	$4,633	$12,869	$3,003	$127,430
10	$4,418	$56,554	$11,046	$11,782	$22,091	$4,242	$4,772	$13,255	$3,093	$131,253
11	$4,551	$58,251	$11,377	$12,136	$22,754	$4,369	$4,915	$13,653	$3,186	$135,190
12	$4,687	$59,998	$11,718	$12,500	$23,437	$4,500	$5,062	$14,062	$3,281	$139,246
13	$4,828	$61,798	$12,070	$12,875	$24,140	$4,635	$5,214	$14,484	$3,380	$143,423
14	$4,973	$63,652	$12,432	$13,261	$24,864	$4,774	$5,371	$14,918	$3,481	$147,726
15	$5,122	$65,562	$12,805	$13,659	$25,610	$4,917	$5,532	$15,366	$3,585	$152,158
16	$5,276	$67,529	$13,189	$14,068	$26,378	$5,065	$5,698	$15,827	$3,693	$156,722
17	$5,434	$69,554	$13,585	$14,490	$27,170	$5,217	$5,869	$16,302	$3,804	$161,424
18	$5,597	$71,641	$13,992	$14,925	$27,985	$5,373	$6,045	$16,791	$3,918	$166,267
19	$5,765	$73,790	$14,412	$15,373	$28,824	$5,534	$6,226	$17,295	$4,035	$171,255
20	$5,938	$76,004	$14,845	$15,834	$29,689	$5,700	$6,413	$17,813	$4,156	$176,393

Sub-Watershed 408 Annual Cost Before Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,025	$38,717	$7,562	$8,066	$15,124	$2,904	$3,267	$9,074	$2,117	$89,855
2	$3,115	$39,878	$7,789	$8,308	$15,577	$2,991	$3,365	$9,346	$2,181	$92,551
3	$3,209	$41,075	$8,022	$8,557	$16,045	$3,081	$3,466	$9,627	$2,246	$95,327
4	$3,305	$42,307	$8,263	$8,814	$16,526	$3,173	$3,570	$9,916	$2,314	$98,187

5	$3,404	$43,576	$8,511	$9,078	$17,022	$3,268	$3,677	$10,213	$2,383	$101,133
6	$3,507	$44,883	$8,766	$9,351	$17,533	$3,366	$3,787	$10,520	$2,455	$104,167
7	$3,612	$46,230	$9,029	$9,631	$18,059	$3,467	$3,901	$10,835	$2,528	$107,292
8	$3,720	$47,617	$9,300	$9,920	$18,600	$3,571	$4,018	$11,160	$2,604	$110,511
9	$3,832	$49,045	$9,579	$10,218	$19,158	$3,678	$4,138	$11,495	$2,682	$113,826
10	$3,947	$50,517	$9,867	$10,524	$19,733	$3,789	$4,262	$11,840	$2,763	$117,241
11	$4,065	$52,032	$10,163	$10,840	$20,325	$3,902	$4,390	$12,195	$2,846	$120,758
12	$4,187	$53,593	$10,467	$11,165	$20,935	$4,019	$4,522	$12,561	$2,931	$124,381
13	$4,313	$55,201	$10,781	$11,500	$21,563	$4,140	$4,658	$12,938	$3,019	$128,112
14	$4,442	$56,857	$11,105	$11,845	$22,210	$4,264	$4,797	$13,326	$3,109	$131,955
15	$4,575	$58,563	$11,438	$12,201	$22,876	$4,392	$4,941	$13,726	$3,203	$135,914
16	$4,712	$60,320	$11,781	$12,567	$23,562	$4,524	$5,089	$14,137	$3,299	$139,992
17	$4,854	$62,129	$12,135	$12,944	$24,269	$4,660	$5,242	$14,562	$3,398	$144,191
18	$4,999	$63,993	$12,499	$13,332	$24,997	$4,799	$5,399	$14,998	$3,500	$148,517
19	$5,149	$65,913	$12,874	$13,732	$25,747	$4,943	$5,561	$15,448	$3,605	$152,973
20	$5,304	$67,890	$13,260	$14,144	$26,520	$5,092	$5,728	$15,912	$3,713	$157,562

Sub-Watershed 409 Annual Cost Before Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$7,177	$91,866	$17,943	$19,139	$35,885	$6,890	$7,751	$21,531	$5,024	$213,205
2	$7,392	$94,622	$18,481	$19,713	$36,962	$7,097	$7,984	$22,177	$5,175	$219,601
3	$7,614	$97,460	$19,035	$20,304	$38,070	$7,310	$8,223	$22,842	$5,330	$226,189
4	$7,843	$100,384	$19,606	$20,913	$39,213	$7,529	$8,470	$23,528	$5,490	$232,975
5	$8,078	$103,396	$20,194	$21,541	$40,389	$7,755	$8,724	$24,233	$5,654	$239,964
6	$8,320	$106,497	$20,800	$22,187	$41,601	$7,987	$8,986	$24,960	$5,824	$247,163
7	$8,570	$109,692	$21,424	$22,853	$42,849	$8,227	$9,255	$25,709	$5,999	$254,578
8	$8,827	$112,983	$22,067	$23,538	$44,134	$8,474	$9,533	$26,480	$6,179	$262,215
9	$9,092	$116,373	$22,729	$24,244	$45,458	$8,728	$9,819	$27,275	$6,364	$270,081
10	$9,364	$119,864	$23,411	$24,972	$46,822	$8,990	$10,114	$28,093	$6,555	$278,184
11	$9,645	$123,460	$24,113	$25,721	$48,226	$9,259	$10,417	$28,936	$6,752	$286,529
12	$9,935	$127,163	$24,837	$26,492	$49,673	$9,537	$10,729	$29,804	$6,954	$295,125
13	$10,233	$130,978	$25,582	$27,287	$51,163	$9,823	$11,051	$30,698	$7,163	$303,979
14	$10,540	$134,908	$26,349	$28,106	$52,698	$10,118	$11,383	$31,619	$7,378	$313,098
15	$10,856	$138,955	$27,140	$28,949	$54,279	$10,422	$11,724	$32,568	$7,599	$322,491
16	$11,182	$143,124	$27,954	$29,817	$55,908	$10,734	$12,076	$33,545	$7,827	$332,166
17	$11,517	$147,417	$28,792	$30,712	$57,585	$11,056	$12,438	$34,551	$8,062	$342,131
18	$11,862	$151,840	$29,656	$31,633	$59,312	$11,388	$12,811	$35,587	$8,304	$352,395

19	$12,218	$156,395	$30,546	$32,582	$61,092	$11,730	$13,196	$36,655	$8,553	$362,967
20	$12,585	$161,087	$31,462	$33,560	$62,925	$12,082	$13,592	$37,755	$8,809	$373,856

Sub-Watershed 501 Annual Cost Before Cost-Share Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$4,468	$57,194	$11,171	$11,915	$22,341	$4,290	$4,826	$13,405	$3,128	$132,737
2	$4,602	$58,909	$11,506	$12,273	$23,011	$4,418	$4,970	$13,807	$3,222	$136,719
3	$4,740	$60,677	$11,851	$12,641	$23,702	$4,551	$5,120	$14,221	$3,318	$140,820
4	$4,883	$62,497	$12,206	$13,020	$24,413	$4,687	$5,273	$14,648	$3,418	$145,045
5	$5,029	$64,372	$12,573	$13,411	$25,145	$4,828	$5,431	$15,087	$3,520	$149,396
6	$5,180	$66,303	$12,950	$13,813	$25,900	$4,973	$5,594	$15,540	$3,626	$153,878
7	$5,335	$68,292	$13,338	$14,228	$26,677	$5,122	$5,762	$16,006	$3,735	$158,495
8	$5,495	$70,341	$13,738	$14,654	$27,477	$5,276	$5,935	$16,486	$3,847	$163,250
9	$5,660	$72,451	$14,151	$15,094	$28,301	$5,434	$6,113	$16,981	$3,962	$168,147
10	$5,830	$74,625	$14,575	$15,547	$29,150	$5,597	$6,296	$17,490	$4,081	$173,191
11	$6,005	$76,863	$15,012	$16,013	$30,025	$5,765	$6,485	$18,015	$4,203	$178,387
12	$6,185	$79,169	$15,463	$16,494	$30,926	$5,938	$6,680	$18,555	$4,330	$183,739
13	$6,371	$81,544	$15,927	$16,988	$31,853	$6,116	$6,880	$19,112	$4,459	$189,251
14	$6,562	$83,991	$16,404	$17,498	$32,809	$6,299	$7,087	$19,685	$4,593	$194,928
15	$6,759	$86,510	$16,897	$18,023	$33,793	$6,488	$7,299	$20,276	$4,731	$200,776
16	$6,961	$89,106	$17,403	$18,564	$34,807	$6,683	$7,518	$20,884	$4,873	$206,800
17	$7,170	$91,779	$17,926	$19,121	$35,851	$6,883	$7,744	$21,511	$5,019	$213,004
18	$7,385	$94,532	$18,463	$19,694	$36,927	$7,090	$7,976	$22,156	$5,170	$219,394
19	$7,607	$97,368	$19,017	$20,285	$38,034	$7,303	$8,215	$22,821	$5,325	$225,976
20	$7,835	$100,289	$19,588	$20,894	$39,176	$7,522	$8,462	$23,505	$5,485	$232,755

Sub-Watershed 502 Annual Cost, Before Cost-Share Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,691	$47,245	$9,228	$9,843	$18,455	$3,543	$3,986	$11,073	$2,584	$109,647
2	$3,802	$48,662	$9,504	$10,138	$19,009	$3,650	$4,106	$11,405	$2,661	$112,937
3	$3,916	$50,122	$9,789	$10,442	$19,579	$3,759	$4,229	$11,747	$2,741	$116,325
4	$4,033	$51,626	$10,083	$10,755	$20,166	$3,872	$4,356	$12,100	$2,823	$119,815

5	$4,154	$53,174	$10,386	$11,078	$20,771	$3,988	$4,487	$12,463	$2,908	$123,409
6	$4,279	$54,770	$10,697	$11,410	$21,394	$4,108	$4,621	$12,837	$2,995	$127,111
7	$4,407	$56,413	$11,018	$11,753	$22,036	$4,231	$4,760	$13,222	$3,085	$130,925
8	$4,539	$58,105	$11,349	$12,105	$22,697	$4,358	$4,903	$13,618	$3,178	$134,852
9	$4,676	$59,848	$11,689	$12,468	$23,378	$4,489	$5,050	$14,027	$3,273	$138,898
10	$4,816	$61,644	$12,040	$12,842	$24,080	$4,623	$5,201	$14,448	$3,371	$143,065
11	$4,960	$63,493	$12,401	$13,228	$24,802	$4,762	$5,357	$14,881	$3,472	$147,357
12	$5,109	$65,398	$12,773	$13,625	$25,546	$4,905	$5,518	$15,328	$3,576	$151,778
13	$5,262	$67,360	$13,156	$14,033	$26,312	$5,052	$5,683	$15,787	$3,684	$156,331
14	$5,420	$69,381	$13,551	$14,454	$27,102	$5,204	$5,854	$16,261	$3,794	$161,021
15	$5,583	$71,462	$13,957	$14,888	$27,915	$5,360	$6,030	$16,749	$3,908	$165,851
16	$5,750	$73,606	$14,376	$15,335	$28,752	$5,520	$6,210	$17,251	$4,025	$170,827
17	$5,923	$75,814	$14,807	$15,795	$29,615	$5,686	$6,397	$17,769	$4,146	$175,952
18	$6,101	$78,088	$15,252	$16,268	$30,503	$5,857	$6,589	$18,302	$4,270	$181,230
19	$6,284	$80,431	$15,709	$16,756	$31,418	$6,032	$6,786	$18,851	$4,399	$186,667
20	$6,472	$82,844	$16,180	$17,259	$32,361	$6,213	$6,990	$19,417	$4,531	$192,267

Sub-Watershed 406 Annual Cost After Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,386	$21,672	$5,164	$903	$8,466	$1,625	$3,657	$4,064	$2,370	$51,307
2	$3,488	$22,322	$5,319	$930	$8,720	$1,674	$3,767	$4,185	$2,441	$52,847
3	$3,592	$22,992	$5,479	$958	$8,981	$1,724	$3,880	$4,311	$2,515	$54,432
4	$3,700	$23,682	$5,643	$987	$9,251	$1,776	$3,996	$4,440	$2,590	$56,065
5	$3,811	$24,392	$5,812	$1,016	$9,528	$1,829	$4,116	$4,574	$2,668	$57,747
6	$3,926	$25,124	$5,987	$1,047	$9,814	$1,884	$4,240	$4,711	$2,748	$59,479
7	$4,043	$25,878	$6,166	$1,078	$10,108	$1,941	$4,367	$4,852	$2,830	$61,264
8	$4,165	$26,654	$6,351	$1,111	$10,412	$1,999	$4,498	$4,998	$2,915	$63,102
9	$4,290	$27,453	$6,542	$1,144	$10,724	$2,059	$4,633	$5,148	$3,003	$64,995
10	$4,418	$28,277	$6,738	$1,178	$11,046	$2,121	$4,772	$5,302	$3,093	$66,944
11	$4,551	$29,125	$6,940	$1,214	$11,377	$2,184	$4,915	$5,461	$3,186	$68,953
12	$4,687	$29,999	$7,148	$1,250	$11,718	$2,250	$5,062	$5,625	$3,281	$71,021
13	$4,828	$30,899	$7,363	$1,287	$12,070	$2,317	$5,214	$5,794	$3,380	$73,152
14	$4,973	$31,826	$7,584	$1,326	$12,432	$2,387	$5,371	$5,967	$3,481	$75,347
15	$5,122	$32,781	$7,811	$1,366	$12,805	$2,459	$5,532	$6,146	$3,585	$77,607
16	$5,276	$33,764	$8,045	$1,407	$13,189	$2,532	$5,698	$6,331	$3,693	$79,935
17	$5,434	$34,777	$8,287	$1,449	$13,585	$2,608	$5,869	$6,521	$3,804	$82,333
18	$5,597	$35,821	$8,535	$1,493	$13,992	$2,687	$6,045	$6,716	$3,918	$84,803

19	$5,765	$36,895	$8,791	$1,537	$14,412	$2,767	$6,226	$6,918	$4,035	$87,347
20	$5,938	$38,002	$9,055	$1,583	$14,845	$2,850	$6,413	$7,125	$4,156	$89,968

Sub-Watershed 408 Annual Cost After Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,025	$19,358	$4,613	$807	$7,562	$1,452	$3,267	$3,630	$2,117	$45,830
2	$3,115	$19,939	$4,751	$831	$7,789	$1,495	$3,365	$3,739	$2,181	$47,205
3	$3,209	$20,537	$4,894	$856	$8,022	$1,540	$3,466	$3,851	$2,246	$48,621
4	$3,305	$21,153	$5,040	$881	$8,263	$1,587	$3,570	$3,966	$2,314	$50,080
5	$3,404	$21,788	$5,192	$908	$8,511	$1,634	$3,677	$4,085	$2,383	$51,582
6	$3,507	$22,442	$5,347	$935	$8,766	$1,683	$3,787	$4,208	$2,455	$53,130
7	$3,612	$23,115	$5,508	$963	$9,029	$1,734	$3,901	$4,334	$2,528	$54,723
8	$3,720	$23,808	$5,673	$992	$9,300	$1,786	$4,018	$4,464	$2,604	$56,365
9	$3,832	$24,523	$5,843	$1,022	$9,579	$1,839	$4,138	$4,598	$2,682	$58,056
10	$3,947	$25,258	$6,019	$1,052	$9,867	$1,894	$4,262	$4,736	$2,763	$59,798
11	$4,065	$26,016	$6,199	$1,084	$10,163	$1,951	$4,390	$4,878	$2,846	$61,592
12	$4,187	$26,797	$6,385	$1,117	$10,467	$2,010	$4,522	$5,024	$2,931	$63,439
13	$4,313	$27,600	$6,577	$1,150	$10,781	$2,070	$4,658	$5,175	$3,019	$65,343
14	$4,442	$28,428	$6,774	$1,185	$11,105	$2,132	$4,797	$5,330	$3,109	$67,303
15	$4,575	$29,281	$6,977	$1,220	$11,438	$2,196	$4,941	$5,490	$3,203	$69,322
16	$4,712	$30,160	$7,187	$1,257	$11,781	$2,262	$5,089	$5,655	$3,299	$71,402
17	$4,854	$31,065	$7,402	$1,294	$12,135	$2,330	$5,242	$5,825	$3,398	$73,544
18	$4,999	$31,996	$7,624	$1,333	$12,499	$2,400	$5,399	$5,999	$3,500	$75,750
19	$5,149	$32,956	$7,853	$1,373	$12,874	$2,472	$5,561	$6,179	$3,605	$78,023
20	$5,304	$33,945	$8,088	$1,414	$13,260	$2,546	$5,728	$6,365	$3,713	$80,363

Sub-Watershed 409 Annual Cost After Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$7,177	$45,933	$10,945	$1,914	$17,943	$3,445	$7,751	$8,612	$5,024	$108,744
2	$7,392	$47,311	$11,273	$1,971	$18,481	$3,548	$7,984	$8,871	$5,175	$112,006
3	$7,614	$48,730	$11,611	$2,030	$19,035	$3,655	$8,223	$9,137	$5,330	$115,366

4	$7,843	$50,192	$11,960	$2,091	$19,606	$3,764	$8,470	$9,411	$5,490	$118,827
5	$8,078	$51,698	$12,319	$2,154	$20,194	$3,877	$8,724	$9,693	$5,654	$122,392
6	$8,320	$53,249	$12,688	$2,219	$20,800	$3,994	$8,986	$9,984	$5,824	$126,064
7	$8,570	$54,846	$13,069	$2,285	$21,424	$4,113	$9,255	$10,284	$5,999	$129,845
8	$8,827	$56,492	$13,461	$2,354	$22,067	$4,237	$9,533	$10,592	$6,179	$133,741
9	$9,092	$58,186	$13,865	$2,424	$22,729	$4,364	$9,819	$10,910	$6,364	$137,753
10	$9,364	$59,932	$14,281	$2,497	$23,411	$4,495	$10,114	$11,237	$6,555	$141,886
11	$9,645	$61,730	$14,709	$2,572	$24,113	$4,630	$10,417	$11,574	$6,752	$146,142
12	$9,935	$63,582	$15,150	$2,649	$24,837	$4,769	$10,729	$11,922	$6,954	$150,526
13	$10,233	$65,489	$15,605	$2,729	$25,582	$4,912	$11,051	$12,279	$7,163	$155,042
14	$10,540	$67,454	$16,073	$2,811	$26,349	$5,059	$11,383	$12,648	$7,378	$159,694
15	$10,856	$69,477	$16,555	$2,895	$27,140	$5,211	$11,724	$13,027	$7,599	$164,484
16	$11,182	$71,562	$17,052	$2,982	$27,954	$5,367	$12,076	$13,418	$7,827	$169,419
17	$11,517	$73,709	$17,563	$3,071	$28,792	$5,528	$12,438	$13,820	$8,062	$174,501
18	$11,862	$75,920	$18,090	$3,163	$29,656	$5,694	$12,811	$14,235	$8,304	$179,736
19	$12,218	$78,198	$18,633	$3,258	$30,546	$5,865	$13,196	$14,662	$8,553	$185,129
20	$12,585	$80,543	$19,192	$3,356	$31,462	$6,041	$13,592	$15,102	$8,809	$190,682

Sub-Watershed 501 Annual Cost After Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$4,468	$28,597	$6,814	$1,192	$11,171	$2,145	$4,826	$5,362	$3,128	$67,701
2	$4,602	$29,455	$7,019	$1,227	$11,506	$2,209	$4,970	$5,523	$3,222	$69,732
3	$4,740	$30,338	$7,229	$1,264	$11,851	$2,275	$5,120	$5,688	$3,318	$71,824
4	$4,883	$31,248	$7,446	$1,302	$12,206	$2,344	$5,273	$5,859	$3,418	$73,979
5	$5,029	$32,186	$7,669	$1,341	$12,573	$2,414	$5,431	$6,035	$3,520	$76,199
6	$5,180	$33,152	$7,899	$1,381	$12,950	$2,486	$5,594	$6,216	$3,626	$78,485
7	$5,335	$34,146	$8,136	$1,423	$13,338	$2,561	$5,762	$6,402	$3,735	$80,839
8	$5,495	$35,170	$8,380	$1,465	$13,738	$2,638	$5,935	$6,594	$3,847	$83,264
9	$5,660	$36,226	$8,632	$1,509	$14,151	$2,717	$6,113	$6,792	$3,962	$85,762
10	$5,830	$37,312	$8,891	$1,555	$14,575	$2,798	$6,296	$6,996	$4,081	$88,335
11	$6,005	$38,432	$9,158	$1,601	$15,012	$2,882	$6,485	$7,206	$4,203	$90,985
12	$6,185	$39,585	$9,432	$1,649	$15,463	$2,969	$6,680	$7,422	$4,330	$93,715
13	$6,371	$40,772	$9,715	$1,699	$15,927	$3,058	$6,880	$7,645	$4,459	$96,526
14	$6,562	$41,995	$10,007	$1,750	$16,404	$3,150	$7,087	$7,874	$4,593	$99,422
15	$6,759	$43,255	$10,307	$1,802	$16,897	$3,244	$7,299	$8,110	$4,731	$102,404
16	$6,961	$44,553	$10,616	$1,856	$17,403	$3,341	$7,518	$8,354	$4,873	$105,477
17	$7,170	$45,889	$10,935	$1,912	$17,926	$3,442	$7,744	$8,604	$5,019	$108,641

18	$7,385	$47,266	$11,263	$1,969	$18,463	$3,545	$7,976	$8,862	$5,170	$111,900
19	$7,607	$48,684	$11,601	$2,029	$19,017	$3,651	$8,215	$9,128	$5,325	$115,257
20	$7,835	$50,145	$11,949	$2,089	$19,588	$3,761	$8,462	$9,402	$5,485	$118,715

Sub-Watershed 502 Annual Cost After Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,691	$23,622	$5,629	$984	$9,228	$1,772	$3,986	$4,429	$2,584	$55,925
2	$3,802	$24,331	$5,798	$1,014	$9,504	$1,825	$4,106	$4,562	$2,661	$57,603
3	$3,916	$25,061	$5,972	$1,044	$9,789	$1,880	$4,229	$4,699	$2,741	$59,331
4	$4,033	$25,813	$6,151	$1,076	$10,083	$1,936	$4,356	$4,840	$2,823	$61,111
5	$4,154	$26,587	$6,335	$1,108	$10,386	$1,994	$4,487	$4,985	$2,908	$62,944
6	$4,279	$27,385	$6,525	$1,141	$10,697	$2,054	$4,621	$5,135	$2,995	$64,832
7	$4,407	$28,206	$6,721	$1,175	$11,018	$2,115	$4,760	$5,289	$3,085	$66,777
8	$4,539	$29,053	$6,923	$1,211	$11,349	$2,179	$4,903	$5,447	$3,178	$68,780
9	$4,676	$29,924	$7,130	$1,247	$11,689	$2,244	$5,050	$5,611	$3,273	$70,844
10	$4,816	$30,822	$7,344	$1,284	$12,040	$2,312	$5,201	$5,779	$3,371	$72,969
11	$4,960	$31,747	$7,565	$1,323	$12,401	$2,381	$5,357	$5,952	$3,472	$75,158
12	$5,109	$32,699	$7,792	$1,362	$12,773	$2,452	$5,518	$6,131	$3,576	$77,413
13	$5,262	$33,680	$8,025	$1,403	$13,156	$2,526	$5,683	$6,315	$3,684	$79,735
14	$5,420	$34,690	$8,266	$1,445	$13,551	$2,602	$5,854	$6,504	$3,794	$82,127
15	$5,583	$35,731	$8,514	$1,489	$13,957	$2,680	$6,030	$6,700	$3,908	$84,591
16	$5,750	$36,803	$8,769	$1,533	$14,376	$2,760	$6,210	$6,901	$4,025	$87,129
17	$5,923	$37,907	$9,033	$1,579	$14,807	$2,843	$6,397	$7,108	$4,146	$89,743
18	$6,101	$39,044	$9,304	$1,627	$15,252	$2,928	$6,589	$7,321	$4,270	$92,435
19	$6,284	$40,216	$9,583	$1,676	$15,709	$3,016	$6,786	$7,540	$4,399	$95,208
20	$6,472	$41,422	$9,870	$1,726	$16,180	$3,107	$6,990	$7,767	$4,531	$98,064

3.6.3 Lower Milford

Sub-Watershed 506 Annual Cost Before Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$6,222	$79,638	$15,554	$16,591	$31,109	$5,973	$6,719	$18,665	$4,355	$184,827

2	$6,408	$82,028	$16,021	$17,089	$32,042	$6,152	$6,921	$19,225	$4,486	$190,372
3	$6,601	$84,488	$16,502	$17,602	$33,003	$6,337	$7,129	$19,802	$4,620	$196,083
4	$6,799	$87,023	$16,997	$18,130	$33,993	$6,527	$7,343	$20,396	$4,759	$201,966
5	$7,003	$89,634	$17,507	$18,674	$35,013	$6,723	$7,563	$21,008	$4,902	$208,025
6	$7,213	$92,323	$18,032	$19,234	$36,064	$6,924	$7,790	$21,638	$5,049	$214,266
7	$7,429	$95,092	$18,573	$19,811	$37,145	$7,132	$8,023	$22,287	$5,200	$220,694
8	$7,652	$97,945	$19,130	$20,405	$38,260	$7,346	$8,264	$22,956	$5,356	$227,314
9	$7,882	$100,884	$19,704	$21,017	$39,408	$7,566	$8,512	$23,645	$5,517	$234,134
10	$8,118	$103,910	$20,295	$21,648	$40,590	$7,793	$8,767	$24,354	$5,683	$241,158
11	$8,362	$107,027	$20,904	$22,297	$41,808	$8,027	$9,030	$25,085	$5,853	$248,393
12	$8,612	$110,238	$21,531	$22,966	$43,062	$8,268	$9,301	$25,837	$6,029	$255,844
13	$8,871	$113,545	$22,177	$23,655	$44,354	$8,516	$9,580	$26,612	$6,210	$263,520
14	$9,137	$116,952	$22,842	$24,365	$45,684	$8,771	$9,868	$27,411	$6,396	$271,425
15	$9,411	$120,460	$23,527	$25,096	$47,055	$9,035	$10,164	$28,233	$6,588	$279,568
16	$9,693	$124,074	$24,233	$25,849	$48,466	$9,306	$10,469	$29,080	$6,785	$287,955
17	$9,984	$127,796	$24,960	$26,624	$49,920	$9,585	$10,783	$29,952	$6,989	$296,594
18	$10,284	$131,630	$25,709	$27,423	$51,418	$9,872	$11,106	$30,851	$7,199	$305,492
19	$10,592	$135,579	$26,480	$28,246	$52,961	$10,168	$11,439	$31,776	$7,414	$314,656
20	$10,910	$139,646	$27,275	$29,093	$54,549	$10,473	$11,783	$32,730	$7,637	$324,096

Sub-Watershed 507 Annual Cost Before Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$6,990	$89,472	$17,475	$18,640	$34,950	$6,710	$7,549	$20,970	$4,893	$207,650
2	$7,200	$92,156	$17,999	$19,199	$35,999	$6,912	$7,776	$21,599	$5,040	$213,879
3	$7,416	$94,921	$18,539	$19,775	$37,078	$7,119	$8,009	$22,247	$5,191	$220,295
4	$7,638	$97,768	$19,095	$20,368	$38,191	$7,333	$8,249	$22,914	$5,347	$226,904
5	$7,867	$100,702	$19,668	$20,979	$39,337	$7,553	$8,497	$23,602	$5,507	$233,711
6	$8,103	$103,723	$20,258	$21,609	$40,517	$7,779	$8,752	$24,310	$5,672	$240,723
7	$8,346	$106,834	$20,866	$22,257	$41,732	$8,013	$9,014	$25,039	$5,842	$247,944
8	$8,597	$110,039	$21,492	$22,925	$42,984	$8,253	$9,285	$25,790	$6,018	$255,383
9	$8,855	$113,340	$22,137	$23,613	$44,274	$8,501	$9,563	$26,564	$6,198	$263,044
10	$9,120	$116,741	$22,801	$24,321	$45,602	$8,756	$9,850	$27,361	$6,384	$270,936
11	$9,394	$120,243	$23,485	$25,051	$46,970	$9,018	$10,145	$28,182	$6,576	$279,064
12	$9,676	$123,850	$24,189	$25,802	$48,379	$9,289	$10,450	$29,027	$6,773	$287,436
13	$9,966	$127,566	$24,915	$26,576	$49,830	$9,567	$10,763	$29,898	$6,976	$296,059

14	$10,265	$131,393	$25,663	$27,373	$51,325	$9,854	$11,086	$30,795	$7,186	$304,940
15	$10,573	$135,334	$26,433	$28,195	$52,865	$10,150	$11,419	$31,719	$7,401	$314,089
16	$10,890	$139,394	$27,225	$29,041	$54,451	$10,455	$11,761	$32,671	$7,623	$323,511
17	$11,217	$143,576	$28,042	$29,912	$56,084	$10,768	$12,114	$33,651	$7,852	$333,217
18	$11,553	$147,884	$28,884	$30,809	$57,767	$11,091	$12,478	$34,660	$8,087	$343,213
19	$11,900	$152,320	$29,750	$31,733	$59,500	$11,424	$12,852	$35,700	$8,330	$353,510
20	$12,257	$156,890	$30,643	$32,685	$61,285	$11,767	$13,238	$36,771	$8,580	$364,115

Sub-Watershed 601 Annual Cost Before Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,038	$38,890	$7,596	$8,102	$15,191	$2,917	$3,281	$9,115	$2,127	$90,256
2	$3,129	$40,056	$7,823	$8,345	$15,647	$3,004	$3,380	$9,388	$2,191	$92,964
3	$3,223	$41,258	$8,058	$8,595	$16,116	$3,094	$3,481	$9,670	$2,256	$95,753
4	$3,320	$42,496	$8,300	$8,853	$16,600	$3,187	$3,586	$9,960	$2,324	$98,625
5	$3,420	$43,771	$8,549	$9,119	$17,098	$3,283	$3,693	$10,259	$2,394	$101,584
6	$3,522	$45,084	$8,805	$9,392	$17,611	$3,381	$3,804	$10,566	$2,466	$104,632
7	$3,628	$46,436	$9,070	$9,674	$18,139	$3,483	$3,918	$10,883	$2,539	$107,771
8	$3,737	$47,829	$9,342	$9,964	$18,683	$3,587	$4,036	$11,210	$2,616	$111,004
9	$3,849	$49,264	$9,622	$10,263	$19,244	$3,695	$4,157	$11,546	$2,694	$114,334
10	$3,964	$50,742	$9,911	$10,571	$19,821	$3,806	$4,281	$11,893	$2,775	$117,764
11	$4,083	$52,264	$10,208	$10,888	$20,416	$3,920	$4,410	$12,249	$2,858	$121,297
12	$4,206	$53,832	$10,514	$11,215	$21,028	$4,037	$4,542	$12,617	$2,944	$124,936
13	$4,332	$55,447	$10,830	$11,552	$21,659	$4,159	$4,678	$12,995	$3,032	$128,684
14	$4,462	$57,111	$11,154	$11,898	$22,309	$4,283	$4,819	$13,385	$3,123	$132,544
15	$4,596	$58,824	$11,489	$12,255	$22,978	$4,412	$4,963	$13,787	$3,217	$136,521
16	$4,733	$60,589	$11,834	$12,623	$23,667	$4,544	$5,112	$14,200	$3,313	$140,616
17	$4,875	$62,406	$12,189	$13,001	$24,377	$4,680	$5,266	$14,626	$3,413	$144,835
18	$5,022	$64,279	$12,554	$13,391	$25,109	$4,821	$5,424	$15,065	$3,515	$149,180
19	$5,172	$66,207	$12,931	$13,793	$25,862	$4,966	$5,586	$15,517	$3,621	$153,655
20	$5,328	$68,193	$13,319	$14,207	$26,638	$5,114	$5,754	$15,983	$3,729	$158,265

Sub-Watershed 602 Annual Cost Before Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,755	$48,058	$9,386	$10,012	$18,773	$3,604	$4,055	$11,264	$2,628	$111,534
2	$3,867	$49,499	$9,668	$10,312	$19,336	$3,712	$4,177	$11,601	$2,707	$114,880
3	$3,983	$50,984	$9,958	$10,622	$19,916	$3,824	$4,302	$11,949	$2,788	$118,326
4	$4,103	$52,514	$10,257	$10,940	$20,513	$3,939	$4,431	$12,308	$2,872	$121,876
5	$4,226	$54,089	$10,564	$11,269	$21,129	$4,057	$4,564	$12,677	$2,958	$125,532
6	$4,352	$55,712	$10,881	$11,607	$21,762	$4,178	$4,701	$13,057	$3,047	$129,298
7	$4,483	$57,383	$11,208	$11,955	$22,415	$4,304	$4,842	$13,449	$3,138	$133,177
8	$4,618	$59,105	$11,544	$12,313	$23,088	$4,433	$4,987	$13,853	$3,232	$137,172
9	$4,756	$60,878	$11,890	$12,683	$23,780	$4,566	$5,137	$14,268	$3,329	$141,288
10	$4,899	$62,704	$12,247	$13,063	$24,494	$4,703	$5,291	$14,696	$3,429	$145,526
11	$5,046	$64,585	$12,614	$13,455	$25,229	$4,844	$5,449	$15,137	$3,532	$149,892
12	$5,197	$66,523	$12,993	$13,859	$25,986	$4,989	$5,613	$15,591	$3,638	$154,389
13	$5,353	$68,519	$13,383	$14,275	$26,765	$5,139	$5,781	$16,059	$3,747	$159,020
14	$5,514	$70,574	$13,784	$14,703	$27,568	$5,293	$5,955	$16,541	$3,860	$163,791
15	$5,679	$72,691	$14,198	$15,144	$28,395	$5,452	$6,133	$17,037	$3,975	$168,705
16	$5,849	$74,872	$14,623	$15,598	$29,247	$5,615	$6,317	$17,548	$4,095	$173,766
17	$6,025	$77,118	$15,062	$16,066	$30,124	$5,784	$6,507	$18,075	$4,217	$178,979
18	$6,206	$79,432	$15,514	$16,548	$31,028	$5,957	$6,702	$18,617	$4,344	$184,348
19	$6,392	$81,815	$15,979	$17,045	$31,959	$6,136	$6,903	$19,175	$4,474	$189,879
20	$6,584	$84,269	$16,459	$17,556	$32,918	$6,320	$7,110	$19,751	$4,608	$195,575

Sub-Watershed 603 Annual Cost Before Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$2,991	$38,285	$7,478	$7,976	$14,955	$2,871	$3,230	$8,973	$2,094	$88,853
2	$3,081	$39,433	$7,702	$8,215	$15,404	$2,958	$3,327	$9,242	$2,157	$91,518
3	$3,173	$40,616	$7,933	$8,462	$15,866	$3,046	$3,427	$9,519	$2,221	$94,264
4	$3,268	$41,835	$8,171	$8,716	$16,342	$3,138	$3,530	$9,805	$2,288	$97,092
5	$3,366	$43,090	$8,416	$8,977	$16,832	$3,232	$3,636	$10,099	$2,356	$100,004
6	$3,467	$44,383	$8,668	$9,246	$17,337	$3,329	$3,745	$10,402	$2,427	$103,005
7	$3,571	$45,714	$8,929	$9,524	$17,857	$3,429	$3,857	$10,714	$2,500	$106,095
8	$3,679	$47,085	$9,196	$9,809	$18,393	$3,531	$3,973	$11,036	$2,575	$109,278
9	$3,789	$48,498	$9,472	$10,104	$18,945	$3,637	$4,092	$11,367	$2,652	$112,556

10	$3,903	$49,953	$9,756	$10,407	$19,513	$3,746	$4,215	$11,708	$2,732	$115,933
11	$4,020	$51,452	$10,049	$10,719	$20,098	$3,859	$4,341	$12,059	$2,814	$119,411
12	$4,140	$52,995	$10,351	$11,041	$20,701	$3,975	$4,471	$12,421	$2,898	$122,993
13	$4,264	$54,585	$10,661	$11,372	$21,322	$4,094	$4,606	$12,793	$2,985	$126,683
14	$4,392	$56,223	$10,981	$11,713	$21,962	$4,217	$4,744	$13,177	$3,075	$130,483
15	$4,524	$57,909	$11,310	$12,064	$22,621	$4,343	$4,886	$13,572	$3,167	$134,398
16	$4,660	$59,646	$11,650	$12,426	$23,299	$4,473	$5,033	$13,980	$3,262	$138,430
17	$4,800	$61,436	$11,999	$12,799	$23,998	$4,608	$5,184	$14,399	$3,360	$142,582
18	$4,944	$63,279	$12,359	$13,183	$24,718	$4,746	$5,339	$14,831	$3,461	$146,860
19	$5,092	$65,177	$12,730	$13,579	$25,460	$4,888	$5,499	$15,276	$3,564	$151,266
20	$5,245	$67,133	$13,112	$13,986	$26,224	$5,035	$5,664	$15,734	$3,671	$155,804

Sub-Watershed 506 Annual Cost After Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$6,222	$39,819	$9,488	$1,659	$15,554	$2,986	$6,719	$7,466	$4,355	$94,270
2	$6,408	$41,014	$9,773	$1,709	$16,021	$3,076	$6,921	$7,690	$4,486	$97,098
3	$6,601	$42,244	$10,066	$1,760	$16,502	$3,168	$7,129	$7,921	$4,620	$100,011
4	$6,799	$43,512	$10,368	$1,813	$16,997	$3,263	$7,343	$8,158	$4,759	$103,011
5	$7,003	$44,817	$10,679	$1,867	$17,507	$3,361	$7,563	$8,403	$4,902	$106,102
6	$7,213	$46,161	$10,999	$1,923	$18,032	$3,462	$7,790	$8,655	$5,049	$109,285
7	$7,429	$47,546	$11,329	$1,981	$18,573	$3,566	$8,023	$8,915	$5,200	$112,563
8	$7,652	$48,973	$11,669	$2,041	$19,130	$3,673	$8,264	$9,182	$5,356	$115,940
9	$7,882	$50,442	$12,019	$2,102	$19,704	$3,783	$8,512	$9,458	$5,517	$119,418
10	$8,118	$51,955	$12,380	$2,165	$20,295	$3,897	$8,767	$9,742	$5,683	$123,001
11	$8,362	$53,514	$12,751	$2,230	$20,904	$4,014	$9,030	$10,034	$5,853	$126,691
12	$8,612	$55,119	$13,134	$2,297	$21,531	$4,134	$9,301	$10,335	$6,029	$130,492
13	$8,871	$56,773	$13,528	$2,366	$22,177	$4,258	$9,580	$10,645	$6,210	$134,406
14	$9,137	$58,476	$13,934	$2,436	$22,842	$4,386	$9,868	$10,964	$6,396	$138,439
15	$9,411	$60,230	$14,352	$2,510	$23,527	$4,517	$10,164	$11,293	$6,588	$142,592
16	$9,693	$62,037	$14,782	$2,585	$24,233	$4,653	$10,469	$11,632	$6,785	$146,869
17	$9,984	$63,898	$15,226	$2,662	$24,960	$4,792	$10,783	$11,981	$6,989	$151,275
18	$10,284	$65,815	$15,682	$2,742	$25,709	$4,936	$11,106	$12,340	$7,199	$155,814
19	$10,592	$67,790	$16,153	$2,825	$26,480	$5,084	$11,439	$12,711	$7,414	$160,488
20	$10,910	$69,823	$16,638	$2,909	$27,275	$5,237	$11,783	$13,092	$7,637	$165,303

Sub-Watershed 507 Annual Cost After Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$6,990	$44,736	$10,660	$1,864	$17,475	$3,355	$7,549	$8,388	$4,893	$105,910
2	$7,200	$46,078	$10,980	$1,920	$17,999	$3,456	$7,776	$8,640	$5,040	$109,087
3	$7,416	$47,460	$11,309	$1,978	$18,539	$3,560	$8,009	$8,899	$5,191	$112,360
4	$7,638	$48,884	$11,648	$2,037	$19,095	$3,666	$8,249	$9,166	$5,347	$115,731
5	$7,867	$50,351	$11,998	$2,098	$19,668	$3,776	$8,497	$9,441	$5,507	$119,203
6	$8,103	$51,861	$12,358	$2,161	$20,258	$3,890	$8,752	$9,724	$5,672	$122,779
7	$8,346	$53,417	$12,728	$2,226	$20,866	$4,006	$9,014	$10,016	$5,842	$126,462
8	$8,597	$55,020	$13,110	$2,292	$21,492	$4,126	$9,285	$10,316	$6,018	$130,256
9	$8,855	$56,670	$13,503	$2,361	$22,137	$4,250	$9,563	$10,626	$6,198	$134,164
10	$9,120	$58,370	$13,909	$2,432	$22,801	$4,378	$9,850	$10,944	$6,384	$138,189
11	$9,394	$60,121	$14,326	$2,505	$23,485	$4,509	$10,145	$11,273	$6,576	$142,334
12	$9,676	$61,925	$14,756	$2,580	$24,189	$4,644	$10,450	$11,611	$6,773	$146,604
13	$9,966	$63,783	$15,198	$2,658	$24,915	$4,784	$10,763	$11,959	$6,976	$151,003
14	$10,265	$65,696	$15,654	$2,737	$25,663	$4,927	$11,086	$12,318	$7,186	$155,533
15	$10,573	$67,667	$16,124	$2,819	$26,433	$5,075	$11,419	$12,688	$7,401	$160,199
16	$10,890	$69,697	$16,608	$2,904	$27,225	$5,227	$11,761	$13,068	$7,623	$165,005
17	$11,217	$71,788	$17,106	$2,991	$28,042	$5,384	$12,114	$13,460	$7,852	$169,955
18	$11,553	$73,942	$17,619	$3,081	$28,884	$5,546	$12,478	$13,864	$8,087	$175,053
19	$11,900	$76,160	$18,148	$3,173	$29,750	$5,712	$12,852	$14,280	$8,330	$180,305
20	$12,257	$78,445	$18,692	$3,269	$30,643	$5,883	$13,238	$14,708	$8,580	$185,714

Sub-Watershed 601 Annual Cost After Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,038	$19,445	$4,633	$810	$7,596	$1,458	$3,281	$3,646	$2,127	$46,035
2	$3,129	$20,028	$4,772	$835	$7,823	$1,502	$3,380	$3,755	$2,191	$47,416
3	$3,223	$20,629	$4,916	$860	$8,058	$1,547	$3,481	$3,868	$2,256	$48,838
4	$3,320	$21,248	$5,063	$885	$8,300	$1,594	$3,586	$3,984	$2,324	$50,303
5	$3,420	$21,885	$5,215	$912	$8,549	$1,641	$3,693	$4,103	$2,394	$51,812
6	$3,522	$22,542	$5,371	$939	$8,805	$1,691	$3,804	$4,227	$2,466	$53,367
7	$3,628	$23,218	$5,532	$967	$9,070	$1,741	$3,918	$4,353	$2,539	$54,968

8	$3,737	$23,915	$5,698	$996	$9,342	$1,794	$4,036	$4,484	$2,616	$56,617
9	$3,849	$24,632	$5,869	$1,026	$9,622	$1,847	$4,157	$4,619	$2,694	$58,315
10	$3,964	$25,371	$6,045	$1,057	$9,911	$1,903	$4,281	$4,757	$2,775	$60,065
11	$4,083	$26,132	$6,227	$1,089	$10,208	$1,960	$4,410	$4,900	$2,858	$61,867
12	$4,206	$26,916	$6,414	$1,122	$10,514	$2,019	$4,542	$5,047	$2,944	$63,723
13	$4,332	$27,724	$6,606	$1,155	$10,830	$2,079	$4,678	$5,198	$3,032	$65,634
14	$4,462	$28,555	$6,804	$1,190	$11,154	$2,142	$4,819	$5,354	$3,123	$67,603
15	$4,596	$29,412	$7,008	$1,226	$11,489	$2,206	$4,963	$5,515	$3,217	$69,631
16	$4,733	$30,294	$7,219	$1,262	$11,834	$2,272	$5,112	$5,680	$3,313	$71,720
17	$4,875	$31,203	$7,435	$1,300	$12,189	$2,340	$5,266	$5,851	$3,413	$73,872
18	$5,022	$32,139	$7,658	$1,339	$12,554	$2,410	$5,424	$6,026	$3,515	$76,088
19	$5,172	$33,103	$7,888	$1,379	$12,931	$2,483	$5,586	$6,207	$3,621	$78,371
20	$5,328	$34,097	$8,125	$1,421	$13,319	$2,557	$5,754	$6,393	$3,729	$80,722

Sub-Watershed 602 Annual Cost After Cost-Share, Cropland BMPs

Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$3,755	$24,029	$5,726	$1,001	$9,386	$1,802	$4,055	$4,505	$2,628	$56,887
2	$3,867	$24,750	$5,897	$1,031	$9,668	$1,856	$4,177	$4,641	$2,707	$58,594
3	$3,983	$25,492	$6,074	$1,062	$9,958	$1,912	$4,302	$4,780	$2,788	$60,351
4	$4,103	$26,257	$6,257	$1,094	$10,257	$1,969	$4,431	$4,923	$2,872	$62,162
5	$4,226	$27,045	$6,444	$1,127	$10,564	$2,028	$4,564	$5,071	$2,958	$64,027
6	$4,352	$27,856	$6,638	$1,161	$10,881	$2,089	$4,701	$5,223	$3,047	$65,948
7	$4,483	$28,692	$6,837	$1,195	$11,208	$2,152	$4,842	$5,380	$3,138	$67,926
8	$4,618	$29,552	$7,042	$1,231	$11,544	$2,216	$4,987	$5,541	$3,232	$69,964
9	$4,756	$30,439	$7,253	$1,268	$11,890	$2,283	$5,137	$5,707	$3,329	$72,063
10	$4,899	$31,352	$7,471	$1,306	$12,247	$2,351	$5,291	$5,879	$3,429	$74,225
11	$5,046	$32,293	$7,695	$1,346	$12,614	$2,422	$5,449	$6,055	$3,532	$76,451
12	$5,197	$33,261	$7,926	$1,386	$12,993	$2,495	$5,613	$6,237	$3,638	$78,745
13	$5,353	$34,259	$8,163	$1,427	$13,383	$2,569	$5,781	$6,424	$3,747	$81,107
14	$5,514	$35,287	$8,408	$1,470	$13,784	$2,647	$5,955	$6,616	$3,860	$83,540
15	$5,679	$36,346	$8,661	$1,514	$14,198	$2,726	$6,133	$6,815	$3,975	$86,047
16	$5,849	$37,436	$8,920	$1,560	$14,623	$2,808	$6,317	$7,019	$4,095	$88,628
17	$6,025	$38,559	$9,188	$1,607	$15,062	$2,892	$6,507	$7,230	$4,217	$91,287
18	$6,206	$39,716	$9,464	$1,655	$15,514	$2,979	$6,702	$7,447	$4,344	$94,025
19	$6,392	$40,907	$9,747	$1,704	$15,979	$3,068	$6,903	$7,670	$4,474	$96,846
20	$6,584	$42,135	$10,040	$1,756	$16,459	$3,160	$7,110	$7,900	$4,608	$99,752

Sub-Watershed 603 Annual Cost After Cost-Share, Cropland BMPs										
Year	Conservation Rotations	Grassed Waterways	No-Till	Buffers	Terraces	Grade Stabilization	Subsurface Fertilizer Application	Cover Crops	Nutrient Management Plans	Total
1	$2,991	$19,142	$4,561	$798	$7,478	$1,436	$3,230	$3,589	$2,094	$45,319
2	$3,081	$19,717	$4,698	$822	$7,702	$1,479	$3,327	$3,697	$2,157	$46,678
3	$3,173	$20,308	$4,839	$846	$7,933	$1,523	$3,427	$3,808	$2,221	$48,079
4	$3,268	$20,917	$4,984	$872	$8,171	$1,569	$3,530	$3,922	$2,288	$49,521
5	$3,366	$21,545	$5,134	$898	$8,416	$1,616	$3,636	$4,040	$2,356	$51,007
6	$3,467	$22,191	$5,288	$925	$8,668	$1,664	$3,745	$4,161	$2,427	$52,537
7	$3,571	$22,857	$5,446	$952	$8,929	$1,714	$3,857	$4,286	$2,500	$54,113
8	$3,679	$23,543	$5,610	$981	$9,196	$1,766	$3,973	$4,414	$2,575	$55,736
9	$3,789	$24,249	$5,778	$1,010	$9,472	$1,819	$4,092	$4,547	$2,652	$57,408
10	$3,903	$24,976	$5,951	$1,041	$9,756	$1,873	$4,215	$4,683	$2,732	$59,131
11	$4,020	$25,726	$6,130	$1,072	$10,049	$1,929	$4,341	$4,824	$2,814	$60,904
12	$4,140	$26,498	$6,314	$1,104	$10,351	$1,987	$4,471	$4,968	$2,898	$62,732
13	$4,264	$27,292	$6,503	$1,137	$10,661	$2,047	$4,606	$5,117	$2,985	$64,614
14	$4,392	$28,111	$6,698	$1,171	$10,981	$2,108	$4,744	$5,271	$3,075	$66,552
15	$4,524	$28,955	$6,899	$1,206	$11,310	$2,172	$4,886	$5,429	$3,167	$68,549
16	$4,660	$29,823	$7,106	$1,243	$11,650	$2,237	$5,033	$5,592	$3,262	$70,605
17	$4,800	$30,718	$7,320	$1,280	$11,999	$2,304	$5,184	$5,760	$3,360	$72,723
18	$4,944	$31,639	$7,539	$1,318	$12,359	$2,373	$5,339	$5,932	$3,461	$74,905
19	$5,092	$32,589	$7,765	$1,358	$12,730	$2,444	$5,499	$6,110	$3,564	$77,152
20	$5,245	$33,566	$7,998	$1,399	$13,112	$2,517	$5,664	$6,294	$3,671	$79,467

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