Tuttle Creek Watershed Restoration and Protection Strategies (WRAPS) Plan

2018

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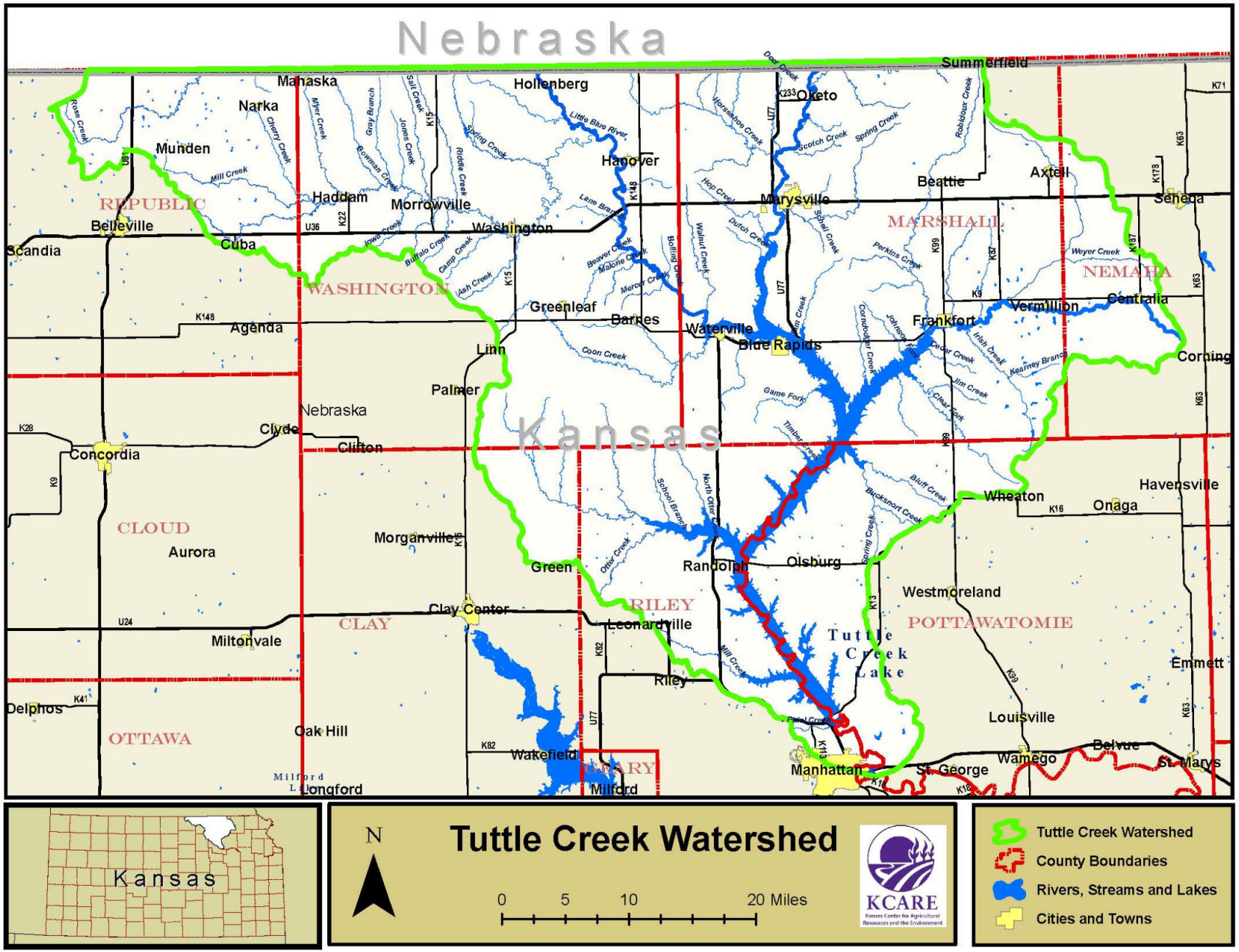

Tuttle Creek Watershed

N

0 5 10 20 Miles

KCARE
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- Tuttle Creek Watershed
- County Boundaries
- Rivers, Streams and Lakes
- Cities and Towns

Table of Contents

1. PREFACE AND PLAN UPDATE 8

2. INTRODUCTION TO THE TUTTLE CREEK WATERSHED WRAPS 9

- **A. WHAT IS A WATERSHED?** 9
- **B. WHAT IS A WATERSHED RESTORATION AND PROTECTION STRATEGY (WRAPS)?** 9
- **C. WATERSHED LOCATION** 9
- **D. TUTTLE CREEK WATERSHED DESCRIPTION** 11
- **E. WHAT IS A HYDROLOGIC UNIT CODE (HUC)?** 12
- **F. TUTTLE CREEK WRAPS HISTORY** 13
- **G. WHO ARE THE STAKEHOLDERS?** 14
- **H. GOALS OF THE STAKEHOLDER LEADERSHIP TEAM (SLT)** 14
- **I. REGIONAL ADVISORY COMMITTEE (RAC)** 14

3. WATERSHED REVIEW 16

- **A. LAND COVER AND LAND USES** 16
- **B. DESIGNATED USES** 18
- **C. SPECIAL AQUATIC LIFE USE WATERS** 20
- **D. EXCEPTIONAL STATE WATERS** 21
- **E. OUTSTANDING NATIONAL RESOURCE WATERS** 21
- **F. RAINFALL AND RUNOFF** 21
- **G. POPULATION AND WASTEWATER SYSTEMS** 22
- **H. AQUIFERS** 24
- **I. PUBLIC WATER SUPPLIES** 25
- **J. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEMS (NPDES)** 27

4. IMPAIRED WATERS IN THE TUTTLE CREEK WATERSHED 29

- **A. 303D LIST OF IMPAIRED WATERS IN THE TUTTLE CREEK WATERSHED** 29
- **B. TOTAL MAXIMUM DAILY LOADS (TMDL)** 32
  - ***1. What is a TMDL?*** *32*
  - ***2. Tuttle Creek Watershed TMDLs*** *33*

5. WATERSHED IMPAIRMENTS TO ADDRESS 37

- **A. SEDIMENT** 38
- **B. EUTROPHICATION: PHOSPHORUS** 41
- **C. HERBICIDES: ALACHLOR AND ATRAZINE** 46
- **D. *E. COLI*** 48
- **E. REMAINING TMDLS** 52
  - ***1. Dissolved Oxygen*** *53*
  - ***2. pH*** *53*

6. TARGETED AREAS 55

- **A. STUDIES CONDUCTED TO DETERMINE TARGETED AREAS** 55
  - ***1. Soil and Water Assessment Tool (SWAT)*** *55*

2. Aerial Assessments *58*
B. TARGETED AREAS 59
C. LOAD REDUCTION ESTIMATE METHODOLOGY: 59
1. Cropland *59*
2. Livestock *59*
3. Streambank *59*

7. IMPLEMENTATION 61

A. SEDIMENT LOSS REDUCTIONS IN THE TUTTLE CREEK WATERSHED 61
1. Cropland targeted for sediment reductions in the Big Blue Targeted Area *62*
2. Cropland targeted for sediment reductions in the Little Blue Targeted Area *67*
3. Streambanks targeted for sediment reductions in the Tuttle Creek Watershed *71*
4. Combined adoption rates and load reductions for sediment in the Tuttle Creek Watershed *74*
B. PHOSPHORUS REDUCTIONS IN THE TUTTLE CREEK WATERSHED 76
1. Cropland targeted for phosphorus reductions *76*
2. Streambanks targeted for phosphorus reductions in the Tuttle Creek Watershed *83*
3. Livestock areas targeted for phosphorus reductions in the Tuttle Creek Watershed *87*
4. Combined adoption rates and phosphorus load reduction in the Tuttle Creek Watershed *90*
C. HERBICIDE REDUCTIONS IN THE TUTTLE CREEK WATERSHED 91
1. Cropland Targeted for Herbicide Reductions *92*
2. Herbicide BMP adoption rates and load reductions *93*
D. *E. COLI* BACTERIA REDUCTIONS IN THE TUTTLE CREEK WATERSHED 95
1. Livestock areas targeted for E. coli reductions *96*
2. E. coli load reduction resulting from livestock BMP implementation *97*

8. INFORMATION AND EDUCATION 98

A. INFORMATION AND EDUCATION ACTIVITIES AND EVENTS SCHEDULED IN THE TUTTLE CREEK WATERSHED 98
B. EVALUATION OF INFORMATION AND EDUCATION ACTIVITIES 100

9. COST OF IMPLEMENTING BMPS AND POSSIBLE FUNDING SOURCES 101

A. CROPLAND BMP IMPLEMENTATION COSTS 101
1. Big Blue Targeted Area *101*
2. Little Blue Targeted Area *103*
B. LIVESTOCK BMP IMPLEMENTATION COSTS 105
C. STREAMBANK BMP IMPLEMENTATION COSTS 107
D. HERBICIDE BMP IMPLEMENTATION COSTS 108
E. TECHNICAL ASSISTANCE FOR BMP IMPLEMENTATION COSTS 109
F. TOTAL COSTS FOR BMP IMPLEMENTATION 110
G. POTENTIAL FUNDING SOURCES AND SERVICE PROVIDERS 111
1. Funding Sources *111*
2. Technical Service Providers *111*

10. TIMEFRAME 113

11. MEASURABLE MILESTONES 114

A. MEASURABLE MILESTONES FOR BMP IMPLEMENTATION 114
B. BENCHMARKS TO MEASURE WATER QUALITY AND SOCIAL PROGRESS 120
1. Sediment and Phosphorus Milestones in 2020 ..... *122*
2. Herbicide milestones in 2020 ..... *122*

3. E. coli bacteria milestones in 2020 ..... *122*
C. BMP IMPLEMENTATION MILESTONES FROM 2020 TO 2050 123
12. MONITORING 124
13. REVIEW OF THE WRAPS PLAN 126
14. APPENDIX 127
A. POTENTIAL SERVICE PROVIDERS 127
B. BMP DEFINITIONS 129
1. Cropland BMPs 129
2. Livestock BMPs 130
3. Streambank 131
4. Herbicide 131
C. BUDGET DERIVATIONS 132
1. Cropland 132
2. Livestock 132
3. Streambank 133
4. Herbicide 133
D. 40-YEAR PROJECT TABLES BY SUB-WATERSHED 133
1. Cropland BMP Implementation in the Big and Little Blue Sub Watersheds 133
2. Cropland BMP Implementation: Sediment Load Reduction by HUC 12 Sub Watersheds 144
3. Cropland BMP Implementation: Phosphorus Load Reduction by HUC 12 Sub Watersheds 154
4. Cropland BMP Implementation: Costs before cost share by HUC 12 Sub Watersheds 165
5. Cropland BMP Implementation: Costs after cost share by HUC 12 Sub Watersheds 175

List of Figures

FIGURE 1. THE 12 RIVER BASINS OF KANSAS, HIGHLIGHTING THE TUTTLE CREEK WATERSHED 10
FIGURE 2. MAP OF THE TUTTLE CREEK WATERSHED 10
FIGURE 3. TUTTLE CREEK WATERSHED CROSSING THE KANSAS BORDER INTO NEBRASKA. 11
FIGURE 4. HUC 8, 10, AND 12 DELINEATIONS IN THE BIG BLUE AND LITTLE BLUE SUB-WATERSHEDS 13
FIGURE 5. LAND COVER AND LAND USE IN THE WATERSHED 17
FIGURE 6. SPECIAL AQUATIC LIFE USE WATERS 20
FIGURE 7. TUTTLE CREEK WATERSHED MONTHLY AVERAGE PRECIPITATION 21
FIGURE 8. ANNUAL PRECIPITATION IN THE TUTTLE CREEK WATERSHED 22
FIGURE 9. TUTTLE CREEK WATERSHED POPULATION MAP, INCLUDING THE TUTTLE CREEK LAKE AREA 24
FIGURE 10. AQUIFERS IN THE WATERSHED 25
FIGURE 11. TUTTLE CREEK WATERSHED MONITORING SITES 29
FIGURE 12. MAP OF 303D LISTED WATERBODIES IN THE TUTTLE CREEK WATERSHED 32
FIGURE 13. MAP OF STREAMS WITH TMDLS IN THE TUTTLE CREEK WATERSHED 36
FIGURE 14. MAP OF LAKES WITH TMDLS IN THE TUTTLE CREEK WATERSHED 36
FIGURE 15. WATER SEGMENTS WITH TMDLS 37
FIGURE 16. SEDIMENT TMDLS IN THE TUTTLE CREEK WATERSHED 38
FIGURE 17. EUTROPHICATION TMDLS IN THE TUTTLE CREEK WATERSHED 42
FIGURE 18. HERBICIDE TMDLS IN THE TUTTLE CREEK WATERSHED 46
FIGURE 19. E. COLI TMDLS IN THE TUTTLE CREEK WATERSHED 49
FIGURE 20. E. COLI STREAM PROFILES IN TUTTLE CREEK WATERSHED 50
FIGURE 21. POSSIBLE TARGET AREAS, AS DETERMINED BY KDHE AERIAL ASSESSMENT 58
FIGURE 22. CROPLAND TARGETED AREAS FOR SEDIMENT IN THE TUTTLE CREEK WATERSHED 61

Figure 23. Land use in the Tuttle Creek Watershed targeted areas 62
Figure 24. Targeted streambank areas for sediment in the Tuttle Creek Watershed 71
Figure 25. Cropland targeted areas for sediment (and phosphorus) in the Tuttle Creek Watershed 76
Figure 26. Streambank targeted areas for sediment (and phosphorus) in the Tuttle Creek Watershed..... 84
Figure 27. Livestock areas targeted for phosphorus reductions 87
Figure 28. Herbicide TMDLs throughout the Tuttle Creek Watershed 92
Figure 29. Livestock BMP targeted areas for E. coli reductions in the Tuttle Creek Watershed 96

List of Tables

Table 1. Land use in the Tuttle Creek Watershed..... 17
Table 2. Designated Water Uses in the Tuttle Creek Watershed..... 19
Table 3. Tuttle Creek Watershed population..... 23
Table 4. Tuttle Creek Watershed public water suppliers..... 26
Table 5. List of NPDES facilities in the Tuttle Creek Watershed..... 28
Table 6. 303d listed impaired waters in the Tuttle Creek Watershed..... 30
Table 7. TMDLs in the Tuttle Creek Watershed 34
Table 8. Tuttle Creek Watershed impairment loads and goals 37
Table 9. BMPs to prevent or reduce sediment runoff and erosion 41
Table 10. BMPs to Reduce Nutrient Leaching and Eutrophication..... 45
Table 11. Corn, sorghum, soybeans acres in the Tuttle Creek Watershed 47
Table 12. BMPs to reduce herbicide runoff 48
Table 13. BMPs to reduce E. coli in the Tuttle Creek Watershed..... 52
Table 14. Land use in the Big Blue Targeted Area 62
Table 15. Land use breakdown for cropland acres in the Big Blue Targeted Area 63
Table 16. Sediment BMP adoption rates in the Big Blue Targeted Area..... 64
Table 17. Adoption rates for cropland BMP implementation in the Big Blue Targeted Area 65
Table 18. Big Blue Targeted Area sediment reductions from implemented cropland BMPs 66
Table 19. Land use in the Little Blue Targeted Area 67
Table 20. Land use breakdown for cropland acres in the Little Blue Targeted Area 67
Table 21. Sediment BMP adoption rates in the Little Blue Targeted Area..... 68
Table 22. Adoption rates for cropland BMP implementation in the Little Blue Targeted Area 69
Table 23. Little Blue Targeted Area sediment reductions from implemented cropland BMPs 70
Table 24. Sediment BMP adoption rates along streambanks 72
Table 25. Cumulative sediment reduction from streambank BMP implementation 73
Table 26. Meeting the sediment TMDL for Tuttle Creek Watershed..... 74
Table 27. Total sediment load reduction for Tuttle Creek Watershed 75
Table 28. Phosphorus adoption rates on cropland in the Big Blue Targeted Area 78
Table 29. Adoption rates for BMP implementation on cropland in the Big Blue Targeted Area 79
Table 30. Cumulative phosphorus reductions from cropland BMPs in the Big Blue Targeted Area..... 80
Table 31. Phosphorus adoption rates on cropland in the Little Blue Targeted Area 81
Table 32. Adoption rates for BMP implementation on cropland in the Little Blue Targeted Area 82
Table 33. Cumulative phosphorus reductions from cropland BMPs in the Little Blue Targeted Area..... 83
Table 34. BMP adoption rates along streambanks 85
Table 35. Phosphorus reduction from streambank BMP implementation 86
Table 36. BMP adoption rates for livestock areas in the Tuttle Creek Watershed..... 88
Table 37. Cumulative phosphorus reductions in livestock targeted areas 89
Table 38. Progress on the phosphorus TMDL for the Tuttle Creek Watershed..... 90
Table 39. Total phosphorus reduction in the Tuttle Creek Watershed..... 91
Table 40. Adoption of herbicide BMPs implemented in the Tuttle Creek Watershed 93
Table 41. Cumulative herbicide reduced from cropland BMP implementation in the Tuttle Creek Watershed .. 94
Table 42. Herbicide load reductions by BMP..... 95

TABLE 43. MEETING THE ATRAZINE TMDL 95
TABLE 44. LIVESTOCK BMP IMPLEMENTATION TO REDUCE E.COLI IN THE TUTTLE CREEK WATERSHED 97
TABLE 45. I&E: CROPLAND BMP IMPLEMENTATION 98
TABLE 46. I&E: LIVESTOCK BMP IMPLEMENTATION 99
TABLE 47. I&E: STREAMBANK BMP IMPLEMENTATION 99
TABLE 48. I&E: HERBICIDE BMP IMPLEMENTATION 99
TABLE 49. I&E: TUTTLE CREEK WATERSHED RESIDENT EDUCATION 100
TABLE 50. COSTS: BIG BLUE TARGETED AREA CROPLAND BMPS BEFORE COST SHARE 101
TABLE 51. COSTS: BIG BLUE TARGETED AREA CROPLAND BMPS AFTER COST SHARE 102
TABLE 52. COSTS: LITTLE BLUE TARGETED AREA CROPLAND BMPS BEFORE COST SHARE 103
TABLE 53. COSTS: LITTLE BLUE TARGETED AREA CROPLAND BMPS AFTER COST SHARE 104
TABLE 54. COSTS: TARGETED LIVESTOCK AREA BMPS BEFORE COST SHARE 105
TABLE 55. COSTS: TARGETED LIVESTOCK AREA BMPS AFTER EQIP COST SHARE 106
TABLE 56. COSTS: STREAMBANK TARGETED AREA 107
TABLE 57. COSTS: CROPLAND HERBICIDE BMPS 108
TABLE 58. TECHNICAL ASSISTANCE REQUIRED FOR BMP IMPLEMENTATION 109
TABLE 59. TOTAL ANNUAL COST FOR BMP IMPLEMENTATION 110
TABLE 60. POTENTIAL FUNDING SOURCES FOR BMP IMPLEMENTATION 111
TABLE 61. POTENTIAL SERVICE PROVIDERS FOR BMP IMPLEMENTATION 112
TABLE 62. TUTTLE CREEK WATERSHED IMPAIRMENT REVIEW SCHEDULE 113
TABLE 63. BIG BLUE TARGETED AREA: GOALS FOR CROPLAND BMP ADOPTION 115
TABLE 64. LITTLE BLUE TARGETED AREA: GOALS FOR CROPLAND BMP ADOPTION 116
TABLE 65. GOALS FOR LIVESTOCK BMP ADOPTION 117
TABLE 66. GOALS FOR HERBICIDE BMP ADOPTION 118
TABLE 67. GOALS FOR STREAMBANK BMP ADOPTION RATE 119
TABLE 68. BENCHMARKS MEASURING WATER QUALITY PROGRESS IN THE WATERSHED 121
TABLE 69. WATER QUALITY GOALS FOR SEDIMENT AND PHOSPHORUS 122
TABLE 70. SERVICE PROVIDER LIST 127

Glossary of Terms and Acronyms

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 used in photosynthesis found in algae and other aquatic plants.

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 originating in the intestines of all warm-blooded animals.

Hydrologic Unit Codes (HUCs): An identification system using numerical digits for watersheds. The smaller the watershed, the more digits a HUC will have.

KDHE: Kansas Department of Health and Environment.

Municipal water system: A water system serving at least 25 people or having more than 15 service connections.

National Pollutant Discharge Elimination System (NPDES) Permit: Permit required by federal law for all point source discharges into waters.

Nitrates: Final product of ammonia's biochemical oxidation, originating from manure and fertilizers. Primary source of nitrogen for plants.

Nitrogen (N): Element essential for plants and animals.

Nonpoint sources (NPS): Sources of pollutants from a disperse area, such as urban areas or agricultural areas.

Nutrients: Nitrogen and/or phosphorus in a water source.

Phosphorus (P): Element in water that, in excess, can lead to increased biological activity.

Point sources (PS): Pollutants originating from a single localized source, such as industrial sites, sewerage systems and confined animal facilities.

RAC: Regional Advisory Committee.

Riparian zone: Margin of vegetation within approximately 100 feet of a waterway.

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

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

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

Total Maximum Daily Load (TMDL): Maximum amount of pollutant that a specific body of water can receive without violating surface water-quality standards and resulting in failure to support their designated uses.

Total Nitrogen (TN): A chemical measurement of all nitrogen forms in a water sample.

Total Phosphorus (TP): A chemical measurement of all phosphorus forms in a water sample.

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

WRAPS: Watershed Restoration and Protection Strategy.

1. Preface and Plan Update

The purpose of this Watershed Restoration and Protection Strategy (WRAPS) report for the Lower Big Blue/Lower Little Blue Rivers watershed – referred to in this plan as the **Tuttle Creek Watershed** – is to outline a plan of restoration and protection goals and actions for this watershed's surface waters. Watershed goals can be characterized as either "restoration" or "protection." Watershed restoration refers to surface waters failing to meet water quality standards, and for areas of the watershed that need improvement in habitat, land management, or other attributes. Watershed protection refers to surface waters currently meeting water quality standards but requiring protection from future degradation.

In the WRAPS process, local communities and governmental agencies work together toward the common goal of a healthy environment. Local participants, or stakeholders, provide valuable grass-roots leadership, responsibility, and management of resources in this process. Because they have the most at stake, these community members work together to ensure that their lands' water quality is protected. Agencies bring science-based information, communication, and technical and financial assistance to the table. By working as a WRAPS team, communities can take several steps toward watershed restoration and protection. Within the watershed, the team works to build awareness and education, engage local leadership, and monitor and evaluate watershed conditions; they also assess, plan and implement the WRAPS process at the local level.

Other crucial objectives for the WRAPS process are to maintain recreational opportunities and biodiversity while protecting the environment from flooding and the negative effects of urbanization and industrial production. Final watershed goals are to provide a sustainable water source for drinking and domestic use while preserving food, fiber, and timber production. The ultimate WRAPS goal is a **restored and protected watershed**: "local hands caring for local lands" in partnership with government agencies in order to improve the environment for everyone.

This report is intended to serve as an overall strategy to guide WRAPS 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 to restore and protect the water quality and watershed conditions of the Tuttle Creek Watershed.

Plan Update: The original Tuttle Creek Watershed WRAPS plan was written and approved in 2010. However, a TMDL revision by the Kansas Department of Health and Environment (KDHE) resulted in outdated WRAPS plan implementation goals. Therefore, the Tuttle Creek Watershed WRAPS plan was updated and revised in 2018 by Kansas State University staff and KDHE, with the guidance of the Tuttle Creek Watershed SLT.

2. Introduction to the Tuttle Creek Watershed WRAPS

This section includes a discussion about the importance of a WRAPS plan as well as a description of the key collaborators who strive to make it effective. There is a special focus on the specifics of the Tuttle Creek Watershed's location and stakeholders.

A. What is a Watershed?

A watershed is an area of land that catches precipitation and funnels it to a particular creek, stream, river and so on, until the water drains into an ocean. A watershed has distinct elevation boundaries that do not follow county, state, or international borders. Watersheds come in all shapes and sizes, with some only covering an area of a few acres, while others encompass thousands of square miles.

B. What is a Watershed Restoration and Protection Strategy (WRAPS)?

WRAPS is a planning and management framework built to engage local citizen-stakeholders within a particular watershed. It is a process used to **identify** restoration and protection needs, **establish** management goals for the watershed community, **create** an action plan to achieve those goals, and **implement** the action plan.

The acronym "WRAPS" originated from KDHE in response to the 1998 Clean Water Action Plan issued by the Clinton Administration. The Clean Water Action Plan directed the state environmental agency and the state conservationist of every state to complete a "unified watershed assessment." Upon completion of the assessment, states were directed to develop "watershed restoration action strategies" (WRAS).

The state of Kansas contends that restoring damage to a watershed is not enough because it only addresses part of the need; action to protect water is a necessity, hence the new term WRAPS. Historically, WRAPS refers to the development of action plans that address nonpoint source pollution sources on a watershed basis. WRAPS projects are initiated by watershed stakeholders and received financial support from KDHE to address Total Maximum Daily Loads (TMDLs) and related water quality concerns.

The WRAPS initiative intends to address priority issues identified in the basin sections of the Kansas Water Plan through the development and implementation of WRAPS in priority watersheds.

C. Watershed location

There are 12 river basins located in Kansas. The scope of this WRAPS project is a portion of the Kansas-Lower Republican Basin in north-central Kansas (**Figure 1**). This entire basin drains the Kansas River and its tributaries into the Missouri River, eventually emptying into the Gulf of Mexico. The extent of this WRAPS area is the Big Blue and Little Blue Rivers and their supporting tributaries. The geographical endpoint of the watershed is the confluence of the Big Blue River and the Kansas River below Tuttle Creek Lake and dam.

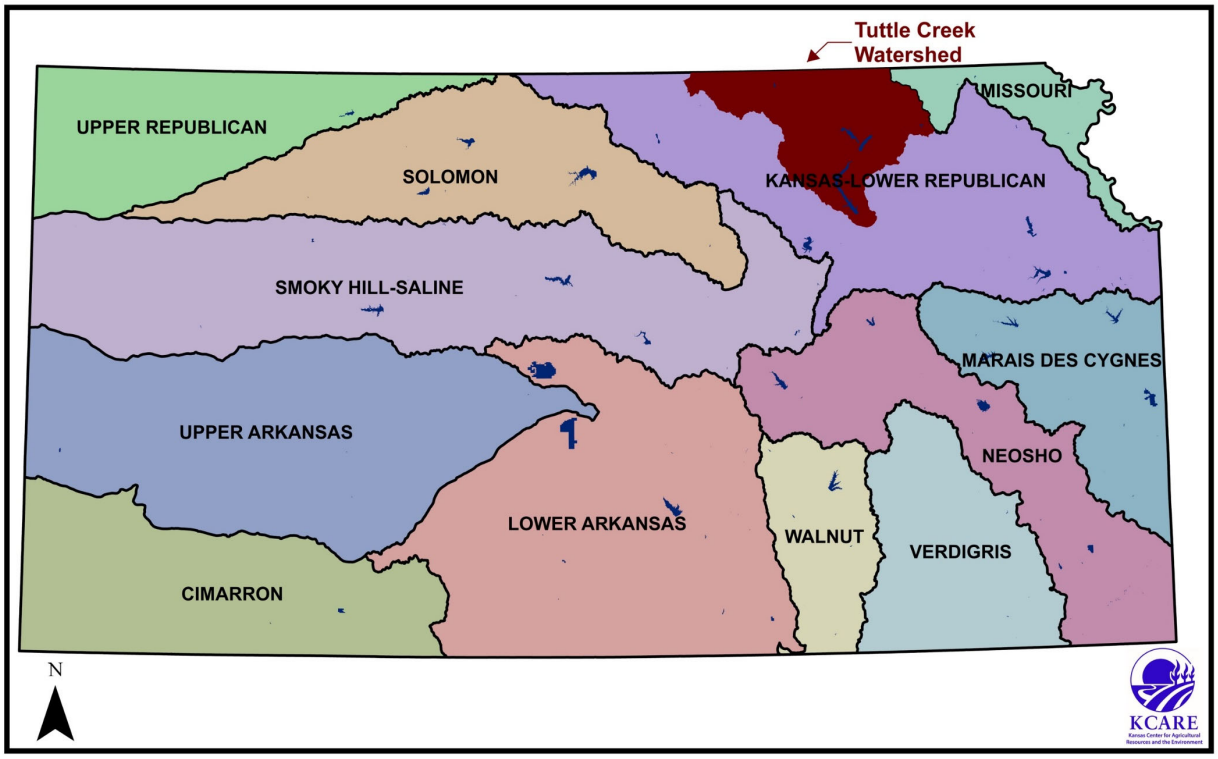


Figure 1. The 12 river basins of Kansas, highlighting the Tuttle Creek Watershed

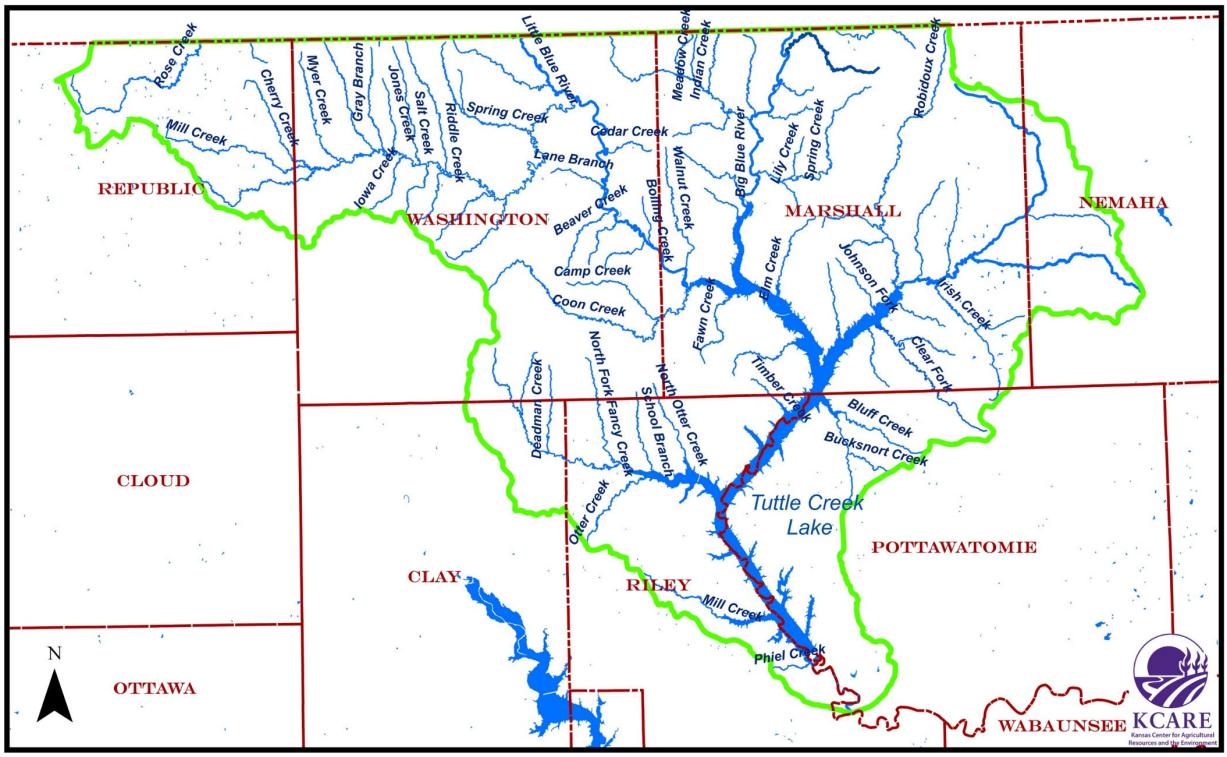


Figure 2. Map of the Tuttle Creek Watershed

The Tuttle Creek Watershed is located in north-eastern Kansas, residing in portions of seven counties (**Figure 2**). The Little Blue Watershed covers 564,375 acres, and the Big Blue Watershed covers 991,887 for a total of 1,556,262 acres in the Tuttle Creek Watershed. This covers most of Marshall and Washington counties, parts of northeast Republic, Clay and Riley counties, as well as western segments in Nemaha and Pottawatomie counties. The Tuttle Creek Lake itself is located on the Riley-Pottawatomie county line at the base of the watershed's drainage area. There are numerous towns and cities in this watershed in addition to developed areas surrounding Tuttle Creek Lake. Specific information about land use within the watershed, as well as specific population information, can be found in Section 3 of this report.

D. Tuttle Creek Watershed description

Only approximately 25 percent of the Tuttle Creek watershed is located in Kansas: the bulk of the watershed lies to the north, in Nebraska (**Figure 3**). While it is necessary that Kansas and Nebraska work in unison to achieve water quality improvements, this WRAPS project only includes the Kansas portion of the total watershed.

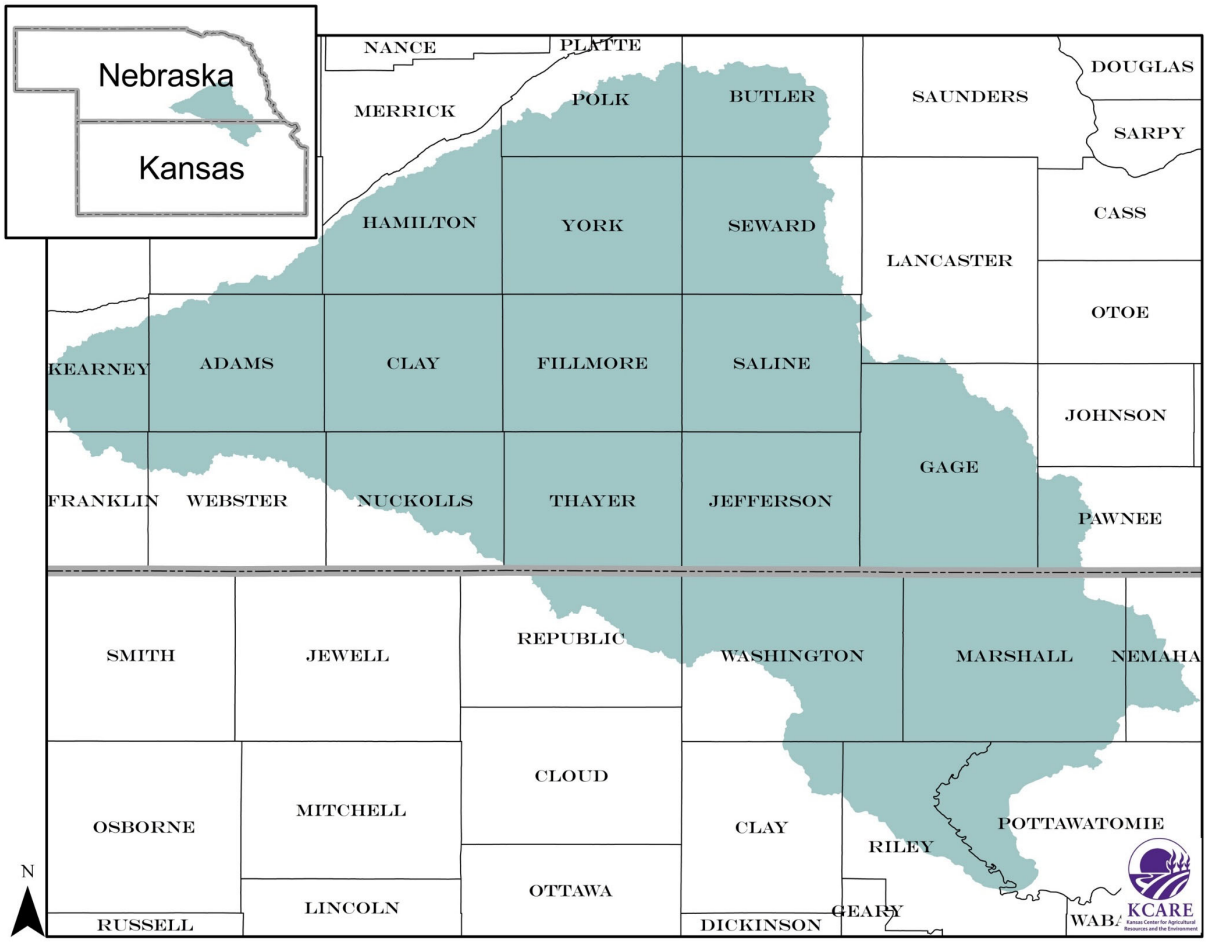


Figure 3. Tuttle Creek Watershed crossing the Kansas border into Nebraska.

EPA Targeted Watershed Grant

In an effort to work across state lines, the entire watershed in Kansas and Nebraska has been granted an EPA Targeted Watershed Grant to advance the goals of the Tuttle Creek Lake partners and to implement watershed management plans. This grant program is a competitive program designed to encourage collaborative, community-driven approaches to meet clean water goals. Goals of the EPA Targeted Watershed Grant include:

- target and implement Best Management Practices (BMPs) for agriculture in critical sub-watersheds;
- install continuous no-till cultivation practices;
- establish riparian buffer strips and filter strips;
- enhance educational efforts, including the development of nutrient and herbicide plans and field demonstrations about conservation practices;
- utilize market-based incentives to encourage and support landowner adoption of BMPs, including cost-share assistance for planting specialty forest products in riparian buffer strips; and
- conduct water-quality monitoring to record reductions in sediment, nutrient, herbicide and bacteria runoff due to the installation of BMPs.

Blue River Compact[1]

Kansas and Nebraska have an interstate compact to implement pollution abatement programs in each of the two states. Agreements within this compact in terms of water quality are as follows:

Article VI--Water Quality Control

6.1 *The states of Kansas and Nebraska mutually agree to the principle of individual state efforts to control natural and man-made water pollution within each state and to the continuing support of both states in active water pollution control programs.*

6.2 *The two states agree to cooperate, through their appropriate state agencies, in the investigation, abatement, and control of sources of alleged interstate pollution within the Big Blue river basin whenever such sources are called to their attention by the administration.*

6.3 *The two states agree to cooperate in maintaining the quality of the waters of the Big Blue river basin at or above such water quality standards as may be adopted, now or hereafter, by the water pollution control agencies of the respective states in compliance with the provisions of the federal water quality act of 1965, and amendments thereto.*

6.4 *The two states agree to the principle that neither state may require the other to provide water for the purpose of water quality control as a substitute for adequate waste treatment.*

E. What is a Hydrologic Unit Code (HUC)?

HUC is an acronym for **H**ydrologic **U**nit **C**odes. HUCs act as an identification system for watersheds. Each watershed is assigned a unique HUC number, in addition to a common name. As watersheds become smaller, the HUC number becomes larger. The first two numbers in the

[1] Kansas-Nebraska Blue River Compact.
http://www.ksda.gov/includes/document_center/interstate_water_issues/IWI_Docs/Blue_River_Compact.pdf

HUC 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 pair of digits is the cataloging unit.

For example, the Kansas-Lower Republican Basin is one of 12 basins in the state of Kansas. Within the Kansas-Lower Republican Basin are 10 HUC 8 classifications. Tuttle Creek Lake Watershed is comprised of two eight-digit HUC watersheds: 10270205 (Lower Big Blue) and 10270207 (Lower Little Blue). *Throughout this WRAPS plan, these two watersheds will be referred to separately as the "Big Blue" and the "Little Blue"*. HUC 8s can be split further into smaller watersheds that are given HUC 10 numbers, and HUC 10 watersheds can be divided into smaller HUC 12 watersheds (**Figure 4**).

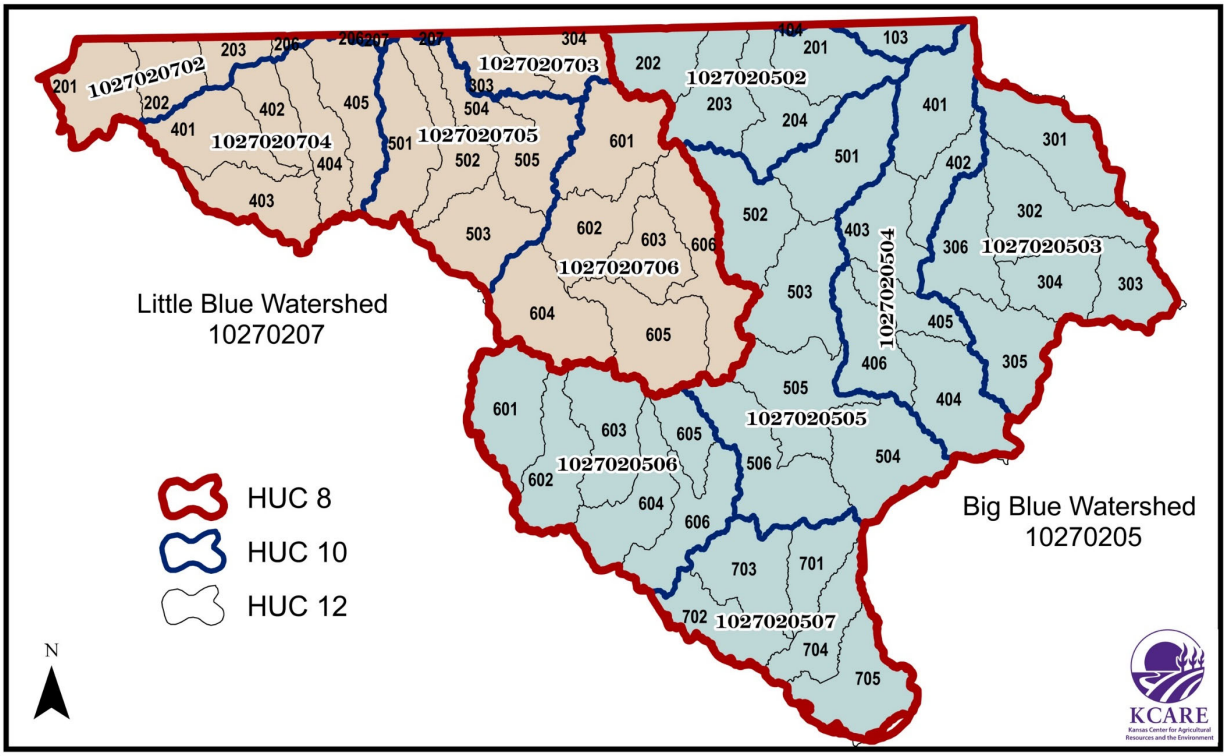


Figure 4. HUC 8, 10, and 12 delineations in the Big Blue and Little Blue sub-watersheds

F. Tuttle Creek WRAPS History

The Big Blue and Little Blue Watersheds are designated as Category I watersheds. This means that these two watersheds need restoration, as defined by the 1999 Kansas Unified Watershed Assessment submitted by KDHE and the United States Department of Agriculture (USDA). A Category I watershed does not meet state water quality standards or fails to achieve aquatic system goals related to habitat and ecosystem health. Category I watersheds also are assigned a priority for restoration: out of 92 watersheds in Kansas, the Big Blue watershed has a priority ranking of 2nd, and the Little Blue watershed is ranked 10th.

G. Who are the Stakeholders?

In 2007, a group of concerned citizens established a proactive and voluntary Stakeholder Leadership Team (SLT). This grass-roots task force was comprised of landowners, producers, residents, agency representatives and other stakeholders from the Tuttle Creek Watershed interested in exploring water quality issues and nonpoint source pollution. The SLT submitted the original Tuttle Creek WRAPS plan to KDHE in May of 2010. A list of current SLT members can be found at the beginning of this report.

H. Goals of the Stakeholder Leadership Team (SLT)

Responsibility for restoration and protection of the watershed rests primarily in the hands of local stakeholders. In cooperation with these local stakeholders, federal and state agencies provide technical and financial assistance for education activities and implementation of BMPs. The SLT has identified specific goals to achieve watershed improvement; implementation of BMPs as well as financial incentives and cost-share programs will, over time, lead to decreases in surface and ground water impairments.

The Tuttle Creek SLT has set six **WRAPS goals**:

1. Protect and restore water quality throughout the watersheds.
2. Protect the water supply storage capacity in Tuttle Creek Lake.
3. Protect recreational uses at Tuttle Creek Lake.
4. Preserve and enhance wildlife habitat in the watershed.
5. Control flooding.
6. Protect the productivity of agricultural lands throughout the watershed.

The main pollutants for the Tuttle Creek Watershed include:

- sediment,
- nutrients,
- alachlor and atrazine herbicides, and
- E. coli bacteria.

I. Regional Advisory Committee (RAC)

In 2013, the Governor of Kansas issued a call to action to develop a 50-Year Vision Plan for incorporation into the Kansas Water Plan. Regional Advisory Committees (RACs) were developed in 2015 to work in concert with the 50-Year Vision Plan. The Tuttle Creek Watershed is part of the **Kansas RAC**. The Kansas RAC has developed the following five goals for the future of the Kansas Lower Republican River basin.[2]

[2] Kansas Water Vision, Regional Goal Action Plans Section. http://kwo.ks.gov/docs/default-source/water-vision-water-plan/vision/rpt-vision-regional-goal-action-plans-section.pdf?sfvrsn=4

1. Increase water storage capacity and availability in federal reservoirs. Purchase all available storage in federal reservoirs to secure an adequate water supply for the region by 2020. Evaluate the ability to raise the conservation pool in each federal reservoir by 2025.
2. Explore additional storage possibilities, such as construction of multipurpose lakes, so that new water sources can be brought online by 2050.
3. Reduce the cumulative sediment rate of federal reservoirs and other water supply lakes in the region by 10 percent every 10 years through implementation of watershed BMPs.
4. Reduce per capita water consumption by 10 percent through conservation, education and pricing mechanisms by 2035.
5. Reduce duration and frequency of harmful algal blooms after the year 2020. These reductions will result in blooms lasting under a week and not occurring until after Labor Day.

The RAC goals are closely aligned with the WRAPS process; to meet these goals, the RAC developed **Action Steps**. These steps include working in cooperation and coordination with local WRAPS groups, conservation districts, producers and municipalities. Partnerships will implement the goals by leveraging existing and finding new funding sources, implementing new conservation practices, and providing education and awareness of water quality and quantity issues in the watershed.

3. Watershed Review

This watershed review is an in-depth description of the Tuttle Creek Watershed. This section includes descriptions and data about the Tuttle Creek Watershed's land cover and use, special water designations, annual rainfall, aquifers, population, public water supplies and permitted waste water facilities.

A. Land Cover and Land Uses

Land use activities have a significant impact on the types and quantity of pollutants in the watershed (**Figure 5**). The two major land uses in Tuttle Creek Watershed are grassland (42 percent) and cropland (41 percent). Cropland is the source of sediment from overland flow; fertilizer overuse or application prior to a rainfall event can also result in nutrient runoff, especially E. coli bacteria from manure applied before a rainfall event, and atrazine applied on crops in the spring. Grassland also can cause E. coli runoff from any grazing livestock that have access to streams and ponds, in addition to sediment from cattle trails and gullies in pastures. **Table 1** shows the remaining land uses in the watershed, including: forest (7 percent), developed/open space (4 percent), pasture/hay (2 percent), open water (2 percent) and other (2 percent).

Land in the Tuttle Creek Watershed has an increased potential for erosion and nutrient runoff due to several factors. The cropland in this watershed is largely conventional, with approximately 80 percent without buffers and only 5 percent utilizing continuous no-till. Combined with the amount of rainfall for this region of Kansas, this leads to increased erosion potential and increased nutrient runoff originating from cropland. On the Big and Little Blue Rivers, approximately 36 miles of buffer are characterized as barren land. This land does not have adequate vegetation to stabilize the riverbanks, leading to a very high potential for streambank erosion and increased nutrient loadings from the streambanks.

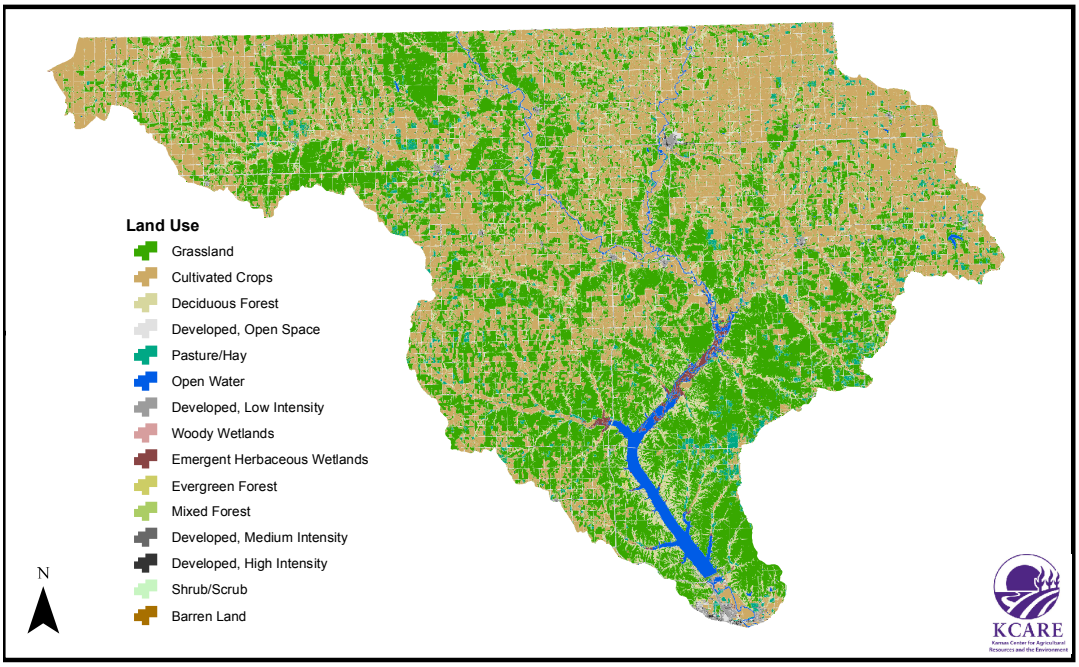


Figure 5. Land cover and land use in the watershed

Table 1. Land use in the Tuttle Creek Watershed

Land Use in the Tuttle Creek Watershed		
Land Use	**Acres**	**Percentage**
Grassland	651,377	41.9%
Cultivated Crops	637,283	40.9%
Deciduous Forest	114,414	7.4%
Developed, Open Space	56,269	3.6%
Pasture/Hay	33,574	2.2%
Open Water	30,258	1.9%
Developed, Low Intensity	12,334	0.8%
Woody Wetlands	7,012	0.5%
Emergent Herbaceous Wetlands	5,625	0.4%
Evergreen Forest	2,906	0.2%
Mixed Forest	2,473	0.2%
Developed, Medium Intensity	1,787	0.1%
Developed, High Intensity	468	0.0%
Shrub/Scrub	347	0.0%
Barren Land	135	0.0%
Total	**1,556,262**	**100.0%**

B. Designated Uses

Generally, surface waters in this watershed are used for aquatic life (fish), human health purposes, domestic water supply, contact recreational (fishing, boating and swimming), groundwater recharge, industrial water supply, irrigation, and livestock water. Commonly, these are referred to as "designated uses" as stated in the Kansas Surface Water Registry, 2013, issued by KDHE (**Table 2**).

Designated Uses Abbreviation Key			
AL	Aquatic Life	GR	Groundwater Recharge
CR	Contact Recreational	IW	Industrial Water Supply
DS	Domestic Water Supply	IR	Irrigation
FP	Food Procurement	LW	Livestock Water
a	Secondary 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 or accessible by the public under Kansas law
B	Primary contact recreation stream segment is by law or written permission of the landowner open to and accessible by the public	C	Primary contact recreation stream segment is not open to or accessible by the public under Kansas law
E	Expected aquatic life use water	S	Special aquatic life use water
O	Referenced stream segment does not support the indicated designated us.	X	Referenced stream segment is assigned the indicated designated use

Table 2. Designated Water Uses in the Tuttle Creek Watershed[3]

Designated Water Uses in the Tuttle Creek Watershed								
Stream Name	**AL**	**CR**	**DS**	**FP**	**GR**	**IW**	**IR**	**LW**
Fancy Creek, Mill Creek: *Segment 16*	E	a	X	X	X	X	X	X
Dog Walk Creek, Dutch Creek, Kearney Branch, Silver Creek	E	b	O	O	O	O	O	O
Mercer Creek, Scotch Creek	E	b	O	O	O	O	O	X
Joy Creek, Phiel Creek, School Branch, Weyer Creek	E	b	O	O	O	O	X	X
Beaver Creek, Johnson Fork	E	b	O	O	X	O	O	X
Lane Branch, Riddle Creek	E	b	O	O	X	O	X	X
Cedar Creek	E	b	O	X	O	O	O	O
Melvin Creek	E	b	O	X	O	O	O	X
Bowman Creek, Buffalo Creek, Gray Branch, Spring Creek: *Segment 30*	E	b	O	X	O	O	X	X
Humphrey Branch	E	b	O	X	X	O	O	O
Cedar Creek	E	b	O	X	X	O	O	X
Corndodger Creek	E	b	O	X	X	O	X	O
De Shazer Creek, Hop Creek, Otter Creek, Rose Creek	E	b	O	X	X	O	X	X
Ackerman Creek, Bolling Creek, Bommer Creek, Camp Creek: *Segments 35 and 40*; Carter Creek, Deadman Creek, Fawn Creek, Game Fork, Jim Creek, Murdock Creek, Perkins Creek	E	b	X	O	X	X	X	X
Malone Creek	E	b	X	X	O	O	O	X
Ash Creek, Black Vermillion River - N Fork, Black Vermillion River: *Segments 11, 13 and 14*; Bucksnort Creek, Cherry Creek, Deer Creek, Elm Creek, Fancy Creek (N Fork), Indian Creek, Iowa Creek, Irish Creek, Jones Creek, Lily Creek, Little Indian Creek, Meadow Creek, Mill Creek (S Fork), Myer Creek, Raemer Creek, Salt Creek, Schell Creek	E	b	X	X	X	X	X	X
Big Blue River: *Segments 1, 2, 7, 17 and 18;* Bluff Creek, Otter Creek (North), Robidoux Creek, Spring Creek: *Segments 19 and 65*; Timber Creek	E	B	X	X	X	X	X	X
Little Blue River: *Segment 4*; Mill Creek: *Segments 18, 20, and 22*; Spring Creek: *Segment 15*	E	b	X	X	X	X	X	X
Fancy Creek (West)	E	C	O	X	X	O	X	X
Big Blue River: *Segments 20 and 21;* Black Vermillion River: *Segments 8 and 10;* Coon Creek, Horseshoe Creek, Little Blue River: *Segments 1, 2 and 3*; Little Timber Creek, Mill Creek, Mill Creek: *Segment 14;* Mission Creek, School Creek, Walnut Creek	E	C	X	X	X	X	X	X
Elm Creek (North)	S	b	X	X	X	X	X	X
Black Vermillion River (Clear Fork)	S	C	X	X	X	X	X	X

[3] Kansas Surface Water Registry, 2013. Kansas Department of Health and Environment. https://www.epa.gov/sites/production/files/2014-12/documents/kswqs-register-2009.pdf

C. Special Aquatic Life Use Waters

Special aquatic life use waters[4] 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 Tuttle Creek watershed has two rivers/creeks listed as special aquatic life use waters: Elm Creek (North), and Black Vermillion River (Clear Fork).

These two areas are home to the Topeka Shiner, a small minnow described by the U.S. Fish and Wildlife Service as typically found in slow-moving and naturally winding waters. In addition to Kansas, this species lives in Iowa, Minnesota**,** Missouri, Montana, Nebraska and South Dakota. It prefers river bottoms made of sand, gravel, or rubble often covered by a deep layer of silt. The Topeka Shiner has been listed as an endangered species since 1998.

The Tuttle Creek watershed's special aquatic life use waters are located in primarily grassland areas (**Figure 6**). Livestock-related pollutants might threaten the health of these waters; for example, manure in the streams leads to pollution from fecal coliform bacteria and nutrients, and livestock traffic paths, or stream access and subsequent bank erosion, leads to sediment deposition in the streams.

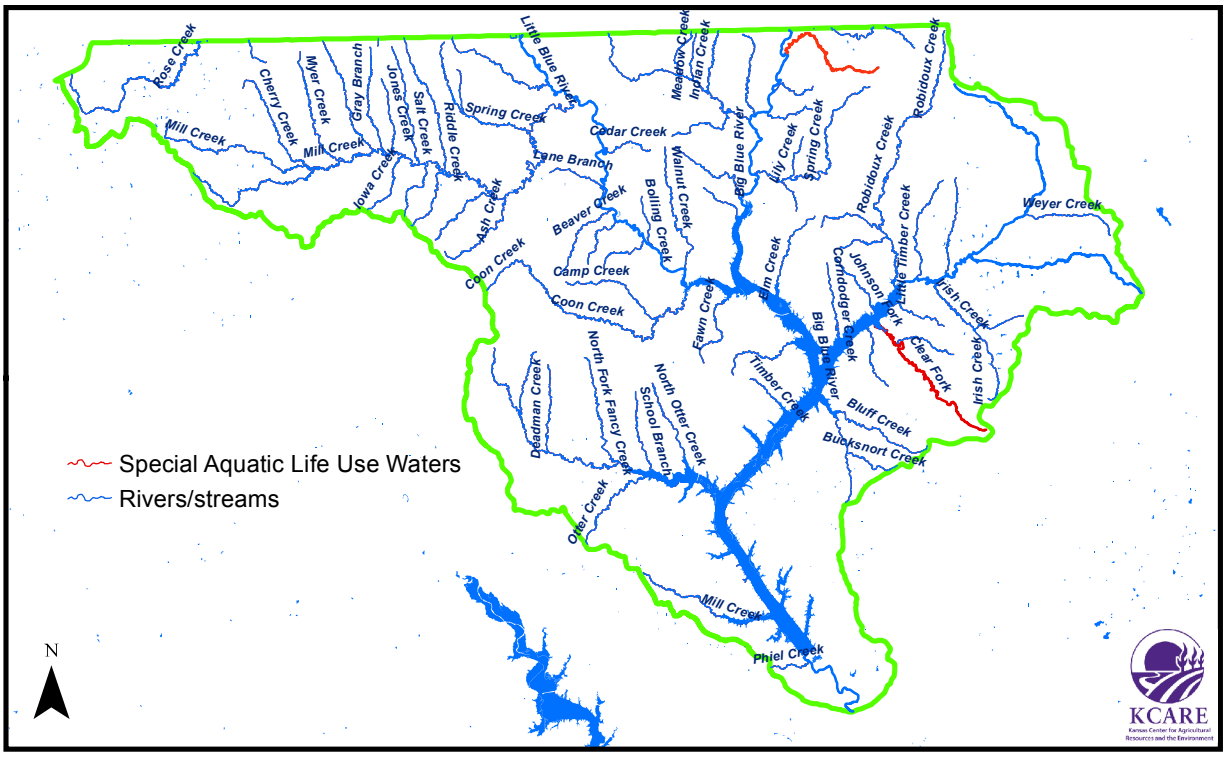


Figure 6. Special Aquatic Life Use Waters

[4] List of exceptional state waters (ESW), special aquatic life use waters (SALU) and outstanding national resource waters (ONRW). 2007. Kansas Department of Health and Environment. http://www.kdheks.gov/nps/resources/specwaterinfo.pdf

D. Exceptional State Waters

Exceptional State Waters[4] (ESW) are defined as "any of the surface waters or surface water segments that are of remarkable quality or of significant recreational or ecological value." There are no ESW in the Tuttle Creek Watershed.

E. Outstanding National Resource Waters

Outstanding National Resource Waters[4] (ONRW) are defined as "any of the surface waters or surface water segments of extraordinary recreational or ecological significance." There are no ONRW in the Tuttle Creek Watershed.

F. Rainfall and Runoff

Rainfall rates and duration affect sediment and nutrient runoff during high-intensity rainfall events, most of which occur in late spring and early summer. This is the time frame when crop land is either bare, or crop biomass is small. Grasses are short and do not catch runoff. Both of these situations can lead to pollutants entering the waterways.

The Tuttle Creek Watershed averages 33.25 inches of rainfall annually. The cities of Marysville and Washington are used to calculate the average precipitation in the Tuttle Creek Watershed (**Figure 7**). Looking at the watershed as a whole, annual precipitation is heaviest in the eastern portions, with the least annual precipitation falling on the northwest corner of the watershed (**Figure 8**). The watershed's average soil permeability is 0.6 inches/hour, according to NRCS STATSGO. Runoff is chiefly generated when rainfall intensities are greater than soil permeability. According to this database, the watershed produces runoff even under low rainfall conditions (1.5 inches/hour). As the watershed's soil profiles become saturated, excess overland flow is produced. Generally, storms producing less than 0.5 inches/hour of rain will only generate runoff from 23.4 percent of this watershed, chiefly along the stream channels.

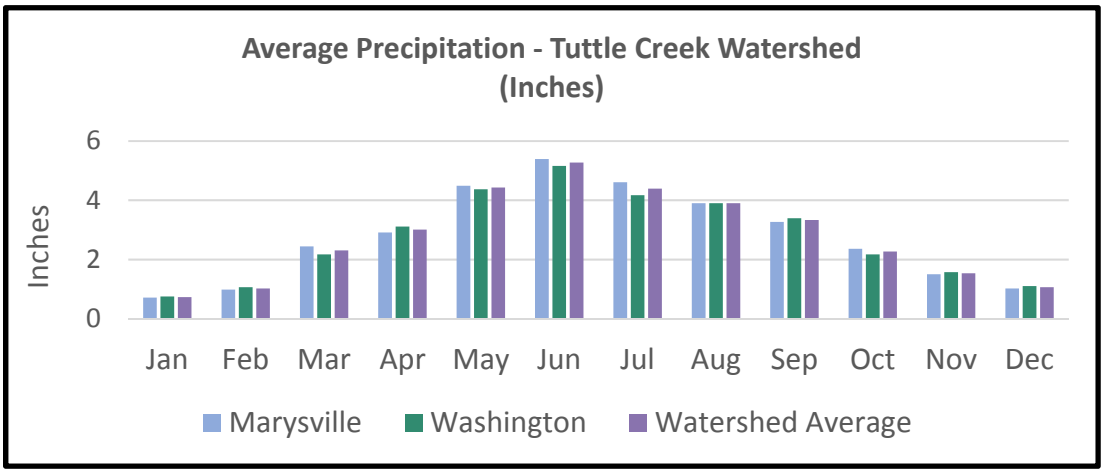


Figure 7. Tuttle Creek Watershed monthly average precipitation[5]

[5] U.S. Climate Data. https://USClimatedata.com

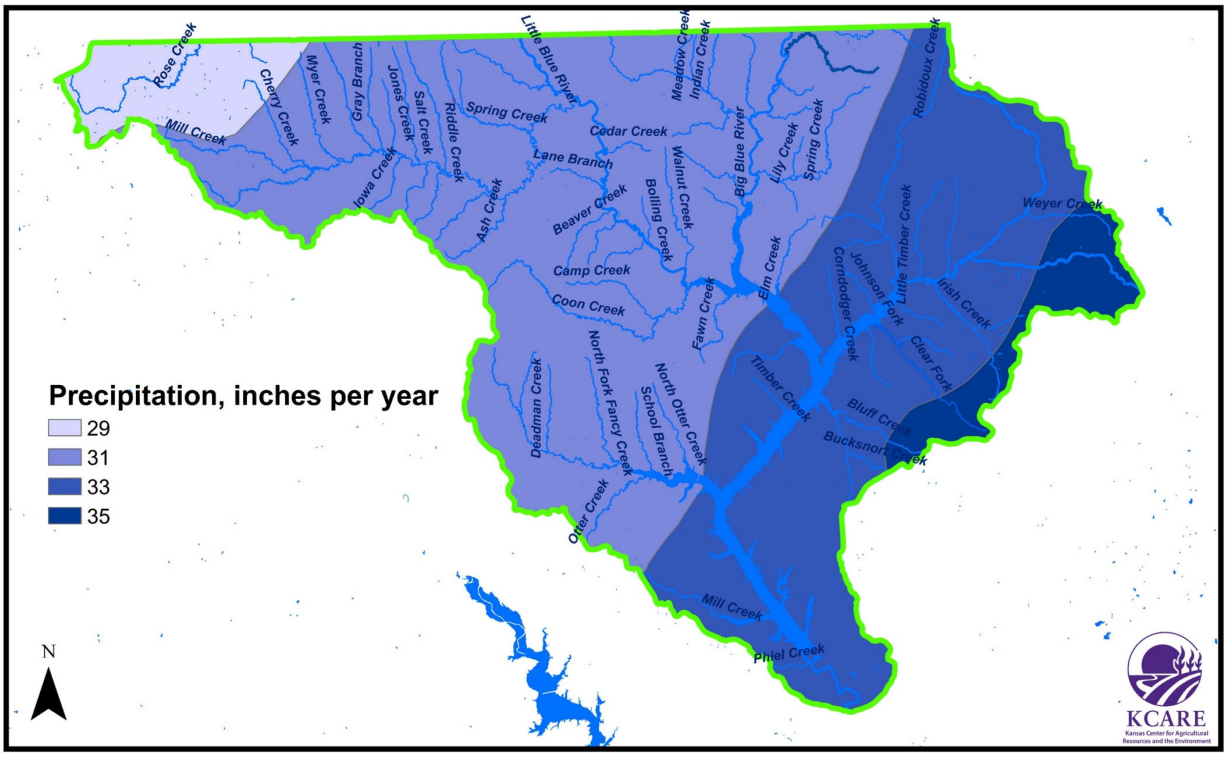


Figure 8. Annual precipitation in the Tuttle Creek Watershed

G. Population and Wastewater Systems

There are 26 small towns in the Tuttle Creek Watershed, ranging in populations from 21 to 3,294 (**Table 3**). Note that the 2018 numbers listed in Table 3 are estimates, therefore this report primarily depends on the 2010 U.S. Census for data. According to the 2010 Census, the total estimated population in the watershed is 43,597. The watershed is overwhelmingly rural, with a very low population density (**Figure 9**). While there has been an increase in population near Manhattan, there was a decrease of 640 people in the smaller rural areas since the year 2000. This equates to nearly 6 percent of the rural and small-town population and 1.5 percent of the total population in the Tuttle Creek Watershed.

It is important to mention that, while there is a small portion of the city of Manhattan located within the southern-most edge of the Tuttle Creek Watershed, Manhattan is not targeted by this WRAPS plan for several reasons. It is located below the lake, and this WRAPS plan focuses only on those areas that drain into Tuttle Creek Lake; water from Manhattan flows into another watershed. Also, Manhattan is an urban area, and this WRAPS plan does not address urban BMPs.

Table 3. Tuttle Creek Watershed population[6]

Tuttle Creek Watershed Population			
Township	**2000**	**2010**	**2018**
Axtell	445	406	402
Baileyville	193	181	180
Barnes	152	159	150
Beattie	277	200	189
Blue Rapids	1,088	1,019	966
Centralia	534	512	514
Cuba	231	156	145
Frankfort	855	726	694
Green	147	128	120
Greenleaf	357	331	310
Haddam	169	104	98
Hanover	653	682	664
Hollenberg	31	21	20
Leonardville	398	449	437
Mahaska	107	83	77
Marysvile	3,271	3,294	3,271
Morrowville	168	155	148
Munden	122	100	93
Narka	93	94	87
Oketo	87	66	63
Olsburg	192	219	220
Randolph	175	163	158
Summerfield	211	156	146
Vermillion	107	112	102
Washington	1,223	1,131	1,073
Waterville	681	680	641
TOTAL URBAN	11,967	11,327	10,968
TOTAL RURAL *(Includes rural areas in the watershed as well as a segment of the City of Manhattan which falls into the southern-most portion of the Tuttle Creek Watershed.)*		32,270	
Tuttle Creek Watershed: TOTAL POPULATION		**43,597**	

[6] U.S. 2010 Census. https://www.census.gov/

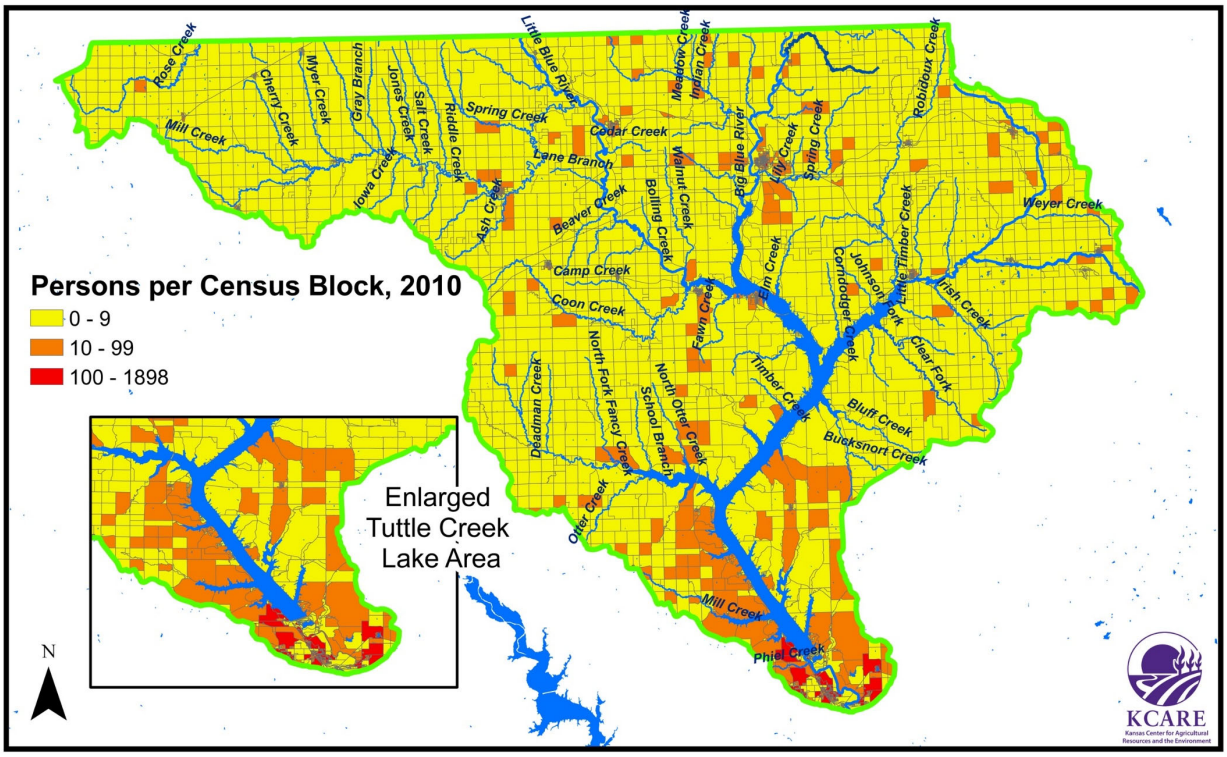


Figure 9. Tuttle Creek Watershed population map, including the Tuttle Creek Lake area

The number of wastewater treatment systems is directly tied to population, particularly in rural areas without access to municipal wastewater treatment facilities. Failing, improperly installed, or the lack of an onsite wastewater system can lead to Fecal Coliform Bacteria (FCB) or other nutrients from untreated sewage leaking or draining into the watershed. Even though all the counties in the watershed have county sanitary codes, there is no way of knowing how many failing or improperly constructed systems exist in this watershed. It is estimated that 14,090 onsite wastewater treatment systems are installed in the watershed with a failure rate of roughly 20 percent.[7]

H. Aquifers

Portions of three aquifers underlie the Tuttle Creek Watershed: the alluvial aquifer, the Glacial Drift Aquifer and the Dakota Aquifer (**Figure 10**).

- The **alluvial** aquifer is a part of and connected to river systems. It consists of sediments deposited by rivers in the stream valleys. The alluvial aquifer in the Tuttle Creek Watershed

[7] Cooperative Extension Service, University of Kentucky, College of Agriculture. http://www2.ca.uky.edu/agcomm/pubs/HENV/HENV502/HENV502.pdf

lies along and below the Big Blue, Little Blue and Black Vermillion Rivers. A sign of a healthy and sustainable alluvial system is adequate stream flow.

- The **Glacial Drift Aquifer** was formed by deposits of rock left by the glacier that covered northeast Kansas 700,000 years ago. These rock deposits of sand and gravel created a porous area that traps and holds water deposits.
- The **Dakota Aquifer** extends from southwestern Kansas to the Arctic Circle. In recent years, this aquifer has been used for irrigation purposes in both southwest and north-central Kansas (Cloud, Republic and Washington counties). The Dakota Aquifer also provides water for municipal, industrial and stock water supplies. The current stipulation for drilling in the Dakota is a one-mile distance between wells.

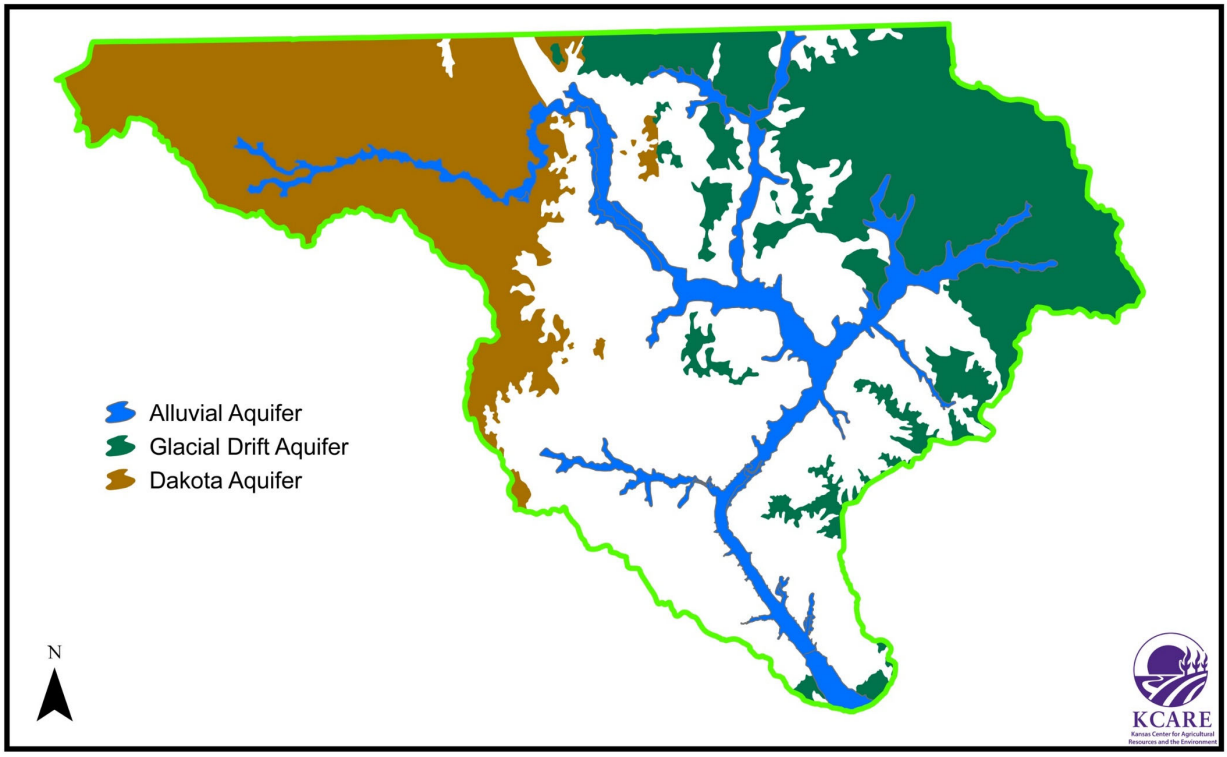


Figure 10. Aquifers in the watershed[8]

I. Public Water Supplies

The watershed has numerous public water supply (PWS) diversion points and rural water districts, in addition to countless private wells (**Table 4**). Most of the PWS water supplies in this watershed are groundwater, and atrazine concentrations in the spring and summer months can affect these supplies because high atrazine concentrations cause increased treatment costs for public water suppliers. A PWS that derives its water from surface water supply also can be affected by sediment, either by

[8] Alluvial Aquifer, 2005, Glacial Drift Aquifer, 2005, Dakota Aquifer, 2012. US Geological Survey, Kansas Geological Survey.

causing difficulty accessing the water at the intake or by requiring additional water treatment prior to consumption. Nutrients and fecal coliform bacteria also can affect surface water supplies.

Table 4. Tuttle Creek Watershed public water suppliers[9]

Public Water Suppliers	County	Source of Water	
		Rural Water District(s)	Number of Active Wells
Axtell, City Of	Marshall	Nemaha Co. RWD 3, Marshall Co. RWD 3	1
Barnes, City Of	Washington		2
Beattie, City Of	Marshall	Marshall Co. RWD 3	
Belleville, City Of	Republic		1
Blue Rapids, City Of	Marshall		3
Broken Arrow Ranch	Pottawatomie		1
Centralia, City Of	Nemaha	Nemaha Co. RWD 3	
Cuba, City Of	Republic	Republic Co. RWD 2	3
Frankfort, City Of	Marshall		3
Green, City Of	Clay		1
Greenleaf, City Of	Washington		2
Haddam, City Of	Washington		3
Hanover, City Of	Washington	Washington Co. RWD 1	
Leonardville, City Of	Riley		3
Living Water Ranch	Pottawatomie		2
Mahaska, City Of	Washington		1
Marshall Co. RWD 1	Marshall	Marshall Co. RWD 3	
Marshall Co. RWD 3	Marshall		5
Marysville, City Of	Marshall		4
Morrowville, City Of	Washington	Washington Co. RWD 1	
Munden, City Of	Republic	Republic Co. RWD 2	
Narka, City Of	Republic	Republic Co. RWD 2	
*Nemaha Co. RWD 3	Nemaha		2
Oketo, City Of	Marshall		2
Olsburg, City Of	Pottawatomie	Pottawatomie Co. RWD 2	2
*Pottawatomie Co. RWD 2	Pottawatomie		2
*Pottawatomie Co. RWD 3	Pottawatomie		3
Randolph, City Of	Riley	Riley Co. RWD 1	
*Republic Co. RWD 2	Republic		2
Riverchase Mobile Home Park	Riley		4
Rocky Ford Mobile Home Court	Riley		4
Summerfield, City Of	Marshall		3
Tuttle Creek Reservoir Stockdale Park	Riley		1
Tuttle Creek Water Company	Riley		2
Tuttle Terrace Trailer Court	Riley		1
University Park Water District	Riley	Riley Co. RWD 1	
Vermillion, City Of	Marshall		2

[9] PWS information provided by KDHE, August 2018. http://165.201.142.59:8080/DWW/WaterSystemSearch.jsp

Source Water Protection

In 1996, every state was required to conduct a Source Water Assessment (SWA) on all public water supplies. In order to protect their source of drinking water, public water supplies were then encouraged by KDHE to develop a Source Water Protection Plan (SWPP). The Tuttle Creek Watershed has 40 active PWS sites. None were ranked as "highly susceptible" by the SWA. Twelve public water suppliers within the Tuttle Creek Watershed that ranked as having a "moderate susceptibility" were required to develop a SWPP[10] in 2003. These cities include: Axtell, Barnes, Blue Rapids, Frankfort, Green, Greenleaf, Haddem, Leonardville, Mahaska, Manhattan, Oketo, and Vermillion.

J. National Pollutant Discharge Elimination Systems (NPDES)

National Pollutant Discharge Elimination System (NPDES) permits specify the maximum amount of pollutants allowed to be discharged to surface waters. Wastewater treatment facilities are permitted and regulated by KDHE, and these facilities are considered point sources for pollutants. Having these point sources located on streams or rivers may impact water quality in the waterways. Municipal wastewater can contain: suspended solids, biological pollutants that reduce oxygen in the water column, inorganic compounds or bacteria. Treatment of municipal waste water is similar across the country: wastewater treatment facilities remove solids and organic materials, disinfect water to kill bacteria and viruses, and discharge water to surface waterways.

Industrial point sources also can contribute toxic chemicals or heavy metals. Treatment of industrial wastewater is specific to the industry and the pollutant discharged. Any pollutant discharge from point sources allowed by the state is considered to be Wasteload Allocation. There are currently 46 permitted NPDES facilities in the Tuttle Creek Watershed (**Table 5**).

[10] Kansas Department of Health and Environment, Source Water Assessment Reports. http://www.kdheks.gov/nps/swap/SWreports.html

Table 5. List of NPDES facilities in the Tuttle Creek Watershed[11]

Facility Name	Facility Type	Description	City	County
Axtell, City Of	Municipal	Waste Stabilization Pond; Overflowing	Axtell	Marshall
Baileyville Improvement District #1	Municipal	Waste Stabilization Pond; Overflowing	Baileyville	Nemaha
Barnes, City Of	Municipal	Waste Stabilization Pond; Non-Overflowing	Barnes	Washington
Beattie, City Of	Municipal	Waste Stabilization Pond; Overflowing	Beattie	Marshall
Blue Rapids, City Of	Municipal	Waste Stabilization Pond; Overflowing	Blue Rapids	Marshall
Bradford Built	Pre_Treatment	Physical/Chemical Treatment	Washington	Wallace
Broken Arrow Ranch	Commercial	Waste Stabilization Pond; Non-Overflowing	N/A	Pottawatomie
Centralia, City Of	Municipal	Waste Stabilization Pond; Overflowing	Centralia	Nemaha
Cuba, City Of	Municipal	Waste Stabilization Pond; Overflowing	Cuba	Republic
Frankfort Groundwater Remediation	Industrial	Groundwater Remediation W/Chemical Treatment	Frankfort	Marshall
Frankfort, City Of	Municipal	Waste Stabilization Pond; Overflowing	Frankfort	Marshall
Frankfort, City Of - PWS #4 Source Water	Industrial	Groundwater Remediation W/Stripper	Frankfort	Marshall
GP Industrial Plasters	Industrial	Miscellaneous Process Water	Blue Rapids	Marshall
Greenleaf, City Of	Municipal	Waste Stabilization Pond; Overflowing	Greenleaf	Washington
Haddam, City Of	Municipal	Waste Stabilization Pond; Non-Overflowing	Haddam	Washington
Hanover, City Of	Municipal	Waste Stabilization Pond; Overflowing	Hanover	Washington
Home City Sewer Dis. 1 - Marshall County	Municipal	Waste Stabilization Pond; Overflowing	Home	Marshall
KDWPT - Tuttle Creek (River Pond Area)	Municipal	Waste Stabilization Pond; Non-Overflowing	N/A	Riley
Lakeside Association	Commercial	Waste Stabilization Pond; Non-Overflowing	N/A	Riley
Landoll Corporation #1	Pre_Treatment	Physical/Chemical Treatment	Marysville	Marshall
Living Waters Ranch	Commercial	Waste Stabilization Pond; Non-Overflowing	N/A	Pottawatomie
Mahaska, City Of	Municipal	Waste Stabilization Pond; Non-Overflowing	Mahaska	Washington
Manhattan, City Of	Municipal	Activated Sludge Complete Mix	Manhattan	Riley
Marysville, City Of	Municipal	Waste Stabilization Pond; Overflowing	Marysville	Marshall
Mccall Pattern Company, Inc	Industrial	Miscellaneous Cooling Water To Drainage (No Treatment)	Manhattan	Riley
Morrowville, City Of	Municipal	Waste Stabilization Pond; Non-Overflowing	Morrowville	Washington
Munden, City Of	Municipal	Waste Stabilization Pond; Non-Overflowing	Munden	Republic
Narka, City Of	Municipal	Waste Stabilization Pond; Non-Overflowing	Narka	Republic
Olsburg, City Of	Municipal	Waste Stabilization Pond; Overflowing	Olsburg	Pottawatomie
Pony Express Service Center	Commercial	Waste Stabilization Pond; Non-Overflowing	N/A	Washington
Rafter M Trailers	Pre_Treatment	Physical/Chemical Treatment	Waterville	Marshall
Randolph, City Of	Municipal	Waste Stabilization Pond; Overflowing	Randolph	Riley
Riley County - Longhorn Subdivision	Municipal	Waste Stabilization Pond; Non-Overflowing		Riley
Rocky Ford Trailer Court	Commercial	Waste Stabilization Pond; Overflowing	N/A	Pottawatomie
Sedalia Mobile Home Court	Commercial	Waste Stabilization Pond; Non-Overflowing	N/A	Riley
Summerfield, City Of	Municipal	Waste Stabilization Pond; Overflowing	Summerfield	Marshall
Terra Heights - Riley County	Municipal	Waste Stabilization Pond; Overflowing	N/A	Riley
Titan Mfg. Plant #1	Pre_Treatment	Physical/Chemical Treatment	Blue Rapids	Marshall
Titan Trailer Manufacturing - Plant #4	Pre_Treatment	Physical/Chemical Treatment	Blue Rapids	Marshall
Tuttle Terrace Trailer Court	Commercial	Waste Stabilization Pond; Non-Overflowing	N/A	Riley
University Park	Municipal	Activated Sludge Extend. Aeration	N/A	Riley
USD #498 Valley Heights	Municipal	Waste Stabilization Pond; Non-Overflowing	Waterville	Marshall
Vermillion, City Of	Municipal	Waste Stabilization Pond; Overflowing	Vermillion	Marshall
Washington, City Of	Municipal	Waste Stabilization Pond; Overflowing	Washington	Washington
Waterville, City Of	Municipal	Waste Stabilization Pond; Overflowing	Waterville	Marshall
Wheaton, City Of	Municipal	Waste Stabilization Pond; Overflowing	Wheaton	Pottawatomie

PWS - Public Water Supply
KDWPT - Kansas Department of Wildlife, Parks and Tourism
Mfg - Manufacturing
USD - Unified School District

[11] NPDES information provided by KDHE, August 2018. http://165.201.142.59:8080/DWW/WaterSystemSearch.jsp

4. Impaired Waters in the Tuttle Creek Watershed

Water quality in the Tuttle Creek Watershed is monitored at 15 different sites (**Figure 11**). These sites include five rotational stream sampling sites, six permanent stream sampling sights and four permanent sites on Tuttle Creek Lake. The water samples are analyzed for nutrients, metals, ammonia, solid fractions, turbidity, alkalinity, pH, dissolved oxygen, *E. coli* bacteria, and chemicals. Sample analysis determines if the water contains an unacceptable level of the previously mentioned pollutants. If analysis determines that any one pollutant exceeds acceptable limits, the water segment then becomes "impaired" by that pollutant and is reported as a 303d-listed impairment. If the water segment affected by the pollutant is in dire need of reduction and is considered "high priority", it is then listed as a Total Maximum Daily Load (TMDL).

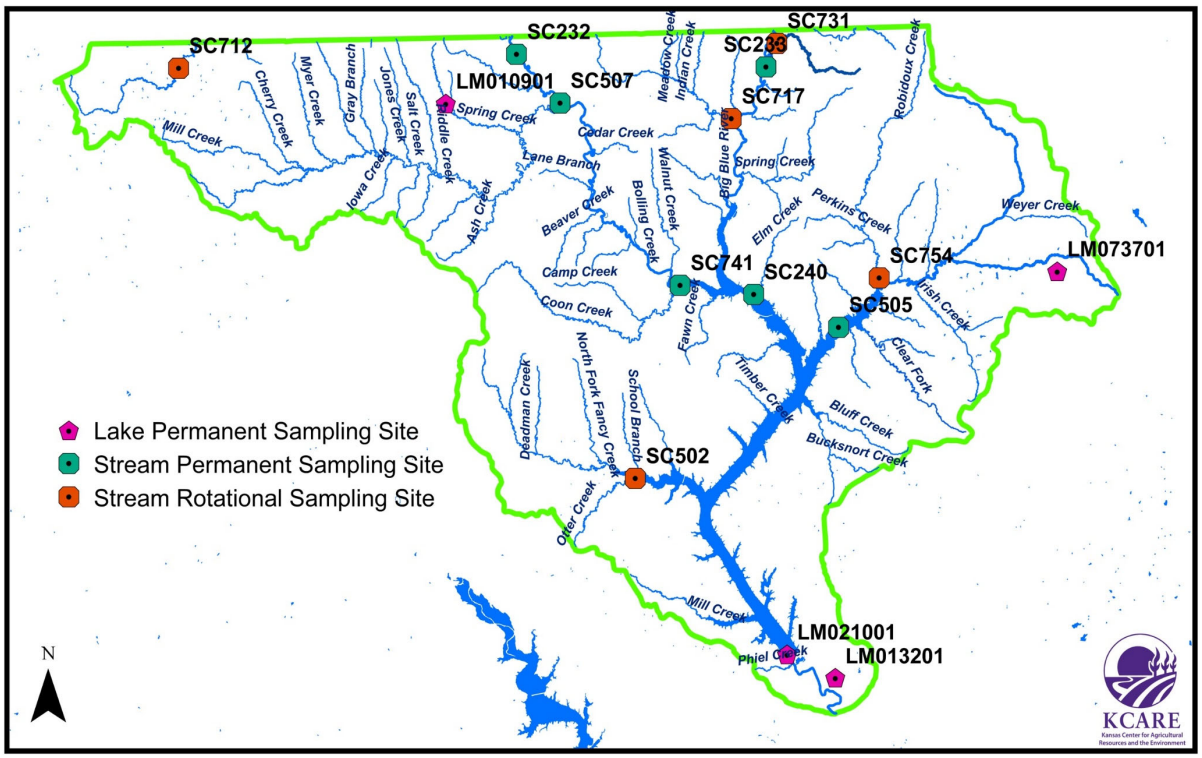


Figure 11. Tuttle Creek Watershed monitoring sites

A. 303d List of Impaired Waters in the Tuttle Creek Watershed

KDHE develops a 303d list of impaired waters and submits the list to EPA biennially. To be included on the 303d list, samples taken during the KDHE monitoring program must show that water quality standards are not being met which, in turn, means that designated uses are not met. All of the impairments listed (**Table 6**) are related to high sediment and nutrient loading in the watershed.

At this time, biology, copper, pH, sulfate, total phosphorus, and total suspended solids are 303d-listed impairments in several streams in the Tuttle Creek Watershed. Washington County State

Fishing Lake (Co. SFL) has been 303d listed for eutrophication[12]. Impaired waters listed as 303d are located throughout the watershed (**Figure 12**).

Table 6. 303d listed impaired waters in the Tuttle Creek Watershed

303d List - Impairment Acronyms	
BIO	Biology
Cu	Copper
E	Eutrophication
TP	Total Phosphorus
TSS	Total Suspended Solids

303d Listed Waters in the Tuttle Creek Watershed								
Water Segment	HUC 8 / Lake ID	Impairment / Year for TMDL Review						
		BIO	Cu	E	pH	Sulfate	TP	TSS
Ackerman Creek	10270205	2022					2019	2023
Ash Creek	10270207						2023	2023
Beaver Creek	10270207						2019	2023
Big Blue River	10270205	2022	2023		2022		2019	2023
Black Vermillion River	10270205	2022					2019	2023
Black Vermillion River, Clear Fork	10270205	2022					2019	2023
Black Vermillion River, North Fork	10270205	2022					2019	2023
Bolling Creek	10270207						2019	2023
Bommer Creek	10270205		2023		2022		2019	2023
Bowman Creek	10270207						2023	2023
Buffalo Creek	10270207						2023	2023
Camp Creek	10270207						2019	2023
Carter Creek	10270205					2023		
Cedar Creek	10270205	2022					2019	2023
Cherry Creek	10270207						2023	2023
Coon Creek	10270207						2019	2023
De Shazer Creek	10270205	2022					2019	2023
Deadman Creek	10270205					2023		
Deer Creek	10270205		2023		2022		2019	2023
Dog Walk Creek	10270205	2022					2019	2023
Dutch Creek	10270205		2023		2022		2019	2023
Elm Creek, North	10270205						2019	

[12] Kansas Department of Health and Environment, September 2018. http://www.kdheks.gov/tmdl/2018/Approved_2018_303_d)_List_of_All_Impaired_Waters.pdf

303d Listed Waters in the Tuttle Creek Watershed - *Continued*								
Water Segment	**HUC 8 / Lake ID**	**Impairment / Year for TMDL Review**						
		BIO	**Cu**	**E**	**pH**	**Sulfate**	**TP**	**TSS**
Fancy Creek	10270205					2023		
Fancy Creek, North Fork	10270205					2023		
Fancy Creek, West	10270205					2023		
Fawn Creek	10270207		2023		2022		2019	2023
Gray Branch	10270207						2023	2023
Hop Creek	10270205		2023		2022		2019	2023
Horseshoe Creek	10270205	2022				2023	2019	
Humphrey Branch	10270207	2022	2023		2022		2019	2023
Indian Creek	10270205					2023	2019	
Iowa Creek	10270207						2023	2023
Irish Creek	10270205	2022					2019	2023
Jim Creek	10270205	2022					2019	2023
Johnson Fork	10270205	2022					2019	2023
Jones Creek	10270207						2023	2023
Joy Creek	10270207						2019	2023
Kearney Branch	10270205	2022					2019	2023
Lane Branch	10270207						2019	2023
Lily Creek	10270205		2023		2022		2019	2023
Little Blue River	10270207	2022	2023		2022		2019	2023
Little Indian Creek	10270205					2023	2019	
Little Timber Creek	10270205	2022					2019	2023
Malone Creek	10270207						2019	2023
Meadow Creek	10270205					2023	2019	
Melvin Creek	10270207						2023	2023
Mercer Creek	10270207						2019	2023
Mill Creek	10270207						2023	2023
Mill Creek, South Fork	10270207						2023	2023
Mission Creek	10270205	2022			2022		2019	2023
Murdock Creek	10270205	2022			2022		2019	2023
Myer Creek	10270207						2023	2023
Otter Creek	10270205					2023		
Perkins Creek	10270205	2022					2019	2023
Raemer Creek	10270205					2023	2019	
Riddle Creek	10270207						2023	2023
Robidoux Creek	10270205	2022					2019	2023
Rose Creek	10270207						2019	
Salt Creek	10270207						2023	2023
Schell Creek	10270205		2023		2022		2019	2023
School Creek	10270207	2022	2023		2022		2019	2023
Scotch Creek	10270205		2023		2022		2019	2023
Silver Creek	10270207	2022	2023		2022		2019	2023
Spring Creek	10270205	2022	2023		2022		2019	2023
Walnut Creek	10270207						2019	2023
Washington County State Fishing Lake (SFL)	LM010901			2023				
Washington SFL Wildlife Area	LM010941			2023				
Weyer Creek	10270205	2022					2019	2023

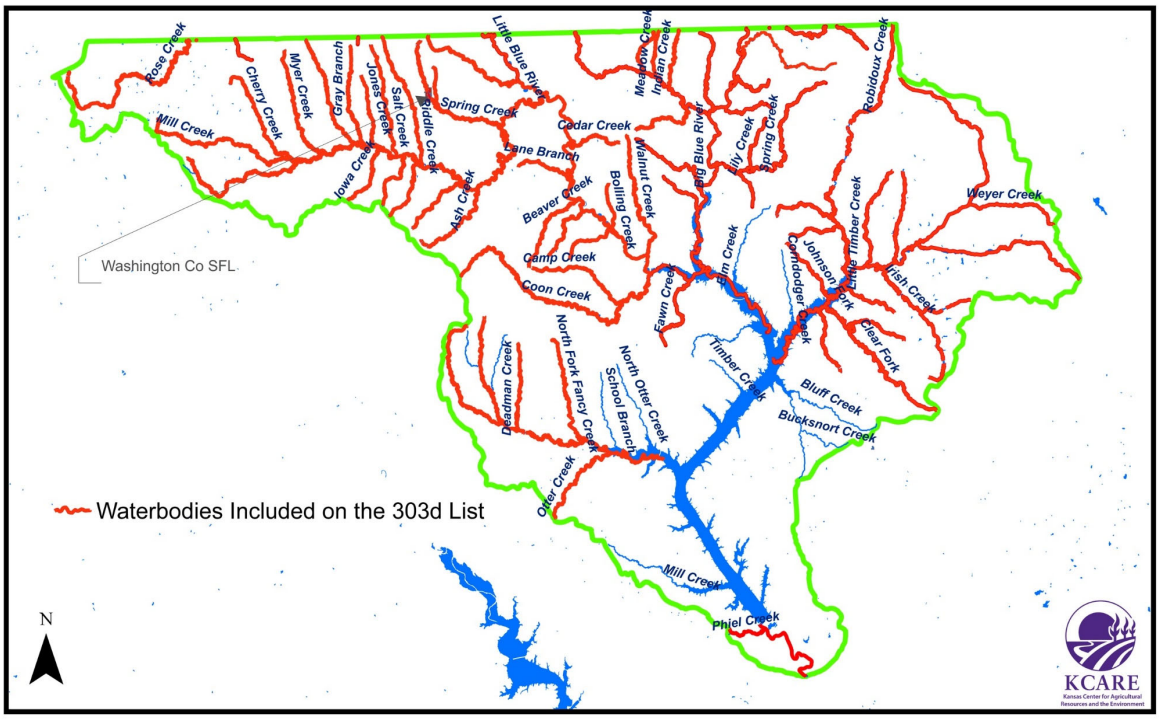


Figure 12. Map of 303d listed waterbodies in the Tuttle Creek Watershed

B. Total Maximum Daily Loads (TMDL)

1. What is a TMDL?

A TMDL designation sets the maximum amount of pollutant that a specific body of water can receive without violating the surface water-quality standards which would result in failure to support their designated uses. TMDLs in Kansas may be established on a watershed basis and may use a pollutant-by-pollutant approach, a biomonitoring approach, or both as appropriate. Establishment of a TMDL must follow the following procedure:

1. Draft the TMDL.
2. Allow public notice and comments on the TMDL.
3. Consider public comments on the TMDL.
4. Complete necessary revisions to the TMDL.
5. Submit the TMDL to EPA for approval.

The TMDL designation uses the current situation as a baseline and includes the desired outcome. Deviations from water quality standards also will be documented. The TMDL states its objective in meeting the appropriate water quality standard by quantifying the degree of pollution reduction expected over time.

In summary, TMDLs provide a tool to target and reduce point and nonpoint pollution sources. The goal of the WRAPS process is to address high-priority TMDLs. KDHE reviews TMDLs assigned in each of the 12 Kansas basins every five years on a rotational schedule. The Tuttle Creek Watershed, as part of the Kansas-Lower Republican River Basin, was reviewed in 2010, 2015 and is scheduled for review in 2020.

2. Tuttle Creek Watershed TMDLs

To be issued a TMDL, water samples taken during the KDHE monitoring program indicated that water quality standards were/are not being met. This in turn means that designated uses are not met.

Current TMDLs assigned to several streams in the Tuttle Creek Watershed are: alachlor, atrazine, *E. coli*, eutrophication, and siltation. Tuttle Creek Lake has high-priority TMDLs for alachlor (AL), atrazine (ATR), eutrophication (E) and siltation (Silt). There are a few other lakes in the Tuttle Creek Watershed that have medium and low-prioirty TMDLs assigned to them for dissolved oxygen (DO), eutrophication, pH and siltation. Specific TMDLs are listed in **Table 7**, while locations within the watershed can be found in **Figures 13 and 14**.

Implemented strategies for addressing current TMDLs as determined by the Tuttle Creek Watershed SLT and outlined in this plan will have an additional benefit by proactively addressing the impairments on the 303d list. The ultimate goal is to eliminate the need for TMDL development of the current 303d listed impairments. For the purpose of this plan, priority will be given to current TMDLs in the Tuttle Creek Watershed.

TMDL Impairment Acronyms	
AL	Alachlor (herbicide)
ATR	Atrazine (herbicide)
DO	Dissolved Oxygen
E	Eutrophication
Silt	Siltation

Table 7. TMDLs in the Tuttle Creek Watershed

TMDLs in the Tuttle Creek Watershed								
Water Segment	Stream / Lake ID	Impairment / Priority						
		AL	ATR	DO	E. coli	E	pH	Silt
Ackerman Creek	1027020549		High		High			
Ash Creek	1027020736		High		High			
Beaver Creek	1027020738		High		High			
Big Blue River	1027020517, 18, 20, 21	High	High		High	High		High
Big Blue River	102702057	High	High			High		High
Black Vermillion River	1027020510, 11, 13, 14,		High		High			
Black Vermillion River	102702058	High	High		High	High		High
Black Vermillion River Clear Fork	102702059		High		High			
Black Vermillion River, North Fork	1027020515		High		High			
Bluff Creek	10270205573	High	High			High		High
Bolling Creek	1027020742		High		High			
Bommer Creek	1027020540		High		High			
Bowman Creek	1027020721		High		High			
Bucksnort Creek	10270205566	High	High			High		High
Buffalo Creek	1027020732		High		High			
Camp Creek	1027020735, 44		High		High			
Carter Creek	1027020559		High		Medium			
Cedar Creek	1027020556		High		High			
Cedar Creek	1027020740		High		High			
Centralia Lake	LM073701					Medium	Medium	
Cherry Creek	1027020725		High		High			
Coon Creek	1027020723		High		High			
Corndodger Creek	1027020552	High	High			High		High
De Shazer Creek	1027020555		High		High			
Deadman Creek	1027020560		High		Medium			
Deer Creek	1027020536		High		High			
Dog Walk Creek	1027020553		High		High			
Dutch Creek	1027020544		High		High			
Elm Creek	1027020546	High	High			High		High
Elm Creek, North	1027020541		High					
Fancy Creek	1.02702E+11	High	High		Medium	High		High
Fancy Creek, North Fork	1027020561		High		Medium			
Fancy Creek, West	1027020529		High		Medium			
Fawn Creek	1027020745		High		High			
Game Fork	1027020554	High	High			High		High
Gray Branch	1027020727		High		High			
Hop Creek	1027020543		High		High			
Horseshoe Creek	1027020526		High		High			
Humphrey Branch	1027020724		High		High			
Indian Creek	1027020537		High		High			
Iowa Creek	1027020734		High		High			

TMDLs in the Tuttle Creek Watershed - *Continued*								
Water Segment	**Stream / Lake ID**	**Impairment / Priority**						
		AL	**ATR**	**DO**	**E. coli**	**E**	**pH**	**Silt**
Irish Creek	1027020512		High		High			
Jim Creek	1027020557		High		High			
Johnson Fork	1027020551		High		High			
Jones Creek	1027020729		High		High			
Joy Creek	1027020713		High		High			
Kearney Branch	1027020558		High		High			
Lake Idlewild	LM061201					Low		
Lane Branch	1027020739		High		High			
Lily Creek	1027020539		High		High			
Little Blue River	102702071, 72, 73, 74		High		High			
Little Indian Creek	1027020535		High		High			
Little Timber Creek	1027020548		High		High			
Malone Creek	1027020737		High		High			
Meadow Creek	1027020534		High		High			
Melvin Creek	1027020733		High		High			
Mercer Creek	1027020743		High		High			
Mill Creek	1027020714, 16, 18, 20, 22		High		High			
Mill Creek, South Fork	1027020731		High		High			
Mission Creek	1027020522		High		High			
Murdock Creek	1027020542		High		High			
Myer Creek	1027020726		High		High			
Otter Creek			High		Medium			
Otter Creek, North	1027020562	High	High			High		High
Perkins Creek	1027020547		High		High			
Raemer Creek	1027020533		High		High			
Riddle Creek	1027020717		High		High			
Robidoux Creek	1027020516		High		High			
Rose Creek	1027020712		High					
Salt Creek	1027020719		High		High			
Schell Creek	1027020545		High		High			
School Branch	1027020563	High	High			High		High
School Creek	1027020749		High		High			
Scotch Creek	1027020538		High		High			
Silver Creek	1027020728		High		High			
Spring Creek	1027020565	High	High			High		High
Spring Creek	1027020519		High		High			
Spring Creek	1027020715, 30		High		High			
Timber Creek	1027020564	High	High			High		High
Tuttle Creek Lake	LM021001	High	High			High		High
Walnut Creek	1027020741		High		High			
Washington County State Fish Lake (SFL)	LM10901			Low				
Washington SFL Wildlife	LM10901					Low		Low
Weyer Creek	1027020550		High		High			

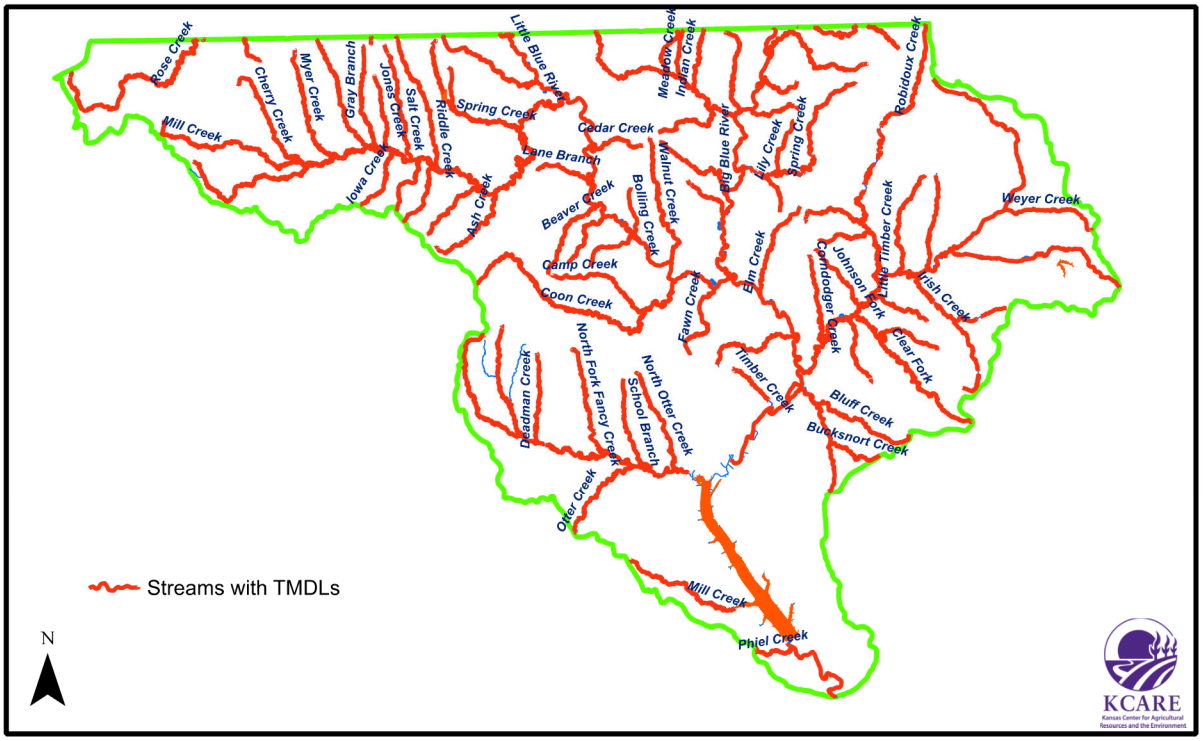


Figure 13. Map of streams with TMDLS in the Tuttle Creek Watershed

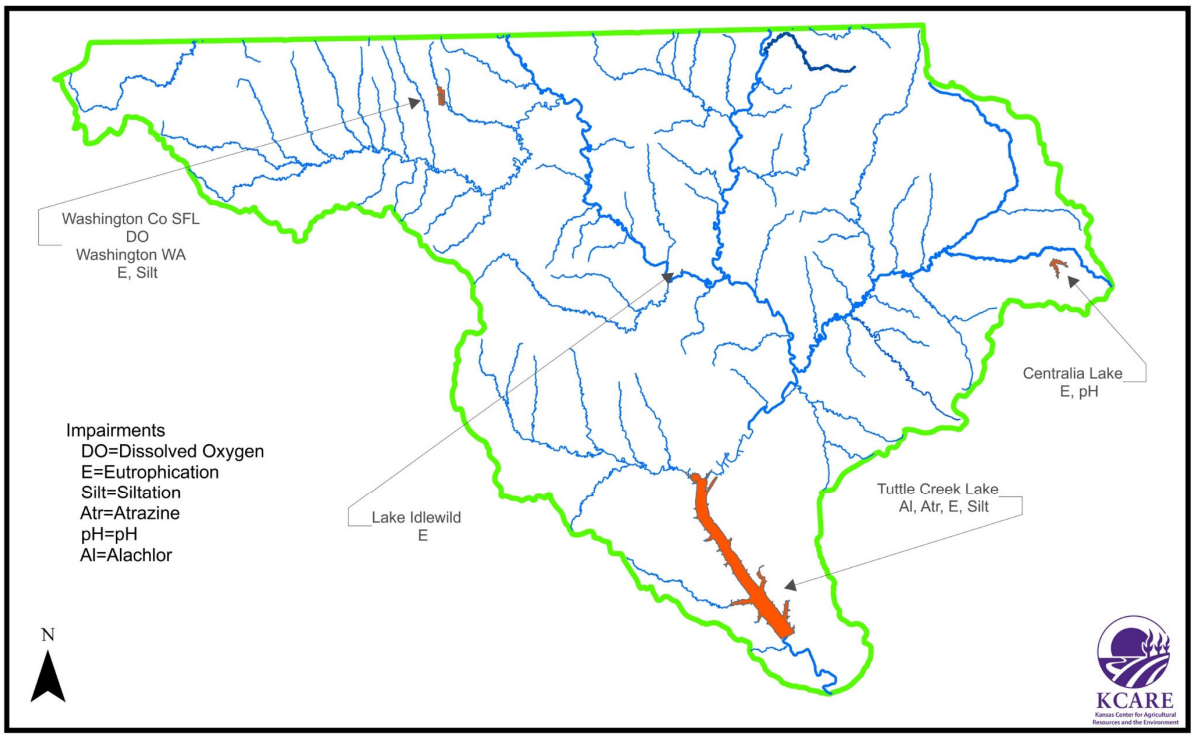


Figure 14. Map of lakes with TMDLs in the Tuttle Creek Watershed

5. Watershed Impairments to Address

The Tuttle Creek Watershed SLT acknowledges all TMDL and 303d-listed water segments in the watershed. All goals and BMPs will be aimed at protecting the Tuttle Creek Watershed from further degradation (**Table 8**). The SLT will focus this plan on four key TMDL-listed impairments:

- Silt (Sediment)
- Eutrophication: Phosphorus
- Herbicides: Alachlor and Atrazine
- *E. coli*

Table 8. Tuttle Creek Watershed impairment loads and goals

Load Allocations for the Tuttle Creek Watershed				
Impairment/TMDL		**Current Load**	**Allowed Load**	**Required Reduction**
Silt/Sediment		5.83 million tons /year	2.83 million tons/year	3 million tons
Eutrophication: Phosphorus		19.14 million pounds/year	1.72 million pounds/year	17.42 million pounds
Herbicides:	**Alachlor**	unknown	unknown	unknown
	Atrazine	63,145 pounds/year	7,262 pounds/year	55,883 pounds
E. coli		Precise numbers are unknown; reductions will be made through livestock BMP implementation and reductions in phosphorus loading.		

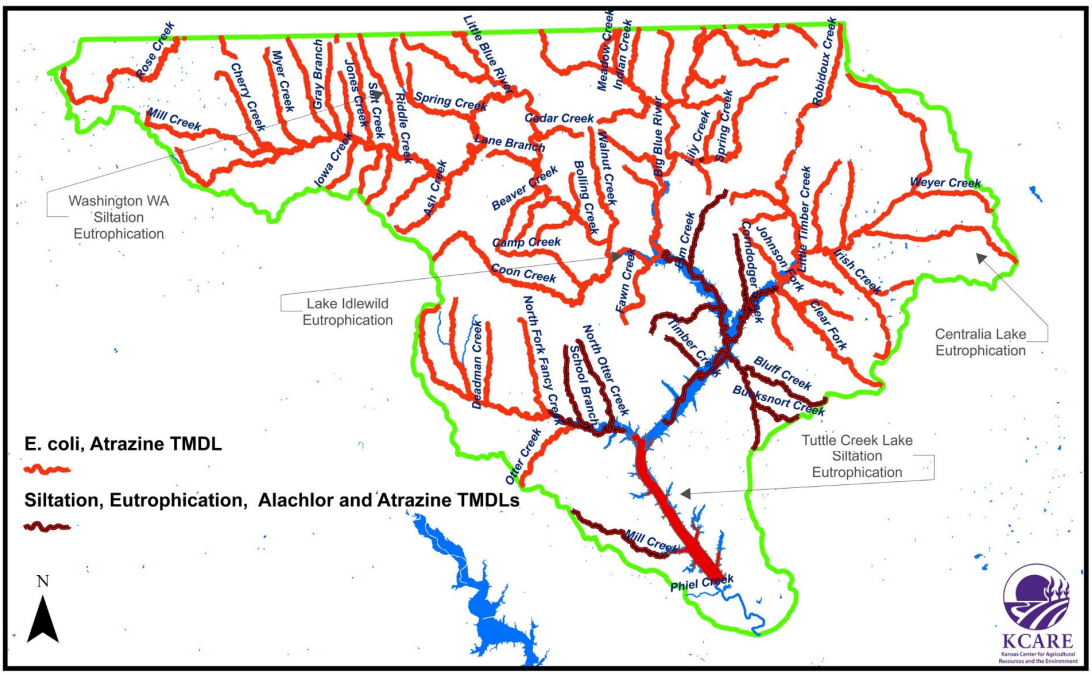


Figure 15. Water segments with TMDLs

A. Sediment

The Tuttle Creek Watershed has a "high" priority TMDL for the impairment of **siltation (sedimentation)** in 13 water segments in the watershed. This impairment effects 12 streams in the watershed as well Tuttle Creek Lake (**Figure 16**). The Washington County State Fishing Lake Wildlife Area has a "low" priority TMDL for siltation. *The remaining portion of this plan refer to silt/siltation as sediment/sedimentation.*

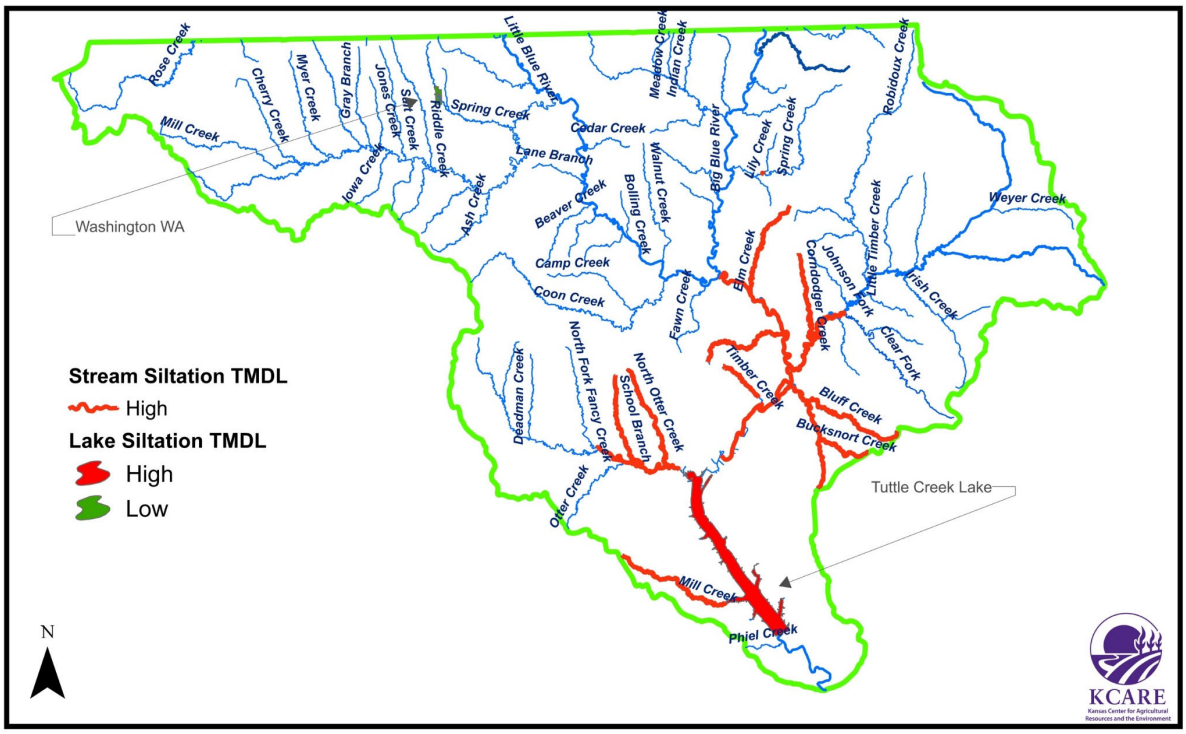


Figure 16. Sediment TMDLS in the Tuttle Creek Watershed

Sediment accumulation in streams and ultimately, lakes, is caused by soil erosion into the waterways. Silt decreases water clarity and can reduce reservoir volume and storage capacity. This limits public access to the lakes due to inaccessibility to boat ramps and beaches. Nutrient pollutants, such as phosphorus and nitrogen, can be attached to suspended soil particles in the water column and cause higher than normal concentrations, thus accelerating the eutrophication problem.

1. Sources of the Impairment

Land-based activities affect sediment transported downstream to lakes. Physical components of the terrain, such as slope, propensity to generate runoff and soil type, are important in sediment movement. Sediment can also come from streambank erosion and sloughing of the sides of river and streambanks. A lack of riparian cover can cause washing on the banks of streams or rivers and enhance erosion. Animal movement, such as livestock that regularly cross the stream, can cause pathways that will erode. Silt is another source of sediment present in the stream from past activities which gradually moves downstream with each high-intensity rainfall event.

Land Use
Land use activities have a significant impact on the types and quantity of sediment transfer in the watershed. Construction projects can leave disturbed areas of soil and unvegetated roadside ditches that can erode in a rainfall event. In addition, agricultural cropland using conventional tillage practices and lacking maintenance from agricultural BMP structures can have cumulative effects on land transformation through sheet and rill erosion. Sediment can also be caused by degraded pastureland or streambank sloughing. In the areas this WRAPS plan will target for BMP implementation (see Section 6), the primary land uses are cropland (76.5 percent) and grassland (16.5 percent). Reducing erosion in these areas is necessary for a reduction in sediment.

Agricultural BMPs such as cover crops, no-till, conservation tillage, grass buffer strips around cropland, terraces, grassed waterways and reducing activities within the riparian areas will reduce erosion and improve water quality.

Soil Erosion by Wind and/or Water
NRCS has established a "T factor" in evaluating soil erosion. T represents the soil loss tolerance factor. It is defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. It is assigned to soils without respect to land use or cover and ranges from one ton per acre for shallow soils, to five tons per acre for deep soils not as affected by loss of productivity by erosion. T factors represent the goal for maximum annual soil loss in sustaining the productivity of land use.[13]

Riparian Quality
An adequately functioning and healthy riparian area will stop sediment flow from cropland and rangeland. Cropland lying adjacent to the stream without buffer protection will cause streambank erosion. On the Big and Little Blue Rivers, approximately 36 miles of buffer are characterized as barren land, or inadequate vegetation to stabilize the riverbanks; therefore, these areas have a high potential for streambank erosion and increased nutrient loadings.

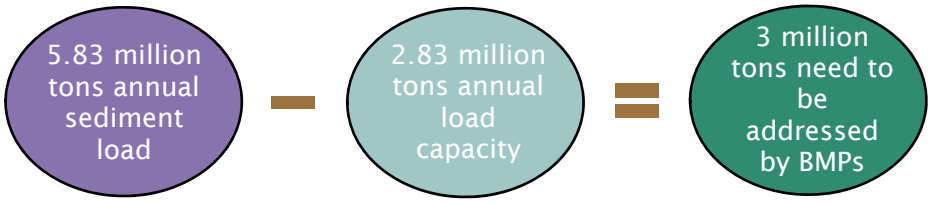
In the targeted areas, the predominant land use in the riparian areas is cropland (30 percent). This is the land that can be most vulnerable to runoff and erosion. The use of buffers and filter strips, along with forested riparian areas, can impede erosion and streambank sloughing. As a result, the SLT decided to incorporate BMPs aimed at cropland filter and buffer strips into this WRAPS plan.

Rainfall and Runoff
Rainfall amounts and the subsequent runoff can affect sediment runoff from both agricultural and urban areas into streams and Tuttle Creek Lake. In addition, high rainfall events can cause cropland erosion and sloughing of streambanks, adding sediment to streams and rivers that ultimately flows into Tuttle Creek Lake.

[13] NRCS T factor. http://www.nrcs.usda.gov/technical/NRI/1997/summary_report/glossary.html and http://www.umbsn.org/watershed_programs/documents/word%20documnets/T-%20featured.htm

2. Pollutant Loads

The current estimated sediment load in the Tuttle Creek Watershed is 5.8 million tons per year, according to the TMDL section of KDHE. **The total load reduction needed to meet the sediment TMDL is 3 million tons of sediment**.



3. What BMPs will be implemented to meet the TMDL?

BMPs were discussed from the beginning of the wraps process, when the SLT members came to an agreement on a list of acceptable BMPs that would result in progress toward significant pollutant reduction.

Agricultural BMPs such as no-till, nutrient management plans, terraces, waterways, cover crops, buffer strips, water retention structures, established vegetation, and subsurface fertilizer application will each reduce erosion and improve water quality. Streambank stabilization is also a BMP the SLT would like to implement as it can be a major sediment contributor during high flow events. Some possible streambank BMPs include riparian buffers, field borders, bottomland timber in wetlands and/or streambank restoration. When the SLT revised and updated this plan in 2018, a *cover crop BMP* was added.

Specific acreages or projects that need to be implemented per year have been determined through modeling and economic analysis and approved by the SLT as shown in **Table 9**.

Table 9. BMPs to prevent or reduce sediment runoff and erosion

BMPs to Prevent / Reduce Sediment Runoff and Erosion			
Protection Measures for:	**Best Management Practices and Other Actions**	**Adoption Rate Goal**	**Acres Needing BMPs, (Annually)**
Cropland	No-till cultivation	25%	1,531
	Nutrient management plans	25%	1,531
	Establish grassed waterways	20%	1,224
	Build new and revamp old terraces	20%	1,224
	Utilize cover crops	20%	1,224
	Establish buffer strips along crop fields	15%	918
	Water retention structures	10%	612
	Establish permanent vegetation	5%	306
	Implement subsurface fertilizer application	5%	306
Streambank	Streambank stabilization	4,750 feet per year	

B. Eutrophication: Phosphorus

The Tuttle Creek Watershed has a "high" priority TMDL for the impairment of **eutrophication** in 14 stream segments. This impairment also has one "medium" priority TMDL at Centralia Lake as well as two "low" priority TMDLs at Lake Idlewild and the Washington County State Fishing Lake Wildlife Area. The Washington County State Fishing Lake and Wildlife Area is also 303d-listed for eutrophication (**Figure 17**).

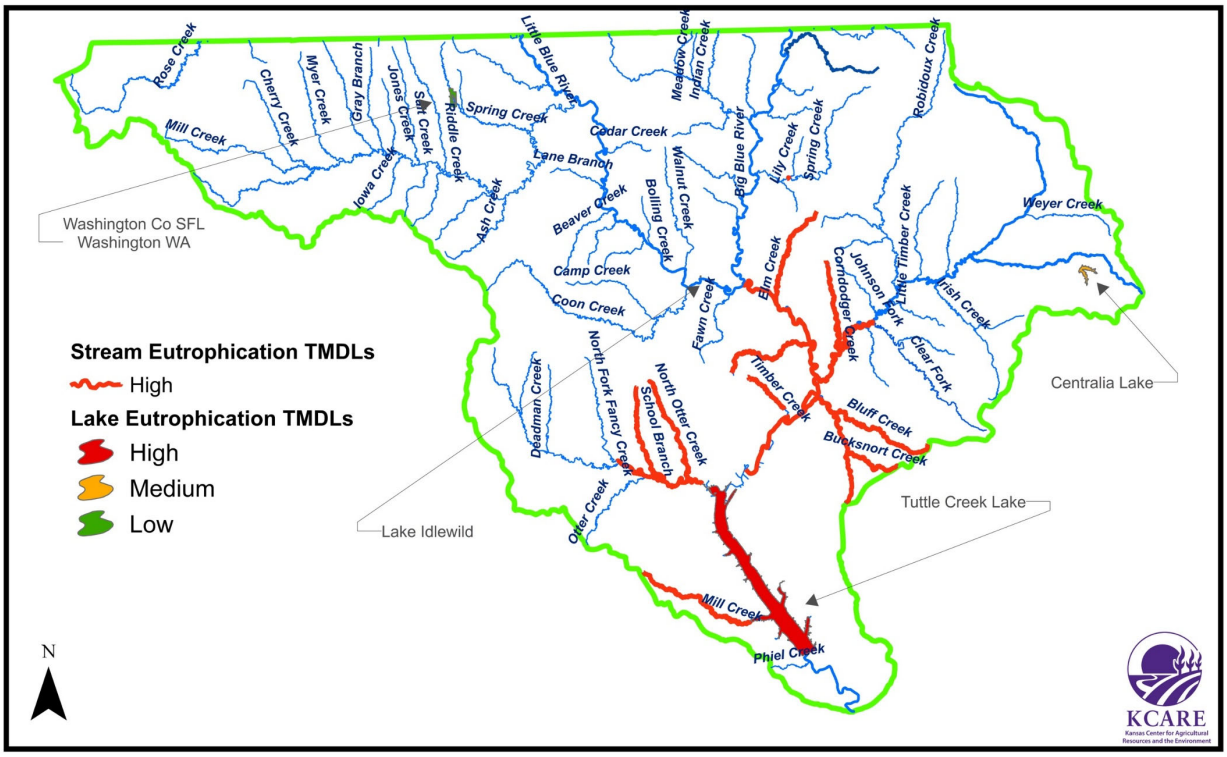


Figure 17. Eutrophication TMDLs in the Tuttle Creek Watershed

Excess nutrient loading (primarily phosphorus) causes eutrophication which creates conditions favorable for algae blooms and aquatic plant growth. Excess nutrients originate from manure and fertilizer runoff in rural and urban areas. In the Tuttle Creek Watershed, urbanization, agricultural land use, and small livestock operations all contribute excess nutrients to the watershed system. Algae blooms and aquatic plant growth may temporarily increase oxygen levels, but the bloom will eventually die off after the nutrients become scarce. During this die off, there is reduced dissolved oxygen levels in the water because the algal decomposition uses the oxygen. This results in an unfavorable habitat for aquatic life. Desirable criteria for healthy water dictates dissolved oxygen rates greater than 5 mg/L and biological oxygen demand (BOD) less than 3.5 mg/L.

1. Sources of the Impairment

Nutrient loading can originate in both rural and urban areas and can be caused by both point and nonpoint sources. For this plan, the focus is primarily on agricultural nonpoint source contributions even though other possible sources will be included as part of the discussion.

Land Use

Land use activities can affect nutrient runoff into streams. Fertilizer or manure applied to frozen ground or cropland prior to a rainfall event can be transported easily downstream. Livestock allowed access to streams to drink or loaf will contribute manure directly into the stream. Overgrazed pastures do not provide adequate biomass to trap manure runoff.

Agricultural BMPs that will help reduce nutrient runoff include: implementing cover crops, no-till, minimum tillage, vegetative buffers and riparian areas; creating grassed waterways and

grassed terraces; establishing permanent vegetative cover and grazing management plans; providing off stream watering sites with fencing of streams and ponds; relocating pasture feeding sites away from streams; relocating feeding pens away from streams; implementing rotational grazing; and placing vegetative filter strips along waterways.

Wastewater Treatment Facilities
Wastewater treatment facilities are permitted and regulated through KDHE. National Pollutant Discharge Elimination System (NPDES) permits specify the maximum amount of pollutants allowed to be discharged to surface waters. There are 46 NPDES facilities in the watershed at the time of the publication of this document.

Population
Watershed population can have an effect on nutrient runoff. There are more than fourteen thousand onsite wastewater systems estimated in the Tuttle Creek Watershed, mainly in rural areas. Although the functional condition of these systems is generally unknown, it is projected that nearly 20 percent may be failing, allowing onsite wastewater to be an area of possible pollution contribution to be evaluated over time.

Confined Animal Feeding Operations
In Kansas, animal feeding operations (AFOs) with greater than 300 animal units (AUs) and less than 1,000 AUs must register with KDHE. An AU is an equal standard for all animals based on size and manure production. For example: 1 AU equals one animal weighing 1,000 pounds. Confined animal feeding operations (CAFOs) are those with more than 999 animal units, and they must be federally permitted. There are certified or permitted AFOs and CAFOs spread throughout the watershed. There are also numerous small livestock farms (below 300 AUs) that contribute to the nutrient loads. *Note that only a portion of each county is in the Tuttle Creek Watershed, therefore actual numbers within the watershed are lower.* In addition to livestock-contributed waste, improperly disposed of pet waste can also be a contributor, although at a much smaller amount.

Grazing Density
Approximately 42 percent of the watershed is grasslands. Grassland in this area of Kansas is a highly productive forage source for beef cattle. Grazing density affects grass cover and potential manure runoff: an overgrazed pasture will not have the needed forage biomass to trap and hold manure in a high rainfall event. Also allowing cattle to drink and loaf in streams increases the occurrence of nutrients and *E. coli* bacteria in the waterway. Grazing density ranges from 8.8 to 17.3 cattle per 100 acres across the watershed.[14] This is considered to be medium density when compared with statewide density numbers.

Rainfall and Runoff
Rainfall amounts and subsequent runoff affect nutrient runoff from agricultural and urban areas into streams and Tuttle Creek Lake. The amount and timing of rainfall events affects manure runoff from livestock allowed access to streams or manure applied before a rainfall or on frozen

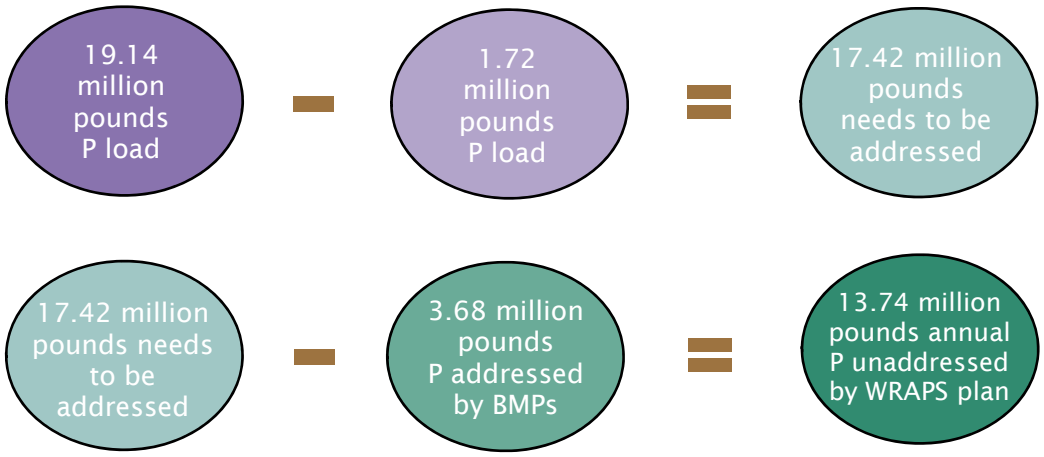
[14] National Agricultural Statistics Service, United States Department of Agriculture, 2002.

ground. Therefore, it is important to maintain adequate grass density to slow the runoff of manure over pastures.

2. Pollutant Loads

Nitrogen
Nitrogen loading is an issue in the watershed, but since phosphorus is the major contributor to eutrophication, the eutrophication/nutrient portion of this WRAPS plan focuses on phosphorus reduction. It is important to note that, as sediment and phosphorus BMPs are implemented, nitrogen is simultaneously reduced.

Phosphorus
The current estimated phosphorus load in the Tuttle Creek Watershed is 19.14 million pounds per year, according to the TMDL section of KDHE.[15] The amount of phosphorus in the watershed contributes to the dissolved oxygen and pH TMDLs as well as eutrophication. Due to the large amount of phosphorus entering the watershed from Nebraska, phosphorus reductions will not be able to meet TMDL requirements, but Kansas can certainly do its part. In the future, cooperation with Nebraska is necessary to achieve adequate phosphorus reduction to meet the TMDL. The WRAPS process needs to support the Targeted Watershed Grant that currently exists between Kansas and Nebraska. It has been determined that a 95 percent phosphorus reduction is necessary to meet the TMDL, of which at least 3 million pounds per year needs to be reduced as a result of this WRAPS plan. **If all BMPs have been implemented, 3,681,310 pounds of phosphorus will have been reduced from the watershed at the end of this 40-year nine element plan.**



3. What BMPs will be implemented to meet the TMDL?

The SLT has identified specific cropland, livestock and streambank BMPs which will result in significant nutrient pollutant reductions and are acceptable to watershed residents. Agricultural BMPs such as no-till, nutrient management plans, terraces, waterways, cover

[15] Kansas Department of Health and Environment. September 2018.

crops, buffer strips, water retention structures, established vegetation, and subsurface fertilizer application will each improve water quality by reducing nutrient runoff and leaching. Implementing grazing management plans, providing off-stream watering sites with fencing of streams and ponds, relocating pasture feeding sites away from streams, relocating feeding pens away from streams, implementing rotational grazing, and planting vegetative filter strips along waterways all reduce nutrient loading from livestock areas. Streambank stabilization is also a BMP that can reduce large quantities of nutrients entering streams. Specific acreages or projects needing implementation per year have been determined through modeling and economic analysis and have been approved by the SLT (**Table 10**).

Cropland BMPs in support of the sediment TMDL also work to reduce phosphorus leaching and loading.

Table 10. BMPs to Reduce Nutrient Leaching and Eutrophication

BMPs to Prevent / Reduce Nutrient Runoff and Loading			
Protection Measures for:	**Best Management Practices and Other Actions**	**Adoption Rate Goal**	**Acres/Projects Needing BMPs (Annual)**
Cropland	No-till cultivation	25%	1,531
	Nutrient management plans	25%	1,531
	Establish grassed waterways	20%	1,224
	Build new and revamp old terraces	20%	1,224
	Utilize cover crops	20%	1,224
	Establish buffer strips along crop fields	15%	918
	Water retention structures	10%	612
	Establish permanent vegetation	5%	306
	Implement subsurface fertilizer application	5%	306
Livestock	Establish vegetative filter strips along creeks	1 site per year	
	Relocate small feedlots away from streams	1 site every other year	
	Relocate pasture feeding sites away from streams	1 site per year in cool season pastures	
		2 sites per year in native grass pastures	
	Promote alternative watering sites away from streams	1 site per year in cropland used for winter grazing of crop stubble	
		1 site per year in cool season pastures	
		2 sites per year in native grass pastures	
Streambank	Streambank stabilization to reduce P contributions from sloughing	4,750 feet per year	

C. Herbicides: Alachlor and Atrazine

The Tuttle Creek Watershed has a "high" priority TMDL for the impairments of **alachlor** and **atrazine** in many streams as well as in Tuttle Creek Lake (**Figure 18**). Atrazine is more prevalent throughout the watershed, affecting more streams than alachlor. However, every stream in which alachlor has a "high" priority TMDL, atrazine does as well. Therefore, for the purpose of this WRAPS plan, they will be addressed together.

Alachlor and atrazine are effective and relatively inexpensive herbicides widely used in corn, sorghum and soybean production. The original alachlor and atrazine TMDLs developed for Tuttle Creek Lake in 1999 were revised using more data from the lake and the watershed stations in 2007 and then again in 2015. The margin of safety was set explicitly by requiring more reduction in non-point source loading than necessary to attain the 2 ppb water quality criterion for alachlor and 3 ppb for atrazine.

Alachlor and atrazine enter streams and lakes by way of sediment runoff. Once these impairments enter the water, they can linger for a long time as the breakdown of the chemicals is slow. Alachlor is suspected to have adverse effects on animals, but no studies have confirmed a health threat to human life. Atrazine is one of the most commonly detected herbicides in groundwater and has been connected to health issues in animals and humans, including reproductive system problems in humans. [16] Both of these chemicals are lab-created, require a license for usage and are considered a health threat in contaminated waters.

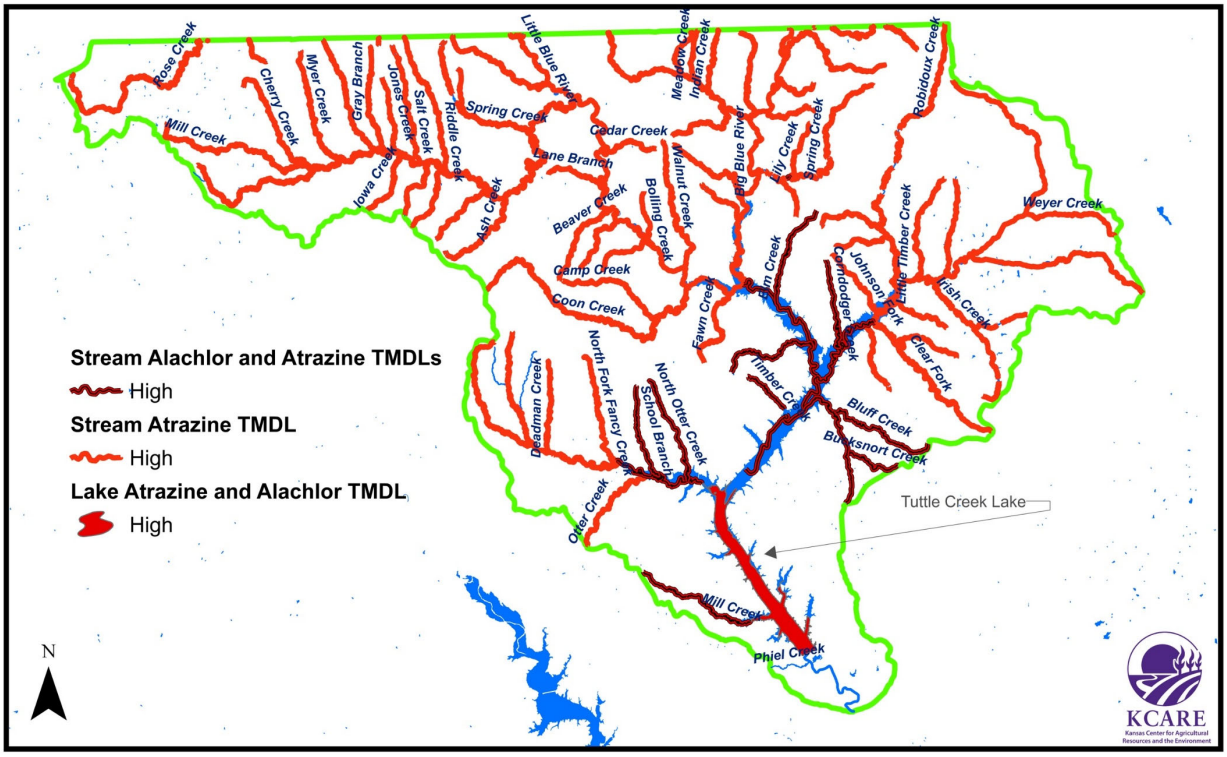


Figure 18. Herbicide TMDLs in the Tuttle Creek Watershed

[16] Agency for Toxic Substance and Disease Registry. https://www.atsdr.cdc.gov/PHS/PHS.asp?id=336&tid=59

1. Sources of the Impairment

Land Use

Cropland sprayed with alachlor and atrazine is the only source of these herbicide concentrations in the surface waters of the Tuttle Creek Watershed. Alachlor is primarily applied to soybean crops while atrazine is applied primarily to corn and sorghum. Nearly 41 percent of the acreage in the watershed is cropland, with 20 percent of fields in corn, 2 percent in sorghum, and 29 percent in soybeans (**Table 11**). There are smaller areas of other crops produced in the watershed, but corn, sorghum and soybeans are the crops primarily utilizing alachlor and atrazine.

Table 11. Corn, sorghum, soybeans acres in the Tuttle Creek Watershed[17]

Cropland in the Watershed (acres)				
County	Corn Planted	Sorghum Planted	Soybeans Planted	Land in Farms
Clay	48,500	12,300	126,000	362,520
Marshall	125,900	4,700	165,000	438,438
Nemaha	121,900	N/A	132,000	382,602
Pottawatomie	39,800	700	48,200	409,659
Republic	106,400	9,100	119,000	361,076
Riley	N/A	4,200	42,100	218,180
Washington	94,700	12,400	139,000	490,063
Total	**537,200**	**43,400**	**771,300**	**2,662,538**

Rainfall and Runoff

Rainfall duration (defined as extended duration of rainfall events causing soil saturation and subsequent runoff) and intensity (defined as high rainfall rates overwhelming soil adsorptive capacity causing runoff) are key components affecting alachlor and atrazine leaching and runoff from agricultural cropland. When these two herbicides are applied to cropland soils in the late spring, the chances are greater that a high-intensity rainfall event will wash away the herbicide on the field. High-intensity rainfall events primarily occur in the late spring in this watershed. Also important is the time before a rainfall event after applying alachlor and atrazine. The longer the time span, the less runoff of these two herbicides.

2. Pollutant Loads

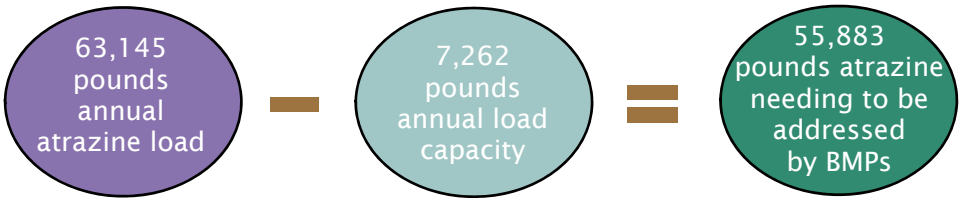
Alachlor

The current estimated pollutant load for alachlor is unknown. The TMDL section at KDHE has determined that alachlor is a "high" priority in several stream segments in the Tuttle

[17] 2012 US Ag Census.

Creek Watershed as well as Tuttle Creek Lake[18], but a quantitative reduction has not yet been determined. It is expected that KDHE will re-evaluate this TMDL and assign a load reduction goal in 2020.

Atrazine
The current estimated pollutant load for atrazine is 63,145 pounds per year in the Tuttle Creek Watershed. **This load needs to be reduced by 55,883 pounds to meet the TMDL.**[19]



3. What BMPs will be implemented to meet the TMDL?

The SLT laid out specific BMPs that they have determined will be acceptable to watershed residents and result in significant reductions in herbicide. At this time, the focus will be on "future protection" rather than "restoration". Specific acreages or projects that need to be implemented annually have been determined through modeling and economic analysis and approved by the SLT (**Table 12**).

Herbicide pollutant reductions and improved water quality in the Tuttle Creek Watershed are expected with the implementation of the following agricultural BMPs: alternative herbicides/no alachlor or atrazine use, vegetative buffers, early application, split application and reduced soil applied rate.

Table 12. BMPs to reduce herbicide runoff

BMPs to Reduce Herbicide in Water Segments						
Protection	**BMPS**	**Adoption**	**Acres**	**Reduction**	**Reduction**	**% of**
Cropland	Split Application	50%	102,709	25%	7,893	14%
	Early Application	50%	102,709	50%	15,786	28%
	Vegetative Buffers	40%	82,167	40%	10,103	18%
	Use Alternative Herbicide	30%	61,625	100%	18,944	34%
	Reduce Soil Applied Rate	30%	61,625	25%	6,251	11%
				Total	**58,977.00**	**105.00%**

D. *E. coli*

The Tuttle Creek Watershed has 61 stream segments with a "high" priority TMDL for ***E. coli***. There are also an additional six segments with "medium" priority TMDLs (**Figure 19**).

[18] Kansas Department of Health and Environment. http://www.kdheks.gov/tmdl/klr/TuttleAl.pdf
[19] Kansas Department of Health and Environment. September 2018.

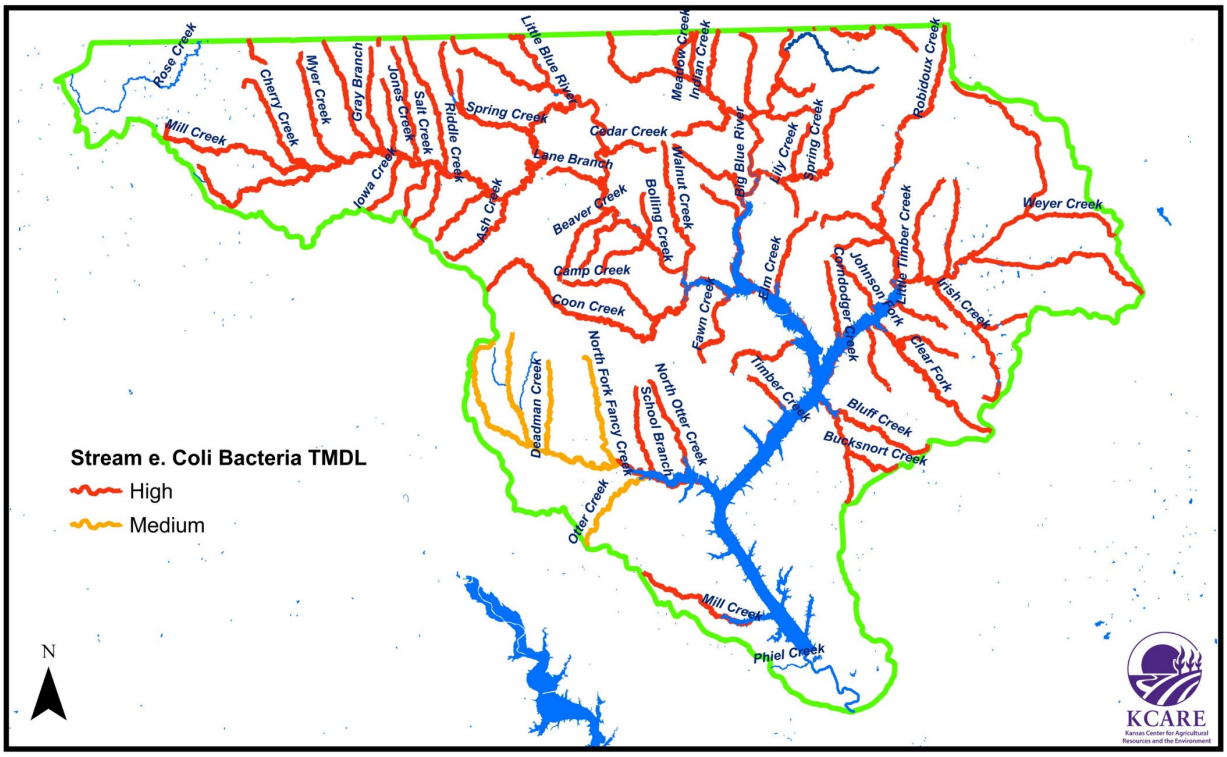


Figure 19. E. coli *TMDLs in the Tuttle Creek Watershed*

E. coli are present in human and animal waste and are 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. *E. coli* are not harmful to humans on its own, but its presence indicates that disease-causing organisms, or pathogens, also may be present. Presence of *E.coli* in waterways can originate from failing septic systems, runoff from livestock production areas, close proximity of animals to water sources, and manure application to land if it is applied before a rainfall event or on frozen ground. TMDLs for *E. coli* have an upper limit of 200cfu/100ml of water for primary contact recreation (such as swimming), and an upper limit of 2,000cfu/ml of water for secondary, non-contact recreation (such as boating and fishing).

Bacteria TMDLs first were developed using fecal coliform bacteria (FCB) data in 1999; since then, the bacteria indicator has changed to *E. coli*; the manner in which to assess bacteria has changed to looking at geometric means of at least five samples taken within a given 30-day period. Bacteria loads are nonsensical, resulting in huge numbers, given that high bacteria levels coincide with high runoff flows. The capability to abate bacteria pollution comes down to the ability to detain bacteria-laden water long enough to kill the bacteria. Because of the unique situation that defines bacteria impairment, an alternative manner to assess "load" reductions was necessary.

The critical measure of improving the sanitary conditions in any of the watershed's streams is not only to reduce the magnitude of bacteria samples collected, but to also reduce the frequency and duration of high bacteria levels. In order to measure these reductions, the bacteria count values of individual samples are transformed using logarithms and normalized by dividing by the logarithm of the applicable bacteria criterion. For most streams, the primary contact recreation

criterion is either 262 or 427 counts, depending upon the accessibility of the stream. The resulting ratio creates an index of relative conformance to the water quality standards. The frequency distribution of the ratios for a given stream is then derived, creating a bacteria profile for the stream, which displays the proportion of samples that are less than the criterion (the unity line).

That profile line serves as the current conditions baseline. The expectation for bacteria load reduction are those practices that decrease the amount of bacteria entering the stream and resulting in a future profile of sample index values that lies under the current line. It is hoped that the majority of the profile will lie below the unit 1. The three characteristics of magnitude, duration and frequency are represented by the profile lines and demarcate the reduction in "loading" of bacteria (**Figure 20**).

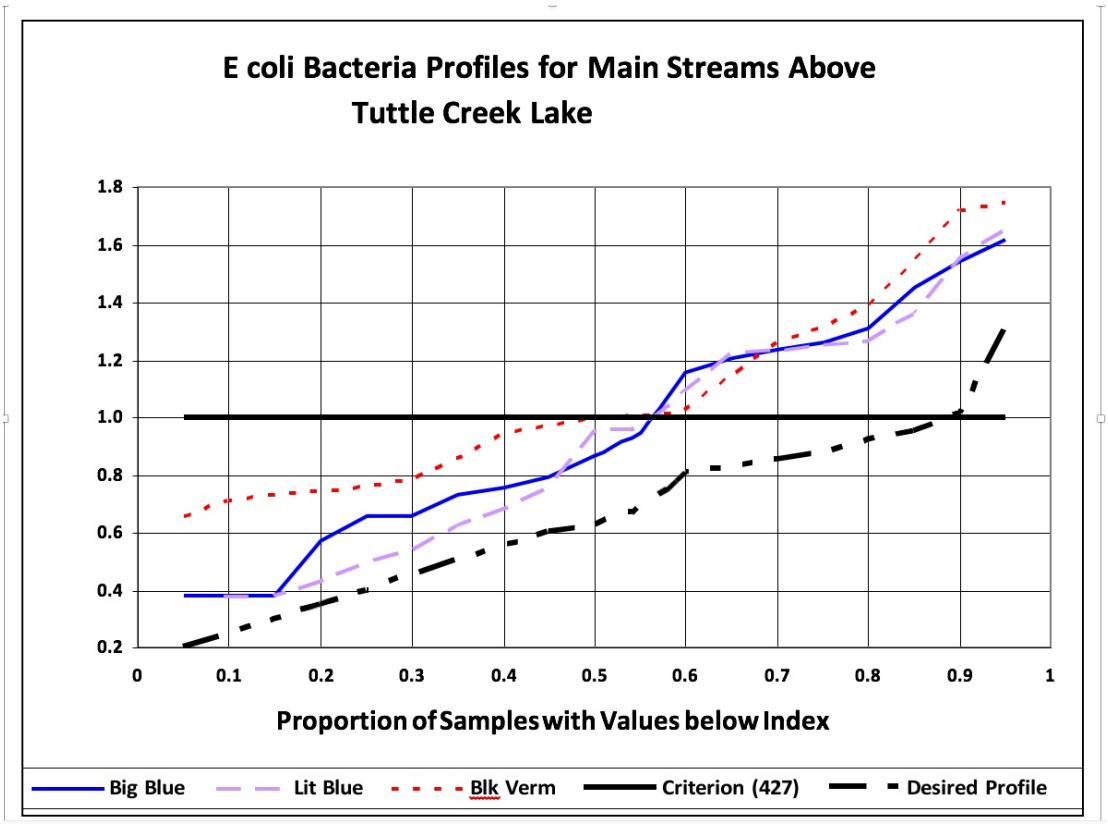


Figure 20. E. Coli stream profiles in Tuttle Creek Watershed

Reductions in magnitude are represented by smaller index values within the profile. Reduced duration is marked by a lowering of the profile line, thereby reducing the area between the unity line (criterion) and the upper portions of the profile. Reduced frequency is deduced by movement of the crossover point where the profile intersects unity further to the right, indicating an increased percentage of samples showing compliant conditions relative to the criterion value. Note there is still allowance for occasional spikes of high bacteria, provided they do not occur frequently.

Future load reduction is seen as the downward movement of subsequent sample profiles, to a point where there is reason to intensively sample the stream. Intensive sampling would occur four

different times during the April – October primary recreation season, in the manner prescribed by the water quality standards (e.g., five samples taken within 30-days). From those intensive data, the decision can be made as to whether the stream meets water quality standards.

As with the other impairments, bacteria are treated fully by the point sources; therefore there are no wasteload allocations to be assigned to the NPDES facilities.

1. Impairment Sources

Bacteria can originate in both rural and urban areas. *E. coli* can be caused by both point and nonpoint sources. Livestock or wildlife access to streams, improper manure disposal, failing onsite wastewater systems, and manure runoff from livestock operations can contribute to *E. coli* in streams.

Land Use
Livestock production areas are a source of bacteria in streams within the Tuttle Creek Watershed. Manure generated by any mammal can contain *E. coli*. Livestock housed in close proximity to a stream or allowed to loaf in the water source can shed *E. coli*. Wild animals also contribute *E. coli* in streams and lakes, but limiting the wild animal population from water sources is not as easy as limiting livestock.

Population and Wastewater Systems
Failing, improperly installed or lack of an onsite wastewater system can contribute *E. coli* to the watershed. Thousands of onsite wastewater systems exist in the Tuttle Creek Watershed, and the functional condition of these systems is generally unknown; however, it is estimated that nearly 20 percent of onsite wastewater systems are failing or insufficient. This could be a result of improper construction or a lack in maintenance on the landowner's part. Systems functioning at a lower capacity than than their original design could result in *E. coli* bacteria pollution.

Manure Runoff from Fields and Livestock 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 have a permit from EPA. An animal unit (AU) is an equal standard for all animals based on size and manure production. For example: one AU equals one animal weighing 1,000 pounds. The Tuttle Creek Watershed contains numerous CAFOs. CAFOs are not allowed to release manure from the operation. However, they are allowed to spread manure on cropland fields for distribution. If this application is followed by a rainfall event, or the manure is applied on frozen ground, it can run off into streams, allowing *E. coli* to enter the water.

Smaller operations are not regulated by the state, and many of these operations are located along streams because of a historic preference by early settlers. Therefore, it can be assumed that smaller operations may have their feeding sites near a stream, and significant amounts of manure can be found generally on or near feeding sites. Rainfall events can result in *E. coli* leaving the feeding site and entering a nearby stream. Alternative water supplies would allow the livestock to have access to fresh water while limiting the time they spend in surrounding

areas and nearby stream segments. This not only reduces the number of bacteria entering streams but also provides a clean drinking water source. Moving feeding sites away from streams and providing alternate watering sites is logistically important to prevent *E. coli* from entering nearby water segments.

2. Pollutant Loads

The current pollutant load for *E. coli* cannot be estimated. *E. coli* concentrations are difficult to model, and the scope of this WRAPS project does not include modeling. Environmental factors affect the viability of *E. coli* since it is a living organism. The lifespan of *E. coli* is affected by variations in initial bacteria loading, ambient temperature, amount of sunlight or UV rays, and a decrease in survivability over time.

3. What BMPs will be implemented to meet the TMDL?

The SLT has identified specific BMPs acceptable to watershed residents and related to livestock management practices and the prevention of *E. coli* from entering the waterways. These will result in significant *E. coli* reductions. The number of required annual projects was determined and approved by the SLT.

Table 13. BMPs to reduce E. coli *in the Tuttle Creek Watershed*

BMPs to Reduce *E. coli* Bacteria		
Protection Measures for:	**Best Management Practices and Other Actions**	**Acres/Projects Needing BMPs, (Annual)**
Livestock	Establish vegetative filter strips along creeks	1 site per year
	Relocate small feedlots away from streams	1 site every other year
	Relocate pasture deeding sites away from streams	1 site per year in cool season pastures
		2 sites per year in native grass pastures
	Promote alternative watering sites away from the stream	1 site per year in cropland used for winter grazing of crop stubble
		1 site per year in cool season pastures
		2 sites per year in native grass pastures

E. Remaining TMDLs

The following two TMDLs are not a direct focus by this WRAPS plan: *dissolved oxygen and pH*. These two impairments will, however, be positively impacted by BMP implementations that focus

on sediment, nutrient, herbicide and *E. coli* TMDLs. In addition, it is expected that the 303d-listed impaired water segments also will be improved.

1. Dissolved Oxygen

Washington County State Fishing Lake has a "low" priority TMDL for **dissolved oxygen** (DO).

Excess nutrient loading from the watershed creates accelerated rates of eutrophication followed by decreasing amounts of DO in the water. This results in an unfavorable habitat for aquatic life. The Washington County State Fishing Lake currently measures 5.8 mg/L at the top of the lake and 2.2 mg/L at the bottom. Desirable criteria for healthy water dictates DO rates greater than 5 mg/L in 80 percent of the water column, and biological oxygen demand (BOD) less than 3.5 mg/L.

Excess nutrients often come off crop fields by way of sediment leaching during runoff events. Excess nutrients also can originate from failing septic systems, livestock manure, and fertilizer runoff in rural and urban areas. In the case of the Washington County State Fishing Lake, DO declines appear to be a natural feature.[20] Nonetheless, no external sources or loads should discharge into the lake, thereby aggravating the declines in oxygen. Therefore, the Load Allocation of BOD substances will be set at zero for external sources around the Washington County State Fishing Lake.

The SLT will not target DO impairments specifically; however, this implementation of this WRAPS plan for sediment and nutrient BMPs subsequently will reduce the amount of nutrient loading found in runoff. This will reduce the nutrients that enter the lake from stream runoff and are contributing to the lake's high DO levels.

2. pH

Centralia Lake has been ranked with a "medium" priority TMDL for **pH**.

pH is a measure of the acidity or alkalinity of water, expressed in terms of its concentration of hydrogen ions. The pH of water determines the solubility and biological availability of chemical constituents such as nutrients and heavy metals. When pollution results in higher algal and plant growth (e.g., from increased temperature or excess nutrients), pH levels may increase. Although small pH changes are not likely to have a direct impact on aquatic life, they greatly influence the availability and solubility of all chemical forms in the lake and may aggravate nutrient problems. Therefore, a change in pH may increase the solubility of phosphorus, making it more available for plant growth and resulting in a greater long-term demand for dissolved oxygen.

The pH scale ranges from zero to 14. A pH of seven is considered to be neutral. Substances with pH of less than seven are acidic; substances with pH greater than seven are basic. Over the five years (1994-1998) that surveys were taken at Centralia Lake, the pH was high 21 percent of the time. The average pH for Centralia Lake was 7.88, ranging from 7.07 to 9.09. The high

[20] Kansas Department of Health and Environment: http://www.kdheks.gov/tmdl/klr/washsflDO.pdf

summer pH occurrences are related to periods of large phytoplankton productivity.[21] The desired pH level for Centralia Lake is between 6.5 and 8.5.

The SLT will not target high pH levels specifically; however, implemented TMDLs will address sediment runoff and nutrient leaching. This will result in less phosphorus in nearby targeted area water segments that drain into the watershed's lakes. Reducing nutrients entering Centralia Lake will aid in keeping algal and plant growth at a 'normal' level, and subsequently keeping pH levels in the normal range.

[21] Kansas Department of Health and Environment: http://www.kdheks.gov/tmdl/klr/centraliaE.pdf

6. Targeted Areas

Implementing BMPs is a necessity for improving a watershed's water quality. All fields, pastures and feed lots are susceptible to runoff waters to some degree; these can contribute sediment, nutrients, herbicides and *E. coli* to nearby water segments. However, some crop fields, pastures, and feed lots are *more* susceptible than others: close proximity to streams, soils more prone to erosion and nutrient leaching, high water flow areas along streams, etc. Areas such as these are considered "high priority." It has been determined that focusing BMP implementation on high-priority areas offers a greater improvement in water quality, since these areas are generally the major contributors to non-point source pollution and ultimately, 303d and TMDL listings.

A. Studies Conducted to Determine Targeted Areas

1. Soil and Water Assessment Tool (SWAT)

SWAT is a physically-based, deterministic, continuous watershed-scale simulation model was developed by USDA-ARS from numerous equations and relationships evolved from years of runoff and erosion research in combination with other models used to estimate pollutant loads from animal feedlots, fertilizer and agrochemical applications, etc. The SWAT model has been tested for a wide range of regions, conditions, practices, and time scales; an 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. It incorporates various grazing management practices by specifying the amount of manure applied to pasture or grassland, grazing periods, and amount of biomass consumed or trampled daily by livestock. Septic systems, NPDES discharges, and other point-sources are considered as combined point-sources and applied to inlets of sub-watersheds. These features make SWAT a good tool for assessing rural watersheds in Kansas.

ArcGIS interface of ArcSWAT version 9.2 was used to model the Tuttle Creek Watershed. This version of the program uses spatially distributed data on topography, soils, land cover, land management, and weather to predict water, sediment, nutrient, and pesticide yields. SWAT spatially divides a modeled watershed 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. They are subdivided further into lumped, non-spatial hydrologic response units (HRUs) consisting of all areas within the sub-watershed that have similar soil, land use, and slope characteristics. HRUs allow slope, soil, and land-use heterogeneity to be simulated within each sub-watershed while ignoring pollutant attenuation between the source area and stream and limiting spatial representation of wetlands, buffers, and other BMPs within a sub-watershed.

The model includes sub-basin, reservoir, and channel routing components.

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

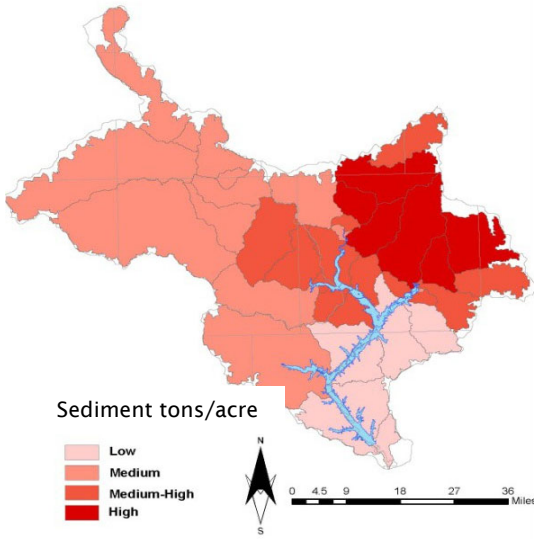
In 2008, Kansas State University's Department of Biological and Agricultural Engineering assessed Tuttle Creek Watershed using the Soil and Water Assessment Tool (SWAT). SWAT estimated annual average pollutant loadings such as nutrients and sediment that come from the land into the stream. At the end of the program's simulation runs, it calculated the average annual loads for each sub-watershed. Based on experience and technical knowledge, the areas – or sub-watersheds – with the top 20-30 percent of the highest loads among all areas within the watershed were selected as critical (targeted) areas for cropland and livestock BMP implementation.

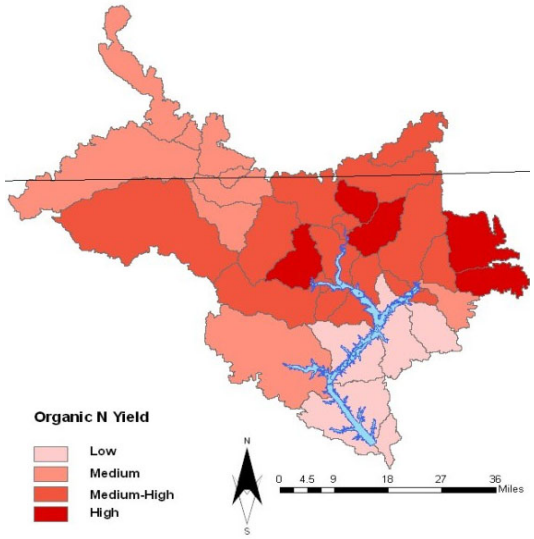
Data for the Tuttle Creek SWAT model were collected from a variety of reliable online and printed data sources and from knowledgeable agency personnel within the watershed. Input data and their online sources include:

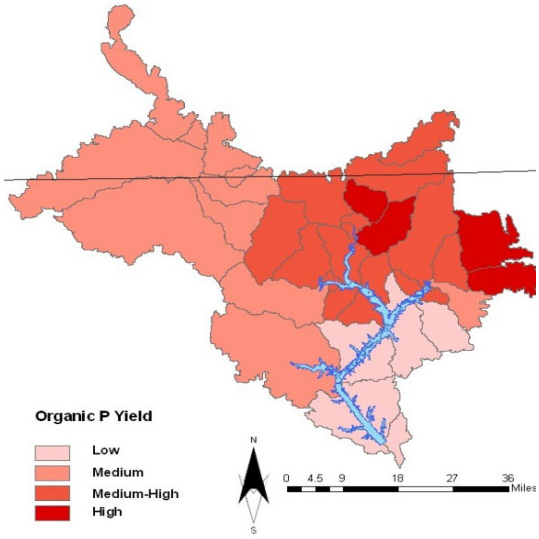
- 30 meters DEM (USGS National Elevation Dataset)
- 30m NLCD 2001 Land Cover data layer (USDA-NRCS)
- STATSGO soil dataset (USDA-NRCS)
- NCDC NOAA daily weather data (NOAA National Climatic Data Center)
- Point sources (KDHE on county basis)
- Septic tanks (US Census)
- Crop rotations (local knowledge)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

The maps produced by the modeling are displayed below. Note that the darker the color on the map, the higher the pollutant load potential.

Sediment, Nitrogen and Phosphorus Yields, as determined by SWAT in 2008.







After locating initial critical targeted areas, the area was groundtruthed. Groundtruthing is a method used to determine the current BMPs utilized in targeted areas. It involves conducting windshield surveys in targeted areas identified by the watershed models to determine which BMPs are currently installed. Local agency personnel and SLT members familiar with the area and its land-use history conduct these surveys. Groundtruthing provides the current adoption rate of BMPs, pictures of the targeted areas, and may call attention to additional water quality concerns not captured by watershed modeling. In 2008, groundtruthing provided the current adoption rates for four common BMPs (buffers, no-till, waterways and subsurface fertilizer application) in the watershed's cropland area. Local agency personnel provided current adoption rates for the number of nutrient management plans in the watershed. The results are as follows:

- Vegetative buffer strip – current adoption rate of 19 percent
- No-till cultivation – current adoption rate of 5 percent
- Nutrient management plans – current adoption rate of 21percent
- Grassed waterways – current adoption rate of 57 percent
- Subsurface fertilizer application – current adoption rate of 5 percent

The SWAT model was revised using the groundtruthing information. Including groundtruthing information allows the SWAT model to develop a more accurate determination of appropriate targeted areas. The SWAT model then determined number of acres needed to be implemented for each BMP.

2. Aerial Assessments

KDHE analyzed aerial images and determined areas of interest (**Figure 21**) either in close proximity to a stream or those that have been degraded over time. These are crop fields and livestock facilities.

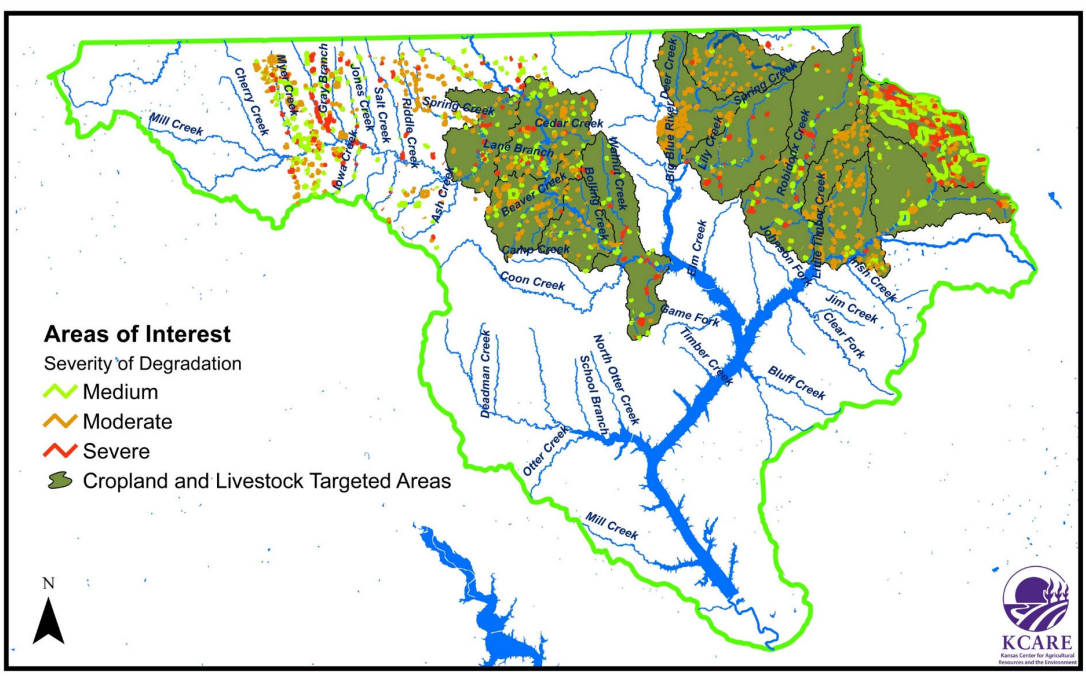


Figure 21. Possible target areas, as determined by KDHE aerial assessment

B. Targeted Areas

Watersheds get a "bigger bang for the buck" by streamlining BMP placement rather than using a "shotgun" approach of randomly applying BMPs throughout the watershed. Every watershed has 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. The SWAT model and the aerial assessments provided data that was used to determine the targeted areas for the Tuttle Creek Watershed WRAPS plan.

The SLT has used their knowledge and data of the Tuttle Creek Watershed to target areas in the watershed to focus BMP placement for sediment runoff, nutrients and E. coli bacteria from livestock production and atrazine runoff.

Targeting for this watershed will be accomplished in three different areas:

1. **Cropland areas will be targeted for sediment, phosphorus, and alachlor and atrazine herbicides.**
2. **Livestock Areas will be targeted for nutrients and E. coli bacteria.**
3. **Streambanks will be targeted for sediment.**

Load Reductions will be estimated for each of these areas for each pollutant addressed to measure success at meeting TMDL goals.

C. Load Reduction Estimate Methodology:

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. Load reduction estimates are the product of baseline loading and the applicable BMP load reduction efficiencies.

2. Livestock

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

3. Streambank

In 2001 the State Conservation Commission identified 13 eroded streambank sites along 8 miles of the Little Blue River in Washington County, Kansas. It was estimated that approximately 4.66 million tons of soil loss had occurred over the past 24 years. A 1991 riparian inventory conducted by USDA/NRCS 26 on the Little Blue and Big Blue Rivers categorized 27.94 and 22.77 miles, respectively, of buffers along the river as barren land, or with no visible riparian

protection. This assessment also showed that the Little and Big Blue Rivers had 11.67 and 12.96 miles respectively of buffers containing cropland. It is recommended that streambank stabilization projects be targeted first within barren land areas and second within cropland areas.

7. Implementation

As mentioned in the previous section, targeting for this watershed will be accomplished in three different areas: cropland, livestock, and streambanks.

The Tuttle Creek Watershed WRAPS plan will target the areas listed above to implement BMPs in an effort to improve the following TMDL impairments:

- Sediment - in cropland areas and streambanks
- Nutrients (primarily phosphorus) - in cropland and livestock areas, and streambanks
- Herbicides (alachlor and atrazine) - in cropland areas
- *E. coli* - in livestock areas

A. Sediment loss reductions in the Tuttle Creek Watershed

The Tuttle Creek Watershed has a "high" TMDL ranking for sediment in 12 stream segments and in Tuttle Creek Lake. The Tuttle Creek Watershed contains two targeted areas for sediment loss reductions. These are **cropland** and **streambanks**. Adoption and implementation of sediment BMPs in the Tuttle Creek Watershed will result in a total sediment load reduction (soil saved) of 866,671 tons at the conclusion of this 40-year WRAPs plan.

In the following sections, discussions about the Lower Big Blue River sub-watershed and the Lower Little Blue River sub-watershed will be referred to as the "Big Blue" and the "Little Blue" Targeted Areas, respectively. These areas are shown in **Figure 22 and 23**.

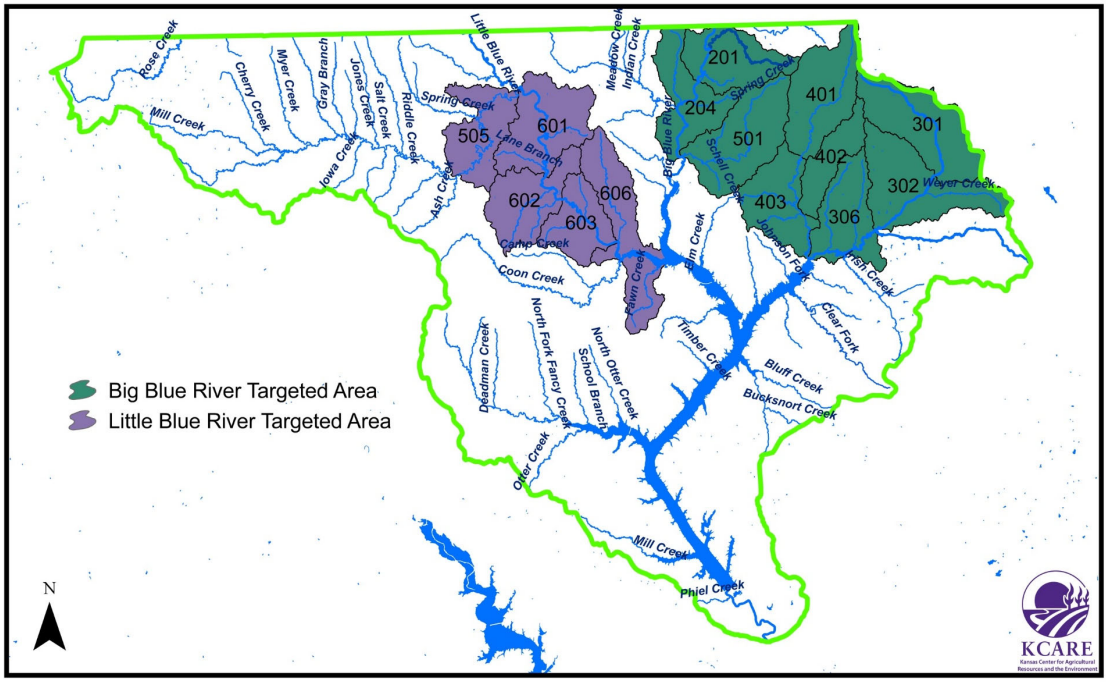


Figure 22. Cropland targeted areas for sediment in the Tuttle Creek Watershed

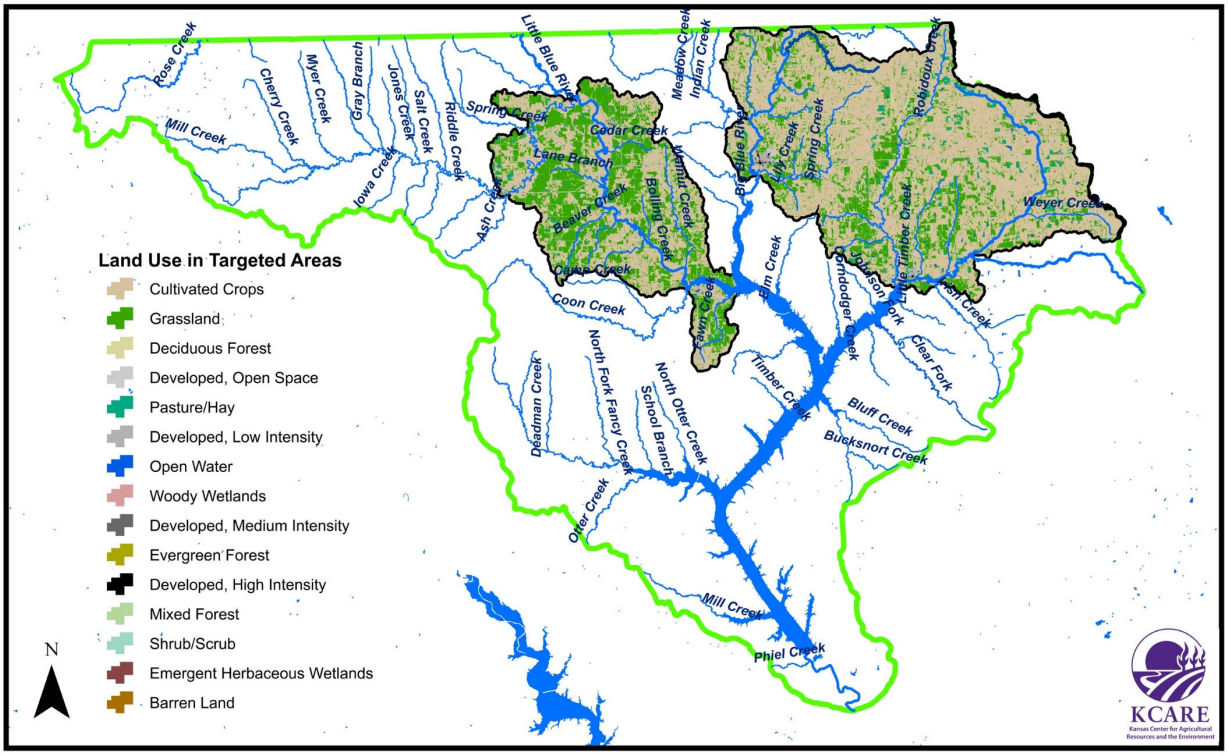


Figure 23. Land use in the Tuttle Creek Watershed targeted areas

1. **Cropland targeted for sediment reductions in the Big Blue Targeted Area**

   a. **Big Blue land use**

There are 180,257 cultivated cropland acres in the Big Blue Targeted Area (**Table 14**).

Table 14. Land use in the Big Blue Targeted Area

Big Blue Targeted Area HUC 10270205										
Land Use	**201**	**204**	**301**	**302**	**306**	**401**	**402**	**403**	**501**	**Total**
Cultivated Crops	18,875	17,418	29,567	28,523	14,117	22,114	10,719	13,025	25,899	**180,256**
Grassland	4,969	6,180	4,316	7,989	9,276	7,372	3,480	9,711	7,120	**60,412**
Deciduous Forest	1,831	1,688	778	1,810	2,538	2,015	915	2,476	2,047	**16,097**
Developed, Open Space	1,056	1,455	1,281	1,483	1,129	1,300	797	957	1,682	**11,140**
Pasture/Hay	0	153	1,165	845	415	1,168	414	376	60	**4,596**
Developed, Low Density	85	506	460	247	370	331	120	178	616	**2,913**
Open Water	342	574	179	246	305	172	63	214	207	**2,303**
Woody Wetlands	140	309	17	35	213	50	78	256	157	**1,255**
Developed, Medium Density	2	90	50	3	36	40	3		149	**373**
Evergreen Forest	119	12		8	15	1		38	10	**203**
Developed, High Intensity		81	7	4	21	8			56	**178**
Mixed Forest	24	20	2	11	7	26	9	31	42	**173**
Shrub/Scrub		19	1	30	14	3	1	17	4	**90**
Emergent Herbaceous Wetlands	6	7	22	2	5	2	4	1		**49**
Barren Land						12			10	**21**
Total	**27,449**	**28,511**	**37,845**	**41,237**	**28,463**	**34,614**	**16,604**	**27,280**	**38,057**	**280,059**

Table 15. Land use breakdown for cropland acres in the Big Blue Targeted Area

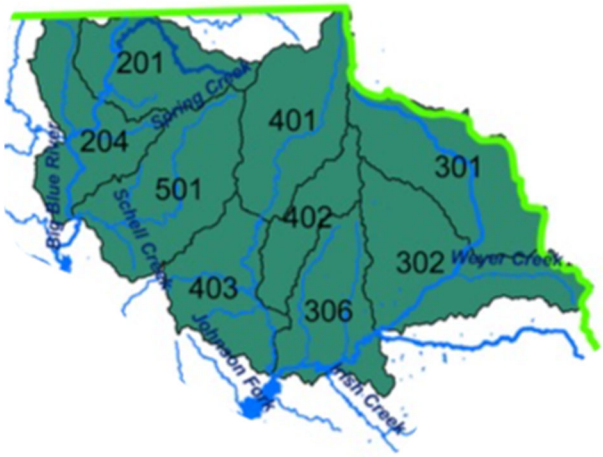
Big Blue: Agricultural Landuse Breakdown - Cropland						
Sub-Watershed - HUC 10270205	Cultivated Cropland (acres)	Percent Cultivated Cropland	Grassland, Pasture and Hay (acres)	Percent Grassland, Pasture and Hay	Percent Other Land Uses	Total (acres)
201	18,875	68.80%	4,968	18.10%	13.10%	27,448
204	17,418	61.10%	6,332	22.20%	16.70%	28,511
301	29,567	78.10%	5,480	14.50%	7.40%	37,844
302	28,523	69.20%	8,833	21.40%	9.40%	41,237
306	14,117	49.60%	9,691	34.00%	16.40%	28,462
401	22,114	63.90%	8,539	24.70%	11.40%	34,613
402	10,719	64.60%	3,894	23.50%	12.00%	16,604
403	13,025	47.70%	10,087	37.00%	15.30%	27,280
501	25,899	68.10%	7,179	18.90%	13.10%	38,056

b. Big Blue Targeted Area cropland BMPs

Cropland Best Management Practices (BMPs) will be implemented in the Big Blue Targeted Area to protect local streams and lakes by reducing sediment loss.

Cropland BMPs will be implemented in the following nine HUC 12s:

- 102702050201
- 102702050204
- 102702050301
- 102702050302
- 102702050306
- 102702050401
- 102702050402
- 102702050403
- 102702050501



Within these HUC 12 areas, these BMPs will be implemented to reduce soil erosion and sediment loss from crop fields:

- adopt no-till cultivation,
- create nutrient management plans,
- establish grassed waterways,
- build new and/or revamp terraces,
- utilize cover crops,
- establish buffer strips along crop fields,
- install water retention structures,
- establish permanent vegetation, and
- implement subsurface fertilizer application.

Table 16. Sediment BMP adoption rates in the Big Blue Targeted Area

BMPs to Prevent / Reduce Sediment Runoff and Erosion			
Protection Measures for:	**Best Management Practices and Other Actions**	**Adoption Rate Goal**	**Acres Needing BMPs (Annual)**
Cropland	No-till cultivation	25%	1,531
	Nutrient management plans	25%	1,531
	Establish grassed waterways	20%	1,224
	Build new and revamp old terraces	20%	1,224
	Utilize cover crops	20%	1,224
	Establish buffer strips along crop fields	15%	918
	Water retention structures	10%	612
	Establish permanent vegetation	5%	306
	Implement subsurface fertilizer application	5%	306

Table 17. Adoption rates for cropland BMP implementation in the Big Blue Targeted Area

Big Blue Targeted Area Total Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Nutrient Management Plans**	**Water-ways**	**Terraces**	**Cover Crops**	**Buffers**	**Water Retention Structure**	**Establish Permanent Vegetation**	**Subsurface Fertilizer Application**	**Total Adoption**
1	1,127	1,127	901	901	901	676	451	225	225	6,534
2	1,127	1,127	901	901	901	676	451	225	225	6,534
3	1,127	1,127	901	901	901	676	451	225	225	6,534
4	1,127	1,127	901	901	901	676	451	225	225	6,534
5	1,127	1,127	901	901	901	676	451	225	225	6,534
6	1,127	1,127	901	901	901	676	451	225	225	6,534
7	1,127	1,127	901	901	901	676	451	225	225	6,534
8	1,127	1,127	901	901	901	676	451	225	225	6,534
9	1,127	1,127	901	901	901	676	451	225	225	6,534
10	1,127	1,127	901	901	901	676	451	225	225	6,534
11	1,127	1,127	901	901	901	676	451	225	225	6,534
12	1,127	1,127	901	901	901	676	451	225	225	6,534
13	1,127	1,127	901	901	901	676	451	225	225	6,534
14	1,127	1,127	901	901	901	676	451	225	225	6,534
15	1,127	1,127	901	901	901	676	451	225	225	6,534
16	1,127	1,127	901	901	901	676	451	225	225	6,534
17	1,127	1,127	901	901	901	676	451	225	225	6,534
18	1,127	1,127	901	901	901	676	451	225	225	6,534
19	1,127	1,127	901	901	901	676	451	225	225	6,534
20	1,127	1,127	901	901	901	676	451	225	225	6,534
21	1,127	1,127	901	901	901	676	451	225	225	6,534
22	1,127	1,127	901	901	901	676	451	225	225	6,534
23	1,127	1,127	901	901	901	676	451	225	225	6,534
24	1,127	1,127	901	901	901	676	451	225	225	6,534
25	1,127	1,127	901	901	901	676	451	225	225	6,534
26	1,127	1,127	901	901	901	676	451	225	225	6,534
27	1,127	1,127	901	901	901	676	451	225	225	6,534
28	1,127	1,127	901	901	901	676	451	225	225	6,534
29	1,127	1,127	901	901	901	676	451	225	225	6,534
30	1,127	1,127	901	901	901	676	451	225	225	6,534
31	1,127	1,127	901	901	901	676	451	225	225	6,534
32	1,127	1,127	901	901	901	676	451	225	225	6,534
33	1,127	1,127	901	901	901	676	451	225	225	6,534
34	1,127	1,127	901	901	901	676	451	225	225	6,534
35	1,127	1,127	901	901	901	676	451	225	225	6,534
36	1,127	1,127	901	901	901	676	451	225	225	6,534
37	1,127	1,127	901	901	901	676	451	225	225	6,534
38	1,127	1,127	901	901	901	676	451	225	225	6,534
39	1,127	1,127	901	901	901	676	451	225	225	6,534
40	1,127	1,127	901	901	901	676	451	225	225	6,534
Total	**45,064**	**45,064**	**36,051**	**36,051**	**36,051**	**27,039**	**18,026**	**9,013**	**9,013**	**261,373**

c. Cumulative sediment load reductions from cropland BMP adoption in the Big Blue Targeted Areas

Table 18. Big Blue Targeted Area sediment reductions from implemented cropland BMPs

Big Blue Targeted Area Total Annual Soil Erosion Reduction, Cumulative, Cropland BMPs (tons)										
Year	No-Till	Nutrient Management Plans	Water-ways	Terraces	Cover Crops	Buffers	Water Retention Structure	Establish Permanent Vegetation	Subsurface Fertilizer Application	Total Load Reduction
1	5,115	1,705	2,182	1,637	2,182	2,046	1,364	1,296	0	17,526
2	10,229	3,410	4,364	3,273	4,364	4,092	2,728	2,591	0	35,052
3	15,344	5,115	6,547	4,910	6,547	6,137	4,092	3,887	0	52,578
4	20,458	6,819	8,729	6,547	8,729	8,183	5,456	5,183	0	70,104
5	25,573	8,524	10,911	8,183	10,911	10,229	6,819	6,478	0	87,629
6	30,687	10,229	13,093	9,820	13,093	12,275	8,183	7,774	0	105,155
7	35,802	11,934	15,275	11,457	15,275	14,321	9,547	9,070	0	122,681
8	40,916	13,639	17,458	13,093	17,458	16,367	10,911	10,366	0	140,207
9	46,031	15,344	19,640	14,730	19,640	18,412	12,275	11,661	0	157,733
10	51,146	17,049	21,822	16,367	21,822	20,458	13,639	12,957	0	175,259
11	56,260	18,753	24,004	18,003	24,004	22,504	15,003	14,253	0	192,785
12	61,375	20,458	26,187	19,640	26,187	24,550	16,367	15,548	0	210,311
13	66,489	22,163	28,369	21,277	28,369	26,596	17,730	16,844	0	227,836
14	71,604	23,868	30,551	22,913	30,551	28,642	19,094	18,140	0	245,362
15	76,718	25,573	32,733	24,550	32,733	30,687	20,458	19,435	0	262,888
16	81,833	27,278	34,915	26,187	34,915	32,733	21,822	20,731	0	280,414
17	86,947	28,982	37,098	27,823	37,098	34,779	23,186	22,027	0	297,940
18	92,062	30,687	39,280	29,460	39,280	36,825	24,550	23,322	0	315,466
19	97,177	32,392	41,462	31,097	41,462	38,871	25,914	24,618	0	332,992
20	102,291	34,097	43,644	32,733	43,644	40,916	27,278	25,914	0	350,518
21	107,406	35,802	45,826	34,370	45,826	42,962	28,642	27,209	0	368,043
22	112,520	37,507	48,009	36,006	48,009	45,008	30,005	28,505	0	385,569
23	117,635	39,212	50,191	37,643	50,191	47,054	31,369	29,801	0	403,095
24	122,749	40,916	52,373	39,280	52,373	49,100	32,733	31,097	0	420,621
25	127,864	42,621	54,555	40,916	54,555	51,146	34,097	32,392	0	438,147
26	132,978	44,326	56,737	42,553	56,737	53,191	35,461	33,688	0	455,673
27	138,093	46,031	58,920	44,190	58,920	55,237	36,825	34,984	0	473,199
28	143,208	47,736	61,102	45,826	61,102	57,283	38,189	36,279	0	490,725
29	148,322	49,441	63,284	47,463	63,284	59,329	39,553	37,575	0	508,250
30	153,437	51,146	65,466	49,100	65,466	61,375	40,916	38,871	0	525,776
31	158,551	52,850	67,649	50,736	67,649	63,420	42,280	40,166	0	543,302
32	163,666	54,555	69,831	52,373	69,831	65,466	43,644	41,462	0	560,828
33	168,780	56,260	72,013	54,010	72,013	67,512	45,008	42,758	0	578,354
34	173,895	57,965	74,195	55,646	74,195	69,558	46,372	44,053	0	595,880
35	179,009	59,670	76,377	57,283	76,377	71,604	47,736	45,349	0	613,406
36	184,124	61,375	78,560	58,920	78,560	73,650	49,100	46,645	0	630,932
37	189,239	63,080	80,742	60,556	80,742	75,695	50,464	47,940	0	648,458
38	194,353	64,784	82,924	62,193	82,924	77,741	51,828	49,236	0	665,983
39	199,468	66,489	85,106	63,830	85,106	79,787	53,191	50,532	0	683,509
40	204,582	68,194	87,288	65,466	87,288	81,833	54,555	51,828	0	701,035

2. Cropland targeted for sediment reductions in the Little Blue Targeted Area

a. Little Blue Land Use

There are 64,585 cultivated cropland acres in the Little Blue Targeted Area, which accounts for about 43 percent of the total land use (**Table 19**).

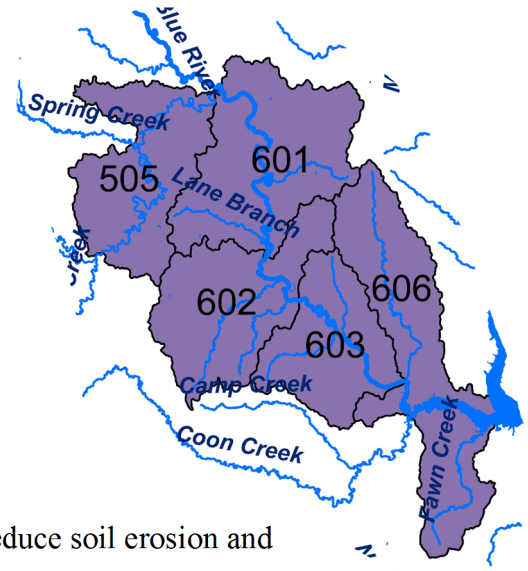
Table 19. Land use in the Little Blue Targeted Area

Little Blue Targeted Watershed 10270207						
Land Use	**505**	**601**	**602**	**603**	**606**	**Total**
Cultivated Crops	12,420	13,338	9,142	11,757	17,928	**64,585**
Grassland	10,470	16,843	14,513	7,402	13,481	**62,709**
Deciduous Forest	1,666	1,846	1,730	961	3,017	**9,220**
Developed, Open Space	985	1,306	1,092	736	1,538	**5,657**
Open Water	317	791	305	382	458	**2,253**
Pasture/Hay	730	253	328		257	**1,568**
Woody Wetlands	107	304	235	377	337	**1,361**
Developed, Low Density	195	334	116	80	456	**1,181**
Mixed Forest	47	63	124	8	77	**319**
Developed, Medium Density	27	39	2	2	31	**101**
Evergreen Forest	2		14	29	33	**79**
Developed, High Intensity	10	10	0		17	**37**
Emergent Herbaceous Wetlands	1	5		5	21	**33**
Barren Land	7	4	2		20	**33**
Shrub/Scrub	4	5	7	5	4	**26**
Total	**26,988**	**35,143**	**27,610**	**21,745**	**37,675**	**149,161**

Table 20. Land use breakdown for cropland acres in the Little Blue Targeted Area

Little Blue: Agricultural Landuse Breakdown - Cropland						
Sub-Watershed - HUC 10270207	**Cultivated Cropland (acres)**	**Percent Cultivated Cropland**	**Grassland, Pasture and Hay (acres)**	**Percent Grassland, Pasture and Hay**	**Percent Other Land Uses**	**Total (acres)**
505	12,420	46.00%	11,201	41.50%	12.50%	26,988
601	13,338	38.00%	17,097	48.60%	13.40%	35,143
602	9,142	33.10%	14,840	53.70%	13.10%	27,610
603	11,757	54.10%	7,402	34.00%	11.90%	21,745
606	17,928	47.60%	13,737	36.50%	16.00%	37,675

b. Little Blue Targeted Area cropland BMPs



Cropland BMPs will be implemented in the Little Blue Targeted Area to protect local streams and lakes by reducing sediment loss.

Cropland BMPs will be implemented in the following five HUC 12s:

- 102702070505
- 102702070601
- 102702070602
- 102702070603
- 102702070606

The following BMPs will be implemented to reduce soil erosion and loss from crop fields:

- adopt no-till cultivation,
- create nutrient management plans,
- establish grassed waterways,
- build new and/or revamp terraces,
- utilize cover crops,
- establish buffer strips along crop fields,
- install water retention structures,
- establish permanent vegetation, and
- implement subsurface fertilizer application.

Table 21. Sediment BMP adoption rates in the Little Blue Targeted Area

BMPs to Prevent / Reduce Sediment Runoff and Erosion			
Protection Measures for:	**Best Management Practices and Other Actions**	**Adoption Rate Goal**	**Acres Needing BMPs (Annual)**
Cropland	No-till cultivation	25%	1,531
	Nutrient management plans	25%	1,531
	Establish grassed waterways	20%	1,224
	Build new and revamp old terraces	20%	1,224
	Utilize cover crops	20%	1,224
	Establish buffer strips along crop fields	15%	918
	Water retention structures	10%	612
	Establish permanent vegetation	5%	306
	Implement subsurface fertilizer application	5%	306

Table 22. Adoption rates for cropland BMP implementation in the Little Blue Targeted Area

Little Blue Targeted Area Total Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Nutrient Management Plans**	**Water-ways**	**Terraces**	**Cover Crops**	**Buffers**	**Water Retention Structure**	**Establish Permanent Vegetation**	**Subsurface Fertilizer Application**	**Total Adoption**
1	404	404	323	323	323	242	161	81	81	2,341
2	404	404	323	323	323	242	161	81	81	2,341
3	404	404	323	323	323	242	161	81	81	2,341
4	404	404	323	323	323	242	161	81	81	2,341
5	404	404	323	323	323	242	161	81	81	2,341
6	404	404	323	323	323	242	161	81	81	2,341
7	404	404	323	323	323	242	161	81	81	2,341
8	404	404	323	323	323	242	161	81	81	2,341
9	404	404	323	323	323	242	161	81	81	2,341
10	404	404	323	323	323	242	161	81	81	2,341
11	404	404	323	323	323	242	161	81	81	2,341
12	404	404	323	323	323	242	161	81	81	2,341
13	404	404	323	323	323	242	161	81	81	2,341
14	404	404	323	323	323	242	161	81	81	2,341
15	404	404	323	323	323	242	161	81	81	2,341
16	404	404	323	323	323	242	161	81	81	2,341
17	404	404	323	323	323	242	161	81	81	2,341
18	404	404	323	323	323	242	161	81	81	2,341
19	404	404	323	323	323	242	161	81	81	2,341
20	404	404	323	323	323	242	161	81	81	2,341
21	404	404	323	323	323	242	161	81	81	2,341
22	404	404	323	323	323	242	161	81	81	2,341
23	404	404	323	323	323	242	161	81	81	2,341
24	404	404	323	323	323	242	161	81	81	2,341
25	404	404	323	323	323	242	161	81	81	2,341
26	404	404	323	323	323	242	161	81	81	2,341
27	404	404	323	323	323	242	161	81	81	2,341
28	404	404	323	323	323	242	161	81	81	2,341
29	404	404	323	323	323	242	161	81	81	2,341
30	404	404	323	323	323	242	161	81	81	2,341
31	404	404	323	323	323	242	161	81	81	2,341
32	404	404	323	323	323	242	161	81	81	2,341
33	404	404	323	323	323	242	161	81	81	2,341
34	404	404	323	323	323	242	161	81	81	2,341
35	404	404	323	323	323	242	161	81	81	2,341
36	404	404	323	323	323	242	161	81	81	2,341
37	404	404	323	323	323	242	161	81	81	2,341
38	404	404	323	323	323	242	161	81	81	2,341
39	404	404	323	323	323	242	161	81	81	2,341
40	404	404	323	323	323	242	161	81	81	2,341
Total	**16,146**	**16,146**	**12,917**	**12,917**	**12,917**	**9,688**	**6,459**	**3,229**	**3,229**	**93,648**

c. Cumulative sediment load reductions from cropland BMP adoption in the Little Blue Targeted Area

Table 23. Little Blue Targeted Area sediment reductions from implemented cropland BMPs

Little Blue Targeted Area Total Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	No-Till	Nutrient Management Plans	Water-ways	Terraces	Cover Crops	Buffers	Water Retention Structure	Establish Permanent Vegetation	Subsurface Fertilizer Application	Total Load Reduction
1	1,208	403	516	387	516	483	322	306	0	4,141
2	2,417	806	1,031	773	1,031	967	644	612	0	8,282
3	3,625	1,208	1,547	1,160	1,547	1,450	967	918	0	12,423
4	4,834	1,611	2,062	1,547	2,062	1,933	1,289	1,225	0	16,564
5	6,042	2,014	2,578	1,933	2,578	2,417	1,611	1,531	0	20,705
6	7,251	2,417	3,094	2,320	3,094	2,900	1,933	1,837	0	24,845
7	8,459	2,820	3,609	2,707	3,609	3,384	2,256	2,143	0	28,986
8	9,667	3,222	4,125	3,094	4,125	3,867	2,578	2,449	0	33,127
9	10,876	3,625	4,640	3,480	4,640	4,350	2,900	2,755	0	37,268
10	12,084	4,028	5,156	3,867	5,156	4,834	3,222	3,061	0	41,409
11	13,293	4,431	5,672	4,254	5,672	5,317	3,545	3,368	0	45,550
12	14,501	4,834	6,187	4,640	6,187	5,800	3,867	3,674	0	49,691
13	15,710	5,237	6,703	5,027	6,703	6,284	4,189	3,980	0	53,832
14	16,918	5,639	7,218	5,414	7,218	6,767	4,511	4,286	0	57,973
15	18,127	6,042	7,734	5,800	7,734	7,251	4,834	4,592	0	62,114
16	19,335	6,445	8,250	6,187	8,250	7,734	5,156	4,898	0	66,255
17	20,543	6,848	8,765	6,574	8,765	8,217	5,478	5,204	0	70,395
18	21,752	7,251	9,281	6,961	9,281	8,701	5,800	5,510	0	74,536
19	22,960	7,653	9,796	7,347	9,796	9,184	6,123	5,817	0	78,677
20	24,169	8,056	10,312	7,734	10,312	9,667	6,445	6,123	0	82,818
21	25,377	8,459	10,828	8,121	10,828	10,151	6,767	6,429	0	86,959
22	26,586	8,862	11,343	8,507	11,343	10,634	7,089	6,735	0	91,100
23	27,794	9,265	11,859	8,894	11,859	11,118	7,412	7,041	0	95,241
24	29,002	9,667	12,374	9,281	12,374	11,601	7,734	7,347	0	99,382
25	30,211	10,070	12,890	9,667	12,890	12,084	8,056	7,653	0	103,523
26	31,419	10,473	13,406	10,054	13,406	12,568	8,378	7,960	0	107,664
27	32,628	10,876	13,921	10,441	13,921	13,051	8,701	8,266	0	111,805
28	33,836	11,279	14,437	10,828	14,437	13,534	9,023	8,572	0	115,945
29	35,045	11,682	14,952	11,214	14,952	14,018	9,345	8,878	0	120,086
30	36,253	12,084	15,468	11,601	15,468	14,501	9,667	9,184	0	124,227
31	37,462	12,487	15,984	11,988	15,984	14,985	9,990	9,490	0	128,368
32	38,670	12,890	16,499	12,374	16,499	15,468	10,312	9,796	0	132,509
33	39,878	13,293	17,015	12,761	17,015	15,951	10,634	10,103	0	136,650
34	41,087	13,696	17,530	13,148	17,530	16,435	10,956	10,409	0	140,791
35	42,295	14,098	18,046	13,534	18,046	16,918	11,279	10,715	0	144,932
36	43,504	14,501	18,562	13,921	18,562	17,401	11,601	11,021	0	149,073
37	44,712	14,904	19,077	14,308	19,077	17,885	11,923	11,327	0	153,214
38	45,921	15,307	19,593	14,695	19,593	18,368	12,245	11,633	0	157,354
39	47,129	15,710	20,108	15,081	20,108	18,852	12,568	11,939	0	161,495
40	48,337	16,112	20,624	15,468	20,624	19,335	12,890	12,245	0	165,636

3. Streambanks targeted for sediment reductions in the Tuttle Creek Watershed

Streambanks will be targeted in the Tuttle Creek Watershed to reduce sediment loss. Stabilization BMPs will take place to reduce sediment (and nutrient) loading. Streambank stabilization BMPs will take place in the following nine HUC 12s:

- 102702050201
- 102702050204
- 102702050304
- 102702050502
- 102702050503
- 102702070601
- 102702070602
- 102702070603
- 102702070606

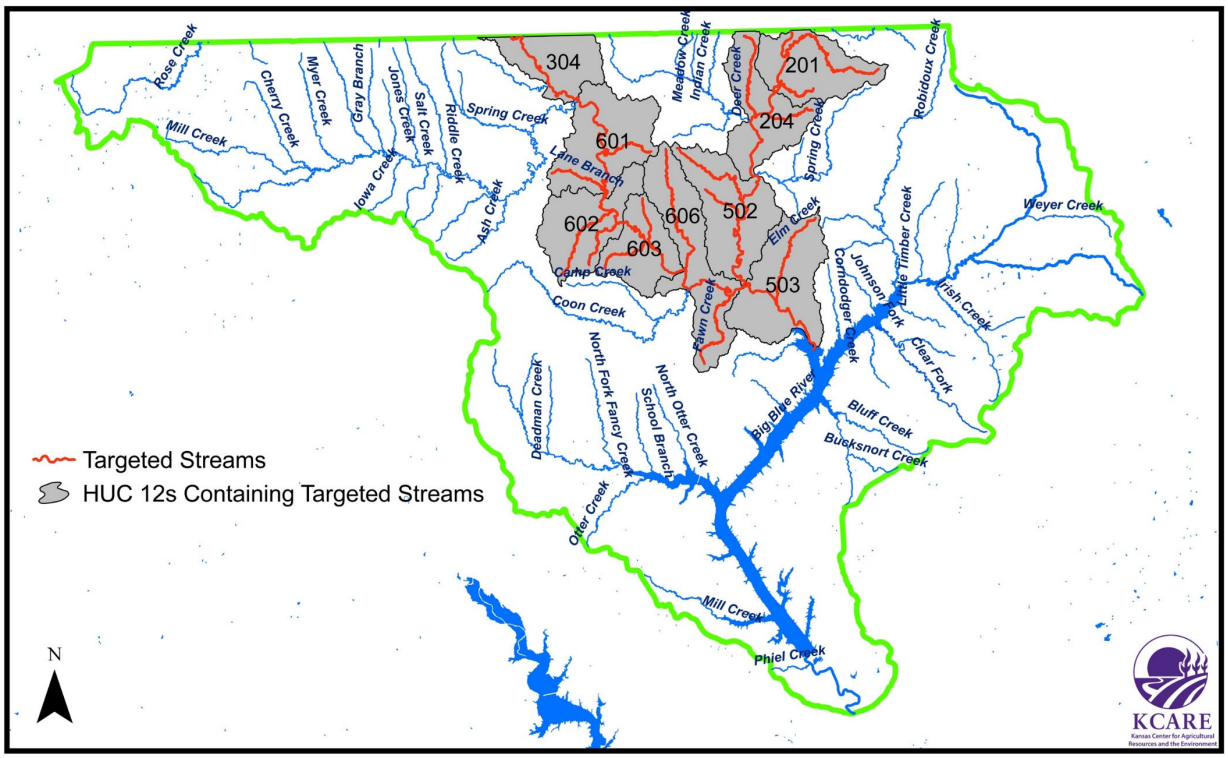


Figure 24. Targeted streambank areas for sediment in the Tuttle Creek Watershed

Stabilization projects will be approved by the SLT each year. There are several methods to stabilize streambanks, and one or more of the BMPs below may be utilized:

- riparian buffers
- field borders
- bottomland timber in wetlands
- streambank restoration, etc.

Adoptions are at the discretion of the SLT and will depend on funding amount and sources, and landowner approval and desire to complete the project.

Table 24. Sediment BMP adoption rates along streambanks

BMPs to Prevent / Reduce Sediment Runoff and Erosion		
Protection Measures for:	**Best Management Practices and Other Actions**	**Adoption Rate Goal**
Streambanks	Streambank Stabilization	4,750 feet per year

The implementation of 4,750 feet of streambank stabilization projects annually will result in a cumulative sediment erosion reduction of 2,162,200 tons at the end of this 40-year WRAPS plan.

Table 25. Cumulative sediment reduction from streambank BMP implementation

Estimated Sediment Load Reductions for Implemented Sediment BMPs on the Streambank			
Year	**Streambank Stabilization (feet)**	**Soil Load Reduction (tons)**	**Cumulative Erosion Reduction (tons)**
1	4,750	54,055	54,055
2	4,750	54,055	108,110
3	4,750	54,055	162,165
4	4,750	54,055	216,220
5	4,750	54,055	270,275
6	4,750	54,055	324,330
7	4,750	54,055	378,385
8	4,750	54,055	432,440
9	4,750	54,055	486,495
10	4,750	54,055	540,550
11	4,750	54,055	594,605
12	4,750	54,055	648,660
13	4,750	54,055	702,715
14	4,750	54,055	756,770
15	4,750	54,055	810,825
16	4,750	54,055	864,880
17	4,750	54,055	918,935
18	4,750	54,055	972,990
19	4,750	54,055	1,027,045
20	4,750	54,055	1,081,100
21	4,750	54,055	1,135,155
22	4,750	54,055	1,189,210
23	4,750	54,055	1,243,265
24	4,750	54,055	1,297,320
25	4,750	54,055	1,351,375
26	4,750	54,055	1,405,430
27	4,750	54,055	1,459,485
28	4,750	54,055	1,513,540
29	4,750	54,055	1,567,595
30	4,750	54,055	1,621,650
31	4,750	54,055	1,675,705
32	4,750	54,055	1,729,760
33	4,750	54,055	1,783,815
34	4,750	54,055	1,837,870
35	4,750	54,055	1,891,925
36	4,750	54,055	1,945,980
37	4,750	54,055	2,000,035
38	4,750	54,055	2,054,090
39	4,750	54,055	2,108,145
40	4,750	54,055	2,162,200

4. Combined adoption rates and load reductions for sediment in the Tuttle Creek Watershed

The implementation of sediment BMPs on cropland and streambanks in the Big Blue and Little Blue River Targeted Areas will result in exceeding the sediment TMDL goal of 3 million tons. At the end of this 40-year WRAPS plan, 3,028,871 tons of soil will be saved.

Table 26. Meeting the sediment TMDL for Tuttle Creek Watershed

Achieving the Tuttle Creek Sediment TMDL		
Category	**Total Erosion Reduction**	**% of Tuttle Creek TMDL**
Cropland	866,671	28.90%
Streambank	2,162,200	72.10%
Total	**3,028,871**	**101.00%**

Table 27. Total sediment load reduction for Tuttle Creek Watershed

Meeting the Sediment TMDL for Tuttle Creek (tons)					
Year	**Big Blue Targeted Area**	**Little Blue Targeted Area**	**Streambank**	**Total**	**% of TMDL**
1	17,526	4,141	54,055	75,722	3%
2	35,052	8,282	108,110	151,444	5%
3	52,578	12,423	162,165	227,165	8%
4	70,104	16,564	216,220	302,887	10%
5	87,629	20,705	270,275	378,609	13%
6	105,155	24,845	324,330	454,331	15%
7	122,681	28,986	378,385	530,052	18%
8	140,207	33,127	432,440	605,774	20%
9	157,733	37,268	486,495	681,496	23%
10	175,259	41,409	540,550	757,218	25%
11	192,785	45,550	594,605	832,940	28%
12	210,311	49,691	648,660	908,661	30%
13	227,836	53,832	702,715	984,383	33%
14	245,362	57,973	756,770	1,060,105	35%
15	262,888	62,114	810,825	1,135,827	38%
16	280,414	66,254	864,880	1,211,548	40%
17	297,940	70,395	918,935	1,287,270	43%
18	315,466	74,536	972,990	1,362,992	45%
19	332,992	78,677	1,027,045	1,438,714	48%
20	350,518	82,818	1,081,100	1,514,436	50%
21	368,043	86,959	1,135,155	1,590,157	53%
22	385,569	91,100	1,189,210	1,665,879	56%
23	403,095	95,241	1,243,265	1,741,601	58%
24	420,621	99,382	1,297,320	1,817,323	61%
25	438,147	103,523	1,351,375	1,893,044	63%
26	455,673	107,663	1,405,430	1,968,766	66%
27	473,199	111,804	1,459,485	2,044,488	68%
28	490,725	115,945	1,513,540	2,120,210	71%
29	508,250	120,086	1,567,595	2,195,932	73%
30	525,776	124,227	1,621,650	2,271,653	76%
31	543,302	128,368	1,675,705	2,347,375	78%
32	560,828	132,509	1,729,760	2,423,097	81%
33	578,354	136,650	1,783,815	2,498,819	83%
34	595,880	140,791	1,837,870	2,574,540	86%
35	613,406	144,932	1,891,925	2,650,262	88%
36	630,932	149,072	1,945,980	2,725,984	91%
37	648,458	153,213	2,000,035	2,801,706	93%
38	665,983	157,354	2,054,090	2,877,428	96%
39	683,509	161,495	2,108,145	2,953,149	98%
40	701,035	165,636	2,162,200	3,028,871	101%
Load Reduction Accomplished (tons)				**3,028,871**	
Load Reduction Required to Meet Sediment TMDL (tons):				**3,000,000**	

It is important to note that the sediment BMPs implemented in this WRAPS plan also will reduce nutrient leaching and nutrient loading into nearby water segments. Excess nutrients cause lower DO levels and higher pH levels than desirable and required by KDHE. Therefore, reducing soil loss and nutrient pollution will subsequently address the DO and pH TMDLs by improving DO and pH levels in the Tuttle Creek Watershed.

B. Phosphorus reductions in the Tuttle Creek Watershed

The Tuttle Creek Watershed has a "high" TMDL ranking for eutrophication (excess nutrients such as nitrogen and phosphorus), in 14 stream segments and in Tuttle Creek Lake. This WRAPS plan will focus only on the reduction of phosphorus. The Tuttle Creek Watershed contains three targeted areas for phosphorus reductions: cropland, streambanks, and livestock areas.

With the BMP adoptions and implementations in the Big and Little Blue Targeted Areas discussed in this section, the Tuttle Creek Watershed will have a total phosphorus load reduction of 371,969 pounds at the conclusion of this 40-year WRAPS plan.

1. Cropland targeted for phosphorus reductions

As previously mentioned, sediment BMPs will aid in the reduction of nutrient (phosphorus) loading. This section will account for total P saved by the implementation of the sediment BMPs implemented on cropland. These BMPs will also serve to reduce nitrogen.

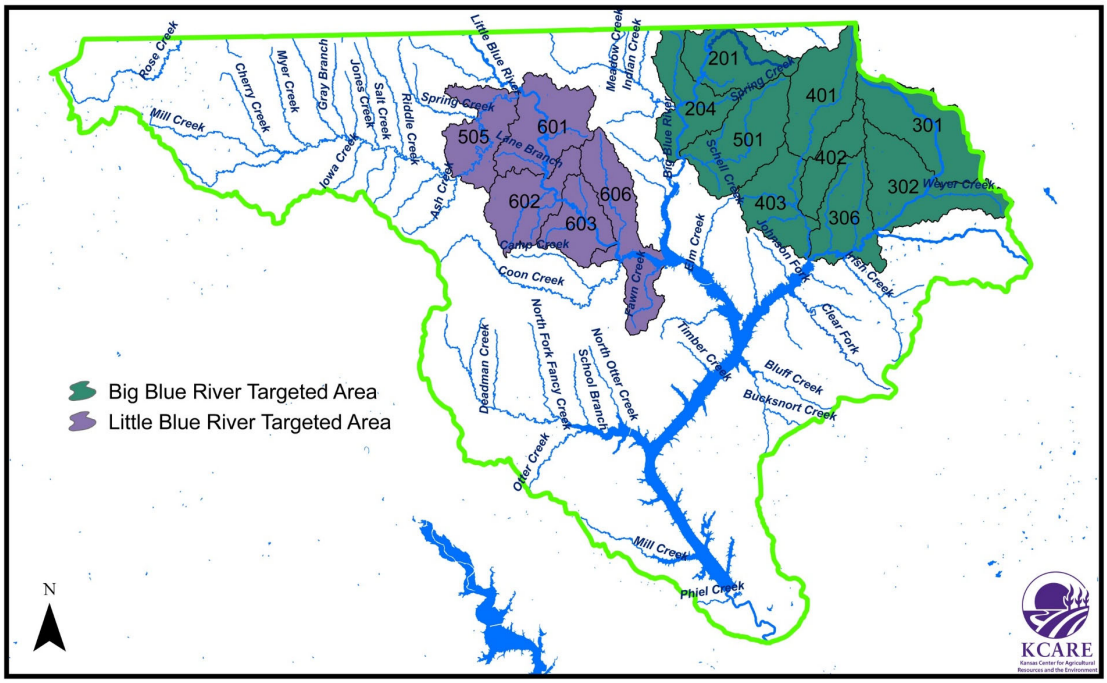
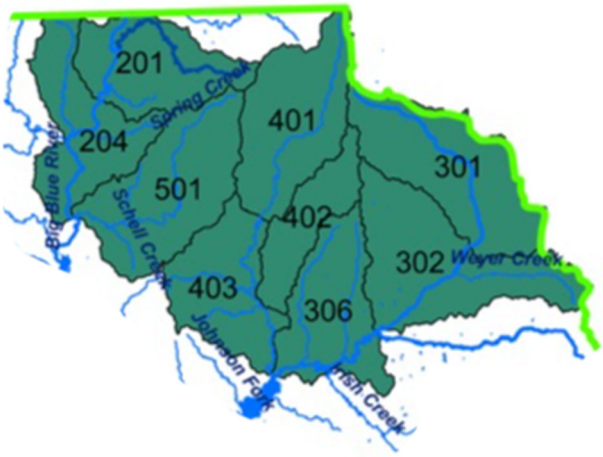


Figure 25. Cropland targeted areas for sediment (and phosphorus) in the Tuttle Creek Watershed

a. Cropland BMPs for phosphorus reduction in the Big Blue Targeted Areas



Cropland BMPs will be implemented in the Big Blue Targeted Area to protect local streams and lakes by reducing nutrient (P) loss.

Cropland BMPs will be implemented in the following nine HUC 12s:

- 102702050201
- 102702050204
- 102702050301
- 102702050302
- 102702050306
- 102702050401
- 102702050402
- 102702050403
- 102702050501

The following BMPs will be implemented to reduce soil erosion and therefore, P leaching, from crop fields:

- adopt no-till cultivation,
- create nutrient management plans,
- establish grassed waterways,
- build new and/or revamp terraces,
- utilize cover crops,
- establish buffer strips along crop fields,
- install water retention structures,
- establish permanent vegetation, and
- implement subsurface fertilizer application.

Table 28. Phosphorus adoption rates on cropland in the Big Blue Targeted Area

BMPs to Prevent / Reduce Sediment Runoff and Erosion			
Protection Measures for:	**Best Management Practices and Other Actions**	**Adoption Rate Goal**	**Acres Needing BMPs (Annual)**
Cropland	No-till cultivation	25%	1,531
	Nutrient management plans	25%	1,531
	Establish grassed waterways	20%	1,224
	Build new and revamp old terraces	20%	1,224
	Utilize cover crops	20%	1,224
	Establish buffer strips along crop fields	15%	918
	Water retention structures	10%	612
	Establish permanent vegetation	5%	306
	Implement subsurface fertilizer application	5%	306

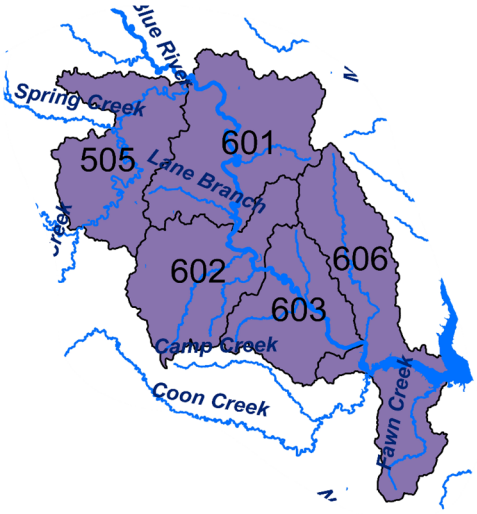
Table 29. Adoption rates for BMP implementation on cropland in the Big Blue Targeted Area

Big Blue Targeted Area Total Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Nutrient Management Plans**	**Water-ways**	**Terraces**	**Cover Crops**	**Buffers**	**Water Retention Structure**	**Establish Permanent Vegetation**	**Subsurface Fertilizer Application**	**Total Adoption**
1	1,127	1,127	901	901	901	676	451	225	225	6,534
2	1,127	1,127	901	901	901	676	451	225	225	6,534
3	1,127	1,127	901	901	901	676	451	225	225	6,534
4	1,127	1,127	901	901	901	676	451	225	225	6,534
5	1,127	1,127	901	901	901	676	451	225	225	6,534
6	1,127	1,127	901	901	901	676	451	225	225	6,534
7	1,127	1,127	901	901	901	676	451	225	225	6,534
8	1,127	1,127	901	901	901	676	451	225	225	6,534
9	1,127	1,127	901	901	901	676	451	225	225	6,534
10	1,127	1,127	901	901	901	676	451	225	225	6,534
11	1,127	1,127	901	901	901	676	451	225	225	6,534
12	1,127	1,127	901	901	901	676	451	225	225	6,534
13	1,127	1,127	901	901	901	676	451	225	225	6,534
14	1,127	1,127	901	901	901	676	451	225	225	6,534
15	1,127	1,127	901	901	901	676	451	225	225	6,534
16	1,127	1,127	901	901	901	676	451	225	225	6,534
17	1,127	1,127	901	901	901	676	451	225	225	6,534
18	1,127	1,127	901	901	901	676	451	225	225	6,534
19	1,127	1,127	901	901	901	676	451	225	225	6,534
20	1,127	1,127	901	901	901	676	451	225	225	6,534
21	1,127	1,127	901	901	901	676	451	225	225	6,534
22	1,127	1,127	901	901	901	676	451	225	225	6,534
23	1,127	1,127	901	901	901	676	451	225	225	6,534
24	1,127	1,127	901	901	901	676	451	225	225	6,534
25	1,127	1,127	901	901	901	676	451	225	225	6,534
26	1,127	1,127	901	901	901	676	451	225	225	6,534
27	1,127	1,127	901	901	901	676	451	225	225	6,534
28	1,127	1,127	901	901	901	676	451	225	225	6,534
29	1,127	1,127	901	901	901	676	451	225	225	6,534
30	1,127	1,127	901	901	901	676	451	225	225	6,534
31	1,127	1,127	901	901	901	676	451	225	225	6,534
32	1,127	1,127	901	901	901	676	451	225	225	6,534
33	1,127	1,127	901	901	901	676	451	225	225	6,534
34	1,127	1,127	901	901	901	676	451	225	225	6,534
35	1,127	1,127	901	901	901	676	451	225	225	6,534
36	1,127	1,127	901	901	901	676	451	225	225	6,534
37	1,127	1,127	901	901	901	676	451	225	225	6,534
38	1,127	1,127	901	901	901	676	451	225	225	6,534
39	1,127	1,127	901	901	901	676	451	225	225	6,534
40	1,127	1,127	901	901	901	676	451	225	225	6,534
Total	**45,064**	**45,064**	**36,051**	**36,051**	**36,051**	**27,039**	**18,026**	**9,013**	**9,013**	**261,373**

Table 30. Cumulative phosphorus reductions from cropland BMPs in the Big Blue Targeted Area

Big Blue Targeted Area Cropland BMPs - Total Annual Phosphorus Reduction, Cumulative (pounds)										
Year	**No-Till**	**Nutrient Management Plans**	**Waterways**	**Terraces**	**Cover Crops**	**Buffers**	**Water Retention Structure**	**Permanent Vegetation**	**Subsurface Fertilizer Application**	**Total Load Reduction**
1	1,221	763	977	733	1,221	916	611	580	305	7,328
2	2,443	1,527	1,954	1,466	2,443	1,832	1,221	1,160	611	14,657
3	3,664	2,290	2,931	2,198	3,664	2,748	1,832	1,740	916	21,985
4	4,886	3,053	3,908	2,931	4,886	3,664	2,443	2,321	1,221	29,313
5	6,107	3,817	4,886	3,664	6,107	4,580	3,053	2,901	1,527	36,641
6	7,328	4,580	5,863	4,397	7,328	5,496	3,664	3,481	1,832	43,970
7	8,550	5,344	6,840	5,130	8,550	6,412	4,275	4,061	2,137	51,298
8	9,771	6,107	7,817	5,863	9,771	7,328	4,886	4,641	2,443	58,626
9	10,992	6,870	8,794	6,595	10,992	8,244	5,496	5,221	2,748	65,955
10	12,214	7,634	9,771	7,328	12,214	9,160	6,107	5,802	3,053	73,283
11	13,435	8,397	10,748	8,061	13,435	10,076	6,718	6,382	3,359	80,611
12	14,657	9,160	11,725	8,794	14,657	10,992	7,328	6,962	3,664	87,939
13	15,878	9,924	12,702	9,527	15,878	11,908	7,939	7,542	3,969	95,268
14	17,099	10,687	13,679	10,260	17,099	12,824	8,550	8,122	4,275	102,596
15	18,321	11,450	14,657	10,992	18,321	13,741	9,160	8,702	4,580	109,924
16	19,542	12,214	15,634	11,725	19,542	14,657	9,771	9,282	4,886	117,253
17	20,763	12,977	16,611	12,458	20,763	15,573	10,382	9,863	5,191	124,581
18	21,985	13,741	17,588	13,191	21,985	16,489	10,992	10,443	5,496	131,909
19	23,206	14,504	18,565	13,924	23,206	17,405	11,603	11,023	5,802	139,237
20	24,428	15,267	19,542	14,657	24,428	18,321	12,214	11,603	6,107	146,566
21	25,649	16,031	20,519	15,389	25,649	19,237	12,824	12,183	6,412	153,894
22	26,870	16,794	21,496	16,122	26,870	20,153	13,435	12,763	6,718	161,222
23	28,092	17,557	22,473	16,855	28,092	21,069	14,046	13,344	7,023	168,551
24	29,313	18,321	23,451	17,588	29,313	21,985	14,657	13,924	7,328	175,879
25	30,535	19,084	24,428	18,321	30,535	22,901	15,267	14,504	7,634	183,207
26	31,756	19,847	25,405	19,054	31,756	23,817	15,878	15,084	7,939	190,535
27	32,977	20,611	26,382	19,786	32,977	24,733	16,489	15,664	8,244	197,864
28	34,199	21,374	27,359	20,519	34,199	25,649	17,099	16,244	8,550	205,192
29	35,420	22,138	28,336	21,252	35,420	26,565	17,710	16,825	8,855	212,520
30	36,641	22,901	29,313	21,985	36,641	27,481	18,321	17,405	9,160	219,849
31	37,863	23,664	30,290	22,718	37,863	28,397	18,931	17,985	9,466	227,177
32	39,084	24,428	31,267	23,451	39,084	29,313	19,542	18,565	9,771	234,505
33	40,306	25,191	32,244	24,183	40,306	30,229	20,153	19,145	10,076	241,833
34	41,527	25,954	33,222	24,916	41,527	31,145	20,763	19,725	10,382	249,162
35	42,748	26,718	34,199	25,649	42,748	32,061	21,374	20,305	10,687	256,490
36	43,970	27,481	35,176	26,382	43,970	32,977	21,985	20,886	10,992	263,818
37	45,191	28,244	36,153	27,115	45,191	33,893	22,596	21,466	11,298	271,147
38	46,412	29,008	37,130	27,847	46,412	34,809	23,206	22,046	11,603	278,475
39	47,634	29,771	38,107	28,580	47,634	35,725	23,817	22,626	11,908	285,803
40	48,855	30,535	39,084	29,313	48,855	36,641	24,428	23,206	12,214	293,131

b. Little Blue cropland BMPs for phosphorus reduction



Cropland BMPs will be implemented in the Little Blue Targeted Area to protect local streams and lakes by reducing nutrient (P) loss.

Cropland BMPs will be implemented in the following five HUC 12s:

- 102702070505
- 102702070601
- 102702070602
- 102702070603
- 102702070606

The following BMPs will be implemented to reduce soil erosion and therefore, P leaching, from crop fields:

- adopt no-till cultivation,
- create nutrient management plans,
- establish grassed waterways,
- build new and/or revamp terraces,
- utilize cover crops,
- establish buffer strips along crop fields,
- install water retention structures,
- establish permanent vegetation, and
- implement subsurface fertilizer application.

Table 31. Phosphorus adoption rates on cropland in the Little Blue Targeted Area

BMPs to Prevent / Reduce Sediment Runoff and Erosion			
Protection Measures for:	**Best Management Practices and Other Actions**	**Adoption Rate Goal**	**Acres Needing BMPs (Annual)**
Cropland	No-till cultivation	25%	1,531
	Nutrient management plans	25%	1,531
	Establish grassed waterways	20%	1,224
	Build new and revamp old terraces	20%	1,224
	Utilize cover crops	20%	1,224
	Establish buffer strips along crop fields	15%	918
	Water retention structures	10%	612
	Establish permanent vegetation	5%	306
	Implement subsurface fertilizer application	5%	306

Table 32. Adoption rates for BMP implementation on cropland in the Little Blue Targeted Area

Little Blue Targeted Area Total Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Nutrient Management Plans**	**Water-ways**	**Terraces**	**Cover Crops**	**Buffers**	**Water Retention Structure**	**Establish Permanent Vegetation**	**Subsurface Fertilizer Application**	**Total Adoption**
1	404	404	323	323	323	242	161	81	81	2,341
2	404	404	323	323	323	242	161	81	81	2,341
3	404	404	323	323	323	242	161	81	81	2,341
4	404	404	323	323	323	242	161	81	81	2,341
5	404	404	323	323	323	242	161	81	81	2,341
6	404	404	323	323	323	242	161	81	81	2,341
7	404	404	323	323	323	242	161	81	81	2,341
8	404	404	323	323	323	242	161	81	81	2,341
9	404	404	323	323	323	242	161	81	81	2,341
10	404	404	323	323	323	242	161	81	81	2,341
11	404	404	323	323	323	242	161	81	81	2,341
12	404	404	323	323	323	242	161	81	81	2,341
13	404	404	323	323	323	242	161	81	81	2,341
14	404	404	323	323	323	242	161	81	81	2,341
15	404	404	323	323	323	242	161	81	81	2,341
16	404	404	323	323	323	242	161	81	81	2,341
17	404	404	323	323	323	242	161	81	81	2,341
18	404	404	323	323	323	242	161	81	81	2,341
19	404	404	323	323	323	242	161	81	81	2,341
20	404	404	323	323	323	242	161	81	81	2,341
21	404	404	323	323	323	242	161	81	81	2,341
22	404	404	323	323	323	242	161	81	81	2,341
23	404	404	323	323	323	242	161	81	81	2,341
24	404	404	323	323	323	242	161	81	81	2,341
25	404	404	323	323	323	242	161	81	81	2,341
26	404	404	323	323	323	242	161	81	81	2,341
27	404	404	323	323	323	242	161	81	81	2,341
28	404	404	323	323	323	242	161	81	81	2,341
29	404	404	323	323	323	242	161	81	81	2,341
30	404	404	323	323	323	242	161	81	81	2,341
31	404	404	323	323	323	242	161	81	81	2,341
32	404	404	323	323	323	242	161	81	81	2,341
33	404	404	323	323	323	242	161	81	81	2,341
34	404	404	323	323	323	242	161	81	81	2,341
35	404	404	323	323	323	242	161	81	81	2,341
36	404	404	323	323	323	242	161	81	81	2,341
37	404	404	323	323	323	242	161	81	81	2,341
38	404	404	323	323	323	242	161	81	81	2,341
39	404	404	323	323	323	242	161	81	81	2,341
40	404	404	323	323	323	242	161	81	81	2,341
Total	**16,146**	**16,146**	**12,917**	**12,917**	**12,917**	**9,688**	**6,459**	**3,229**	**3,229**	**93,648**

Table 33. Cumulative phosphorus reductions from cropland BMPs in the Little Blue Targeted Area

Little Blue Targeted Area Cropland BMPs - Total Annual Phosphorus Reduction, Cumulative (pounds)										
Year	**No-Till**	**Nutrient Management Plans**	**Waterways**	**Terraces**	**Cover Crops**	**Buffers**	**Water Retention Structure**	**Permanent Vegetation**	**Subsurface Fertilizer Application**	**Total Load Reduction**
1	328	205	263	197	328	246	164	156	82	1,971
2	657	411	526	394	657	493	328	312	164	3,942
3	985	616	788	591	985	739	493	468	246	5,913
4	1,314	821	1,051	788	1,314	985	657	624	328	7,884
5	1,642	1,027	1,314	985	1,642	1,232	821	780	411	9,855
6	1,971	1,232	1,577	1,183	1,971	1,478	985	936	493	11,826
7	2,299	1,437	1,840	1,380	2,299	1,725	1,150	1,092	575	13,797
8	2,628	1,642	2,102	1,577	2,628	1,971	1,314	1,248	657	15,768
9	2,956	1,848	2,365	1,774	2,956	2,217	1,478	1,404	739	17,738
10	3,285	2,053	2,628	1,971	3,285	2,464	1,642	1,560	821	19,709
11	3,613	2,258	2,891	2,168	3,613	2,710	1,807	1,716	903	21,680
12	3,942	2,464	3,154	2,365	3,942	2,956	1,971	1,872	985	23,651
13	4,270	2,669	3,416	2,562	4,270	3,203	2,135	2,028	1,068	25,622
14	4,599	2,874	3,679	2,759	4,599	3,449	2,299	2,184	1,150	27,593
15	4,927	3,080	3,942	2,956	4,927	3,696	2,464	2,340	1,232	29,564
16	5,256	3,285	4,205	3,154	5,256	3,942	2,628	2,497	1,314	31,535
17	5,584	3,490	4,467	3,351	5,584	4,188	2,792	2,653	1,396	33,506
18	5,913	3,696	4,730	3,548	5,913	4,435	2,956	2,809	1,478	35,477
19	6,241	3,901	4,993	3,745	6,241	4,681	3,121	2,965	1,560	37,448
20	6,570	4,106	5,256	3,942	6,570	4,927	3,285	3,121	1,642	39,419
21	6,898	4,311	5,519	4,139	6,898	5,174	3,449	3,277	1,725	41,390
22	7,227	4,517	5,781	4,336	7,227	5,420	3,613	3,433	1,807	43,361
23	7,555	4,722	6,044	4,533	7,555	5,666	3,778	3,589	1,889	45,332
24	7,884	4,927	6,307	4,730	7,884	5,913	3,942	3,745	1,971	47,303
25	8,212	5,133	6,570	4,927	8,212	6,159	4,106	3,901	2,053	49,274
26	8,541	5,338	6,833	5,124	8,541	6,406	4,270	4,057	2,135	51,244
27	8,869	5,543	7,095	5,322	8,869	6,652	4,435	4,213	2,217	53,215
28	9,198	5,749	7,358	5,519	9,198	6,898	4,599	4,369	2,299	55,186
29	9,526	5,954	7,621	5,716	9,526	7,145	4,763	4,525	2,382	57,157
30	9,855	6,159	7,884	5,913	9,855	7,391	4,927	4,681	2,464	59,128
31	10,183	6,365	8,147	6,110	10,183	7,637	5,092	4,837	2,546	61,099
32	10,512	6,570	8,409	6,307	10,512	7,884	5,256	4,993	2,628	63,070
33	10,840	6,775	8,672	6,504	10,840	8,130	5,420	5,149	2,710	65,041
34	11,169	6,980	8,935	6,701	11,169	8,377	5,584	5,305	2,792	67,012
35	11,497	7,186	9,198	6,898	11,497	8,623	5,749	5,461	2,874	68,983
36	11,826	7,391	9,461	7,095	11,826	8,869	5,913	5,617	2,956	70,954
37	12,154	7,596	9,723	7,292	12,154	9,116	6,077	5,773	3,039	72,925
38	12,483	7,802	9,986	7,490	12,483	9,362	6,241	5,929	3,121	74,896
39	12,811	8,007	10,249	7,687	12,811	9,608	6,406	6,085	3,203	76,867
40	13,140	8,212	10,512	7,884	13,140	9,855	6,570	6,241	3,285	78,838

2. Streambanks targeted for phosphorus reductions in the Tuttle Creek Watershed

Streambanks will be targeted in the Tuttle Creek Watershed to reduce sediment loss. In doing so, they will also reduce nutrient P loading. Stabilization BMPs will reduce sediment (and nutrient) loading as well as serve to reduce nitrogen. The implementation of 4,750 feet of streambank

stabilization projects annually will result in a cumulative sediment erosion reduction of 3,243,300 pounds at the end of this 40-year WRAPS plan.

Streambank stabilization BMPs will take place in the following nine HUC 12s:

- 102702050201
- 102702050204
- 102702050304
- 102702050502
- 102702050503
- 102702070601
- 102702070602
- 102702070603
- 102702070606

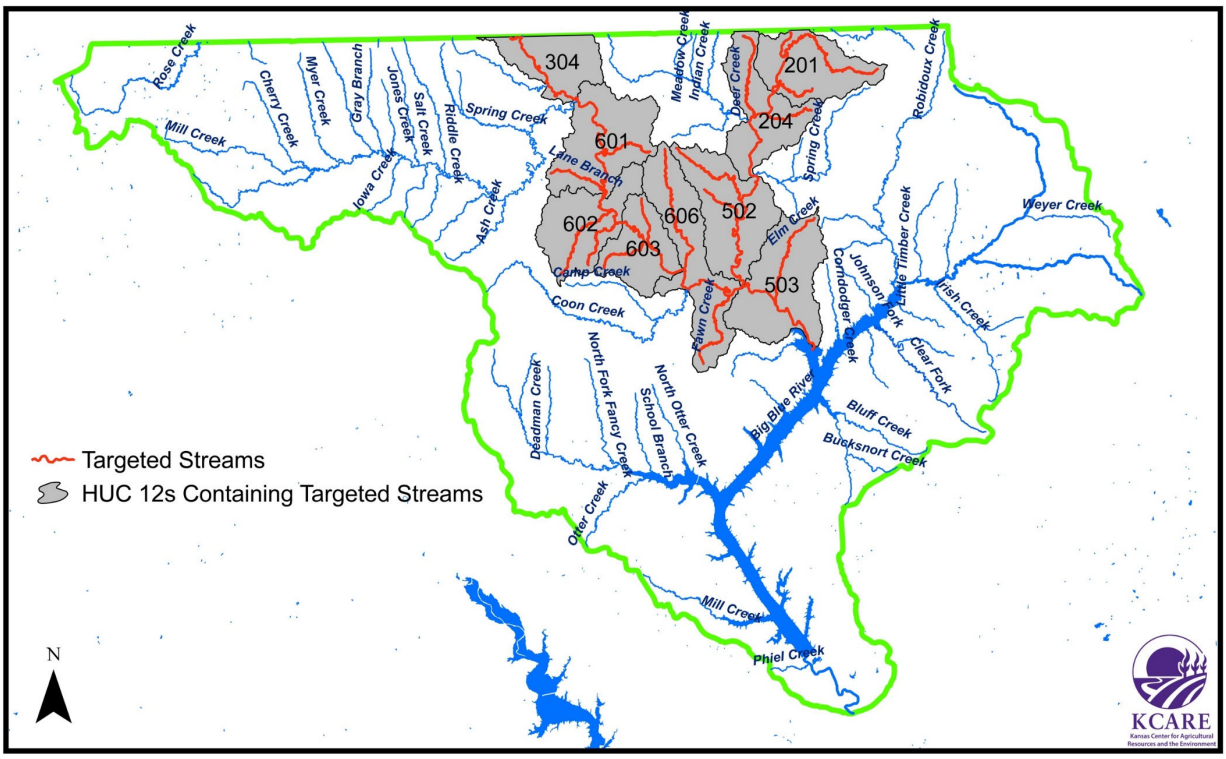


Figure 26. Streambank targeted areas for sediment (and phosphorus) in the Tuttle Creek Watershed

Stabilization projects will be approved by the SLT each year. There are several methods to stabilize streambanks, and one or more of the BMPs below may be utilized:

- riparian buffers
- field borders
- bottomland timber in wetlands
- streambank restoration, etc.

Adoptions are at the discretion of the SLT and will depend on funding amount and sources, and landowner approval and desire to complete the project.

Table 34. BMP adoption rates along streambanks

BMPs to Prevent / Reduce Sediment Runoff and Erosion		
Protection Measures for:	**Best Management Practices and Other Actions**	**Adoption Rate Goal**
Streambank	Streambank Stabilization	4,750 feet per year

Table 35. Phosphorus reduction from streambank BMP implementation

Streambank Phosphorus Load Reductions			
Year	**Streambank Stabilization (feet)**	**Phosphorous Reduction (lbs)**	**Cumulative P Load Reduction (lbs)**
1	4,750	81,083	81,083
2	4,750	81,083	162,165
3	4,750	81,083	243,248
4	4,750	81,083	324,330
5	4,750	81,083	405,413
6	4,750	81,083	486,495
7	4,750	81,083	567,578
8	4,750	81,083	648,660
9	4,750	81,083	729,743
10	4,750	81,083	810,825
11	4,750	81,083	891,908
12	4,750	81,083	972,990
13	4,750	81,083	1,054,073
14	4,750	81,083	1,135,155
15	4,750	81,083	1,216,238
16	4,750	81,083	1,297,320
17	4,750	81,083	1,378,403
18	4,750	81,083	1,459,485
19	4,750	81,083	1,540,568
20	4,750	81,083	1,621,650
21	4,750	81,083	1,702,733
22	4,750	81,083	1,783,815
23	4,750	81,083	1,864,898
24	4,750	81,083	1,945,980
25	4,750	81,083	2,027,063
26	4,750	81,083	2,108,145
27	4,750	81,083	2,189,228
28	4,750	81,083	2,270,310
29	4,750	81,083	2,351,393
30	4,750	81,083	2,432,475
31	4,750	81,083	2,513,558
32	4,750	81,083	2,594,640
33	4,750	81,083	2,675,723
34	4,750	81,083	2,756,805
35	4,750	81,083	2,837,888
36	4,750	81,083	2,918,970
37	4,750	81,083	3,000,053
38	4,750	81,083	3,081,135
39	4,750	81,083	3,162,218
40	4,750	81,083	3,243,300

3. Livestock areas targeted for phosphorus reductions in the Tuttle Creek Watershed

The Big and Little Blue Targeted Areas will be targeted with livestock BMPs to reduce phosphorus loading. At the conclusion of this 40-year WRAPS plan, it is estimated that 66,041 pounds of phosphorus will be reduced due to livestock BMP implementation.

Livestock BMPs will be implemented in the following fourteen HUC 12s:

- 102702050201
- 102702050204
- 102702050301
- 102702050302
- 102702050306
- 102702050401
- 102702050402
- 102702050403
- 102702050501
- 102702070505
- 102702070601
- 102702070602
- 102702070603
- 102702070606

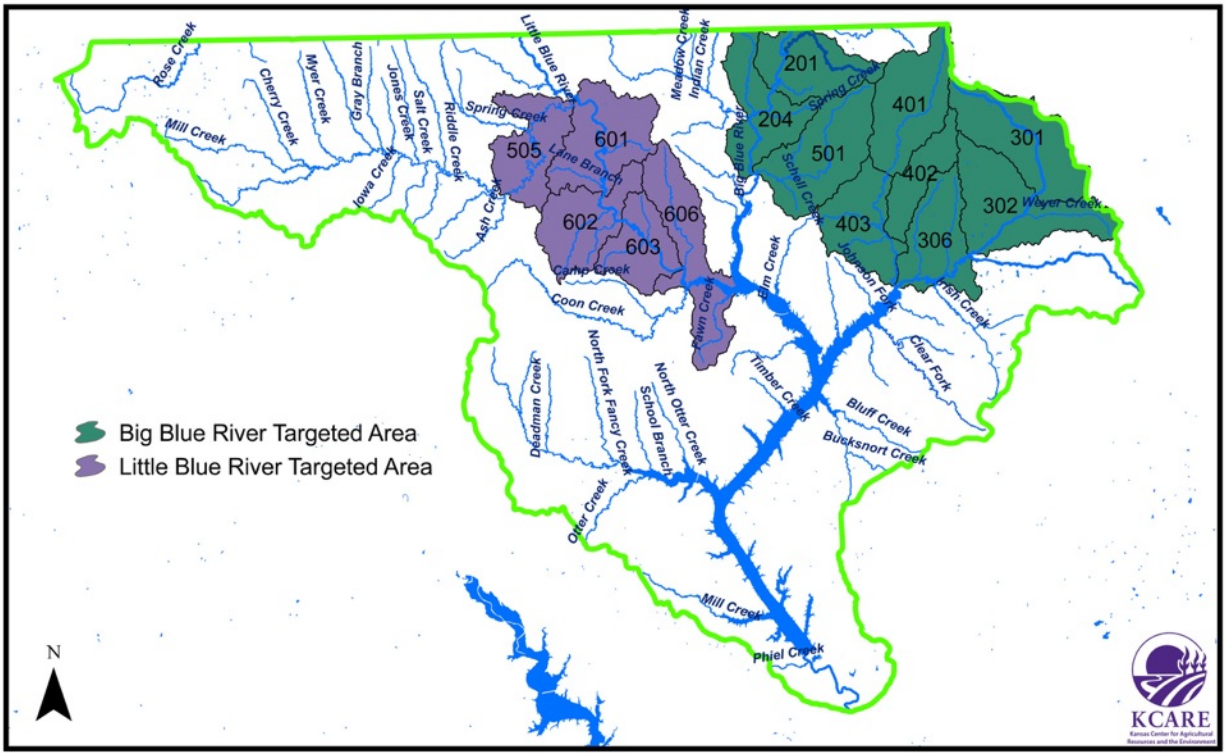


Figure 27. Livestock areas targeted for phosphorus reductions

The BMPs listed used in the watershed for phosphorus load reductions also will result in nitrogen and *E. coli* reductions. These BMPs are:

- establish vegetative filter strips along creeks,
- relocate small feedlots away from streams,
- relocate pasture feeding sites away from streams, and
- promote alternative watering sites away from streams.

Table 36. BMP adoption rates for livestock areas in the Tuttle Creek Watershed

Livestock BMPs to Reduce Phosphorus		
Protection Measures for:	**Best Management Practices and Other Actions**	**Acres/Projects Needing BMPs**
Livestock	Establish vegetative filter strips along creeks	1 site per year
	Relocate small feedlots away from streams	1 site every other year
	Relocate pasture feeding sites away from streams	1 site per year in cool season pastures
		2 sites per year in native grass pastures
	Promote alternative watering sites away from streams	1 site per year in cropland that is being used for winter grazing of crop stubble
		1 site per year in cool season pastures
		2 sites per year in native grass pastures

Table 37. Cumulative phosphorus reductions in livestock targeted areas

Livestock BMPs - Annual Phosphorus Load Reduction (pounds)								
Year	Vegetative Filter Strip	Relocate Feedlot	Relocate Pasture Feeding		Off-Stream Watering System			Annual Reduction
			Native	Cool Season	Native	Cool Season	Cropland	
1	638		153		153		25	**969**
2	638	957	153	204	153	204	25	**3,302**
3	638		153		153		25	**4,271**
4	638	957	153	204	153	204	25	**6,604**
5	638		153		153		25	**7,573**
6	638	957	153	204	153	204	25	**9,906**
7	638		153		153		25	**10,875**
8	638	957	153	204	153	204	25	**13,208**
9	638		153		153		25	**14,177**
10	638	957	153	204	153	204	25	**16,510**
11	638		153		153		25	**17,479**
12	638	957	153	204	153	204	25	**19,812**
13	638		153		153		25	**20,781**
14	638	957	153	204	153	204	25	**23,114**
15	638		153		153		25	**24,083**
16	638	957	153	204	153	204	25	**26,416**
17	638		153		153		25	**27,385**
18	638	957	153	204	153	204	25	**29,718**
19	638		153		153		25	**30,687**
20	638	957	153	204	153	204	25	**33,020**
21	638		153		153		25	**33,989**
22	638	957	153	204	153	204	25	**36,322**
23	638		153		153		25	**37,291**
24	638	957	153	204	153	204	25	**39,624**
25	638		153		153		25	**40,593**
26	638	957	153	204	153	204	25	**42,926**
27	638		153		153		25	**43,895**
28	638	957	153	204	153	204	25	**46,229**
29	638		153		153		25	**47,197**
30	638	957	153	204	153	204	25	**49,531**
31	638		153		153		25	**50,499**
32	638	957	153	204	153	204	25	**52,833**
33	638		153		153		25	**53,801**
34	638	957	153	204	153	204	25	**56,135**
35	638		153		153		25	**57,103**
36	638	957	153	204	153	204	25	**59,437**
37	638		153		153		25	**60,405**
38	638	957	153	204	153	204	25	**62,739**
39	638		153		153		25	**63,707**
40	638	957	153	204	153	204	25	**66,041**

4. Combined adoption rates and phosphorus load reduction in the Tuttle Creek Watershed

The implementation of livestock BMPs in addition to the sediment BMPs on cropland and streambanks will result in 3,681,310 pounds of phosphorus reduced. The TMDL goal is 1.72 million pounds, with a current annual P load of 19.14 million pounds. At the end of this 40-year WRAPS plan, the Tuttle Creek Watershed will still be over the stated goal by 13.74 million pounds.

Table 38. Progress on the phosphorus TMDL for the Tuttle Creek Watershed

Progress Toward Meeting the Tuttle Creek Phosphorus TMDL		
Category	**P Reduction**	**% of Phosphorus Reduction**
Big Blue Cropland	293,131	1.70%
Little Blue Cropland	78,838	0.40%
Livestock	66,041	0.40%
Streambank	3,243,300	14.70%
Total	**3,681,310**	**17.20%**

Table 39. Total phosphorus reduction in the Tuttle Creek Watershed

Reduction in Phosphorus for Tuttle Creek						
Year	**Big Blue Targeted Area (pounds)**	**Little Blue Targeted Area (pounds)**	**Livestock (pounds)**	**Streambank (pounds)**	**Total**	**% of TMDL**
1	7,328	1,971	969	81,083	91,350	1%
2	14,657	3,942	3,302	162,165	184,065	1%
3	21,985	5,913	4,271	243,248	275,416	2%
4	29,313	7,884	6,604	324,330	368,131	2%
5	36,641	9,855	7,573	405,413	459,481	3%
6	43,970	11,826	9,906	486,495	552,196	3%
7	51,298	13,797	10,875	567,578	643,547	4%
8	58,626	15,768	13,208	648,660	736,262	4%
9	65,955	17,738	14,177	729,743	827,612	5%
10	73,283	19,709	16,510	810,825	920,327	5%
11	80,611	21,680	17,479	891,908	1,011,678	6%
12	87,939	23,651	19,812	972,990	1,104,393	6%
13	95,268	25,622	20,781	1,054,073	1,195,743	7%
14	102,596	27,593	23,114	1,135,155	1,288,458	7%
15	109,924	29,564	24,083	1,216,238	1,379,809	8%
16	117,253	31,535	26,416	1,297,320	1,472,524	8%
17	124,581	33,506	27,385	1,378,403	1,563,874	9%
18	131,909	35,477	29,718	1,459,485	1,656,589	10%
19	139,237	37,448	30,687	1,540,568	1,747,940	10%
20	146,566	39,419	33,020	1,621,650	1,840,655	11%
21	153,894	41,390	33,989	1,702,733	1,932,005	11%
22	161,222	43,361	36,322	1,783,815	2,024,720	12%
23	168,551	45,332	37,291	1,864,898	2,116,071	12%
24	175,879	47,303	39,624	1,945,980	2,208,786	13%
25	183,207	49,274	40,593	2,027,063	2,300,136	13%
26	190,535	51,244	42,926	2,108,145	2,392,851	14%
27	197,864	53,215	43,895	2,189,228	2,484,202	14%
28	205,192	55,186	46,229	2,270,310	2,576,917	15%
29	212,520	57,157	47,197	2,351,393	2,668,267	15%
30	219,849	59,128	49,531	2,432,475	2,760,982	16%
31	227,177	61,099	50,499	2,513,558	2,852,333	16%
32	234,505	63,070	52,833	2,594,640	2,945,048	17%
33	241,833	65,041	53,801	2,675,723	3,036,398	17%
34	249,162	67,012	56,135	2,756,805	3,129,113	18%
35	256,490	68,983	57,103	2,837,888	3,220,464	18%
36	263,818	70,954	59,437	2,918,970	3,313,179	19%
37	271,147	72,925	60,405	3,000,053	3,404,529	20%
38	278,475	74,896	62,739	3,081,135	3,497,244	20%
39	285,803	76,867	63,707	3,162,218	3,588,595	21%
40	293,131	78,838	66,041	3,243,300	3,681,310	21%
Load Redution Accomplished (pounds)					**3,681,310**	
Load Reduction needed to meet Phosphorous TMDL (pounds):					**17,420,000**	

C. Herbicide reductions in the Tuttle Creek Watershed

Alachlor and atrazine are two widely used herbicides in the Tuttle Creek Watershed. Atrazine is ranked as a "high" priority in every stream in the watershed and in Tuttle Creek Lake. While alachlor is not found in every stream, it is ranked "high" in several streams and in Tuttle Creek Lake.

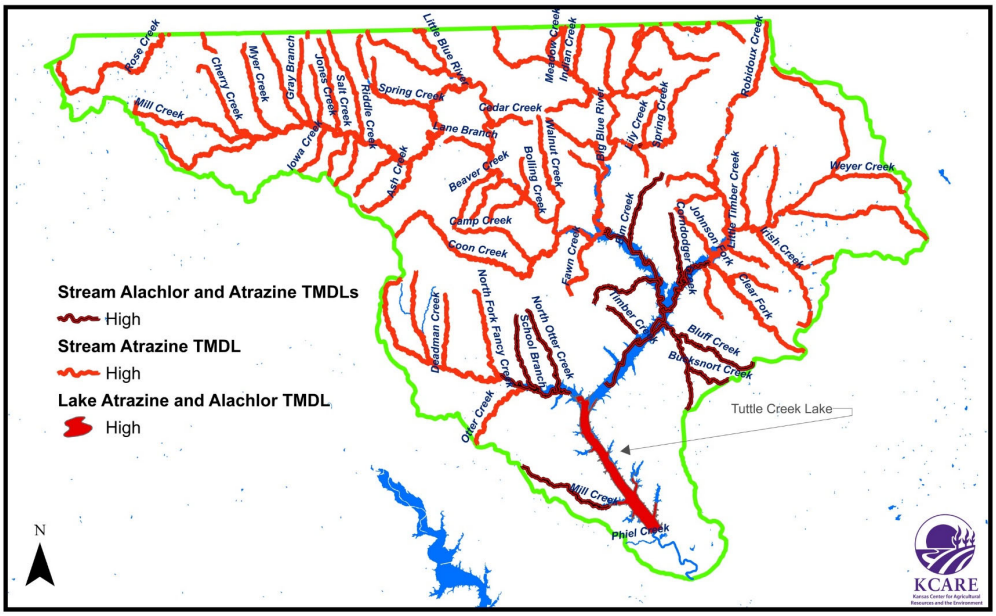


Figure 28. Herbicide TMDLs throughout the Tuttle Creek Watershed

1. Cropland Targeted for Herbicide Reductions

Cropland in the Tuttle Creek Watershed (HUC 8s 10270205 and 10270207), will be targeted for herbicide reductions.

Although there are no current BMPs specific to alachlor, the BMPs used for atrazine reduction also will result in alachlor reductions. At this time, there are no definitive load reduction numbers or data about alachlor in the Tuttle Creek Watershed. It is expected that the KDHE TMDL section will review alachlor in 2020 and set and quantitative load reduction goals. *Therefore, all tables relating to BMP implementation for herbicide reduction factor in only atrazine adoption rates, reduction and goals.*

The following BMPs will be implemented to reduce herbicide runoff from crop fields:

- use alternative herbicide,
- plant vegetative buffers,
- use split application,
- use early application, and
- use reduced soil applied rate.

2. Herbicide BMP adoption rates and load reductions

The implementation of herbicide BMPs on cropland acres within the Tuttle Creek Watershed will result in exceeding the atrazine TMDL goal of 55,845 pounds per year. At the end of this 40-year WRAPS plan, 58,977 pounds of atrazine will be prevented from entering nearby water segments, which equates to 105% of the TMDL goal. Preventing atrazine runoff into streams also will prevent the herbicide from flowing into Tuttle Creek Lake.

Table 40. Adoption of herbicide BMPs implemented in the Tuttle Creek Watershed

Annual Atrazine Adoption Rate (acres)					
Year	**Split Application**	**Early Application**	**Vegetative Buffers**	**Use Alternative Herbicide**	**Reduced Soil Applied Rate**
1	2,568	2,568	2,054	1,541	1,541
2	2,568	2,568	2,054	1,541	1,541
3	2,568	2,568	2,054	1,541	1,541
4	2,568	2,568	2,054	1,541	1,541
6	2,568	2,568	2,054	1,541	1,541
7	2,568	2,568	2,054	1,541	1,541
8	2,568	2,568	2,054	1,541	1,541
9	2,568	2,568	2,054	1,541	1,541
10	2,568	2,568	2,054	1,541	1,541
11	2,568	2,568	2,054	1,541	1,541
12	2,568	2,568	2,054	1,541	1,541
13	2,568	2,568	2,054	1,541	1,541
14	2,568	2,568	2,054	1,541	1,541
15	2,568	2,568	2,054	1,541	1,541
16	2,568	2,568	2,054	1,541	1,541
17	2,568	2,568	2,054	1,541	1,541
18	2,568	2,568	2,054	1,541	1,541
19	2,568	2,568	2,054	1,541	1,541
20	2,568	2,568	2,054	1,541	1,541
21	2,568	2,568	2,054	1,541	1,541
22	2,568	2,568	2,054	1,541	1,541
23	2,568	2,568	2,054	1,541	1,541
24	2,568	2,568	2,054	1,541	1,541
25	2,568	2,568	2,054	1,541	1,541
26	2,568	2,568	2,054	1,541	1,541
27	2,568	2,568	2,054	1,541	1,541
28	2,568	2,568	2,054	1,541	1,541
29	2,568	2,568	2,054	1,541	1,541
30	2,568	2,568	2,054	1,541	1,541
31	2,568	2,568	2,054	1,541	1,541
32	2,568	2,568	2,054	1,541	1,541
33	2,568	2,568	2,054	1,541	1,541
34	2,568	2,568	2,054	1,541	1,541
35	2,568	2,568	2,054	1,541	1,541
36	2,568	2,568	2,054	1,541	1,541
37	2,568	2,568	2,054	1,541	1,541
38	2,568	2,568	2,054	1,541	1,541
39	2,568	2,568	2,054	1,541	1,541
40	2,568	2,568	2,054	1,541	1,541
Total	**102,709**	**102,709**	**82,167**	**61,625**	**61,625**

Table 41. Cumulative herbicide reduced from cropland BMP implementation in the Tuttle Creek Watershed

Annual Atrazine Load Reductions (pounds)							
Year	**Split Application**	**Early Application**	**Vegetative Buffers**	**Use Alternative Herbicide**	**Reduced Soil Applied Rate**	**Total Annual Reduction**	**% of TMDL**
1	197	395	253	474	156	**1,474**	**2.60%**
2	395	789	505	947	313	**2,949**	**5.30%**
3	592	1,184	758	1,421	469	**4,423**	**7.90%**
4	789	1,579	1,010	1,894	625	**5,898**	**10.60%**
5	987	1,973	1,263	2,368	781	**7,372**	**13.20%**
6	1,184	2,368	1,515	2,842	938	**8,847**	**15.80%**
7	1,381	2,763	1,768	3,315	1,094	**10,321**	**18.50%**
8	1,579	3,157	2,021	3,789	1,250	**11,795**	**21.10%**
9	1,776	3,552	2,273	4,262	1,407	**13,270**	**23.80%**
10	1,973	3,947	2,526	4,736	1,563	**14,744**	**26.40%**
11	2,171	4,341	2,778	5,209	1,719	**16,219**	**29.00%**
12	2,368	4,736	3,031	5,683	1,875	**17,693**	**31.70%**
13	2,565	5,131	3,284	6,157	2,032	**19,168**	**34.30%**
14	2,763	5,525	3,536	6,630	2,188	**20,642**	**37.00%**
15	2,960	5,920	3,789	7,104	2,344	**22,117**	**39.60%**
16	3,157	6,315	4,041	7,577	2,501	**23,591**	**42.20%**
17	3,355	6,709	4,294	8,051	2,657	**25,065**	**44.90%**
18	3,552	7,104	4,546	8,525	2,813	**26,540**	**47.50%**
19	3,749	7,498	4,799	8,998	2,969	**28,014**	**50.20%**
20	3,947	7,893	5,052	9,472	3,126	**29,489**	**52.80%**
21	4,144	8,288	5,304	9,945	3,282	**30,963**	**55.40%**
22	4,341	8,682	5,557	10,419	3,438	**32,438**	**58.10%**
23	4,539	9,077	5,809	10,893	3,595	**33,912**	**60.70%**
24	4,736	9,472	6,062	11,366	3,751	**35,386**	**63.40%**
25	4,933	9,866	6,315	11,840	3,907	**36,861**	**66.00%**
26	5,131	10,261	6,567	12,313	4,063	**38,335**	**68.60%**
27	5,328	10,656	6,820	12,787	4,220	**39,810**	**71.30%**
28	5,525	11,050	7,072	13,260	4,376	**41,284**	**73.90%**
29	5,723	11,445	7,325	13,734	4,532	**42,759**	**76.60%**
30	5,920	11,840	7,577	14,208	4,689	**44,233**	**79.20%**
31	6,117	12,234	7,830	14,681	4,845	**45,708**	**81.80%**
32	6,315	12,629	8,083	15,155	5,001	**47,182**	**84.50%**
33	6,512	13,024	8,335	15,628	5,157	**48,656**	**87.10%**
34	6,709	13,418	8,588	16,102	5,314	**50,131**	**89.80%**
35	6,906	13,813	8,840	16,576	5,470	**51,605**	**92.40%**
36	7,104	14,208	9,093	17,049	5,626	**53,080**	**95.00%**
37	7,301	14,602	9,345	17,523	5,783	**54,554**	**97.70%**
38	7,498	14,997	9,598	17,996	5,939	**56,029**	**100.30%**
39	7,696	15,392	9,851	18,470	6,095	**57,503**	**103.00%**
40	7,893	15,786	10,103	18,944	6,251	**58,977**	**105.60%**

Table 42. Herbicide load reductions by BMP

Atrazine BMP Implementation and Load Reductions					
BMP	**Adoption Rate**	**Acres Adopted**	**Reduction Effectiveness[22]**	**Reduction (pounds)**	**% of TMDL**
Split application	50%	102,709	25%	7,893	14%
Early application	50%	102,709	50%	15,786	28%
Vegetative buffers	40%	82,167	40%	10,103	18%
Use alternative herbicide	30%	61,625	100%	18,944	34%
Reduce soil applied rate	30%	61,625	25%	6,251	11%
Load reduction accomplished (pounds)				**58,977**	
Load reduction required to meet atrazine TMDL (pounds)				**55,845**	

Table 43. Meeting the atrazine TMDL

Achieving the Tuttle Creek Atrazine TMDL		
BMP	**Reduction (pounds)**	**% of TMDL**
Split Application	7,893	14%
Early Application	15,786	28%
Vegetative Buffers	10,103	18%
Use Alternative Herbicide	18,944	34%
Reduce Soil Applied Rate	6,251	11%
Load Reduction Accomplished (pounds)	**58,977**	
Load Reduction Required to Meet Atrazine TMDL (pounds)	**55,845**	

Again, since there are no quantitative current load or TMDL required load reduction numbers available for alachlor, there is no table like the one above specific to alachlor. Each of the BMPs listed will result in similar reductions for alachlor.

D. *E. coli* bacteria reductions in the Tuttle Creek Watershed

Bacteria are often found in water. *E. coli* bacteria is ranked as a "high" priority TMDLs in 61 stream segments of the Tuttle Creek Watershed with an additional six streams ranked as "medium." The Tuttle Creek Watershed WRAPS plan will target livestock areas for *E. coli* bacteria reductions.

[22] Atrazine Herbicide: A Water Quality Concern for Kansas. Kansas State University Agricultural Experiment Station and Cooperative Extension Service, August 2000. https://www.bookstore.ksre.ksu.edu/pubs/MF2461.pdf

1. Livestock areas targeted for *E. coli* reductions

Livestock BMPs will be implemented in both the Big and Little Blue Targeted Areas to reduce *E. coli* contamination. These BMPs will also serve to reduce phosphorus and nitrogen.

Livestock BMPs will be implemented in the following fourteen HUC 12s:

- 102702050201
- 102702050204
- 102702050301
- 102702050302
- 102702050306
- 102702050401
- 102702050402
- 102702050403
- 102702050501
- 102702070505
- 102702070601
- 102702070602
- 102702070603
- 102702070606

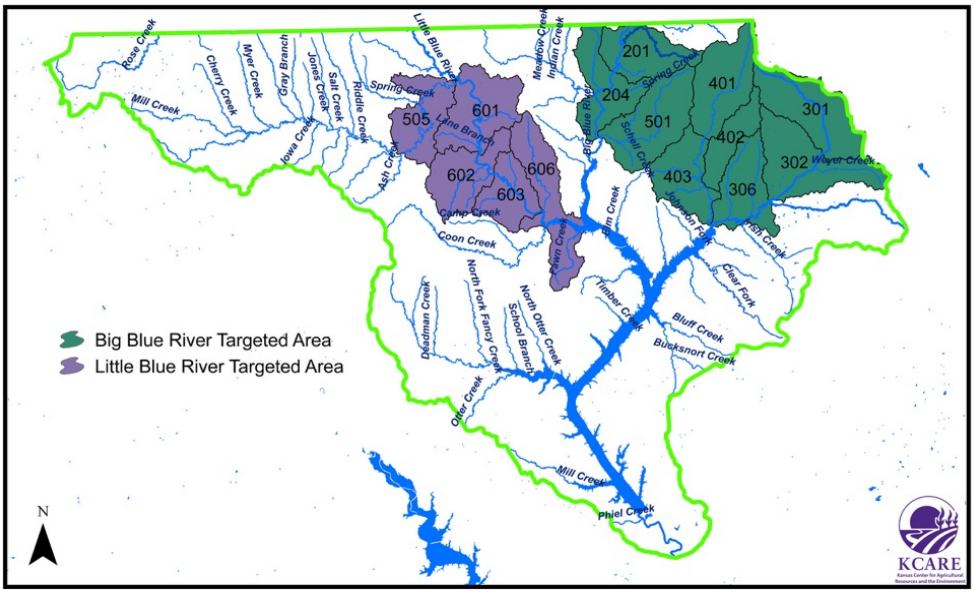


Figure 29. Livestock BMP targeted areas for E. coli *reductions in the Tuttle Creek Watershed*

The BMPs to be implemented for *E. coli* bacteria load reductions also will result in phosphorus and nitrogen reductions. The BMPs include:

- establish vegetative filter strips along creeks,
- relocate small feedlots away from streams,

- relocate pasture feeding sites away from streams, and promote alternative watering sites away from streams.

Table 44. Livestock BMP implementation to reduce E.Coli in the Tuttle Creek watershed

Livestock BMPs to Reduce *E. Coli*		
Protection Measures for:	**BMPs and Other Actions**	**Acres/Projects Needing BMPs, (Annual)**
Livestock	Establish vegetative filter strips along creeks	1 site per year
	Relocate small feedlots away from streams	1 site every other year
	Relocate pasture feeding sites away from streams	1 site per year in cool season pastures
		2 sites per year in native grass pastures
	Promote alternative watering sites away from streams	1 site per year in cropland used for winter grazing of crop stubble
		1 site per year in cool season pastures
		2 sites per year in native grass pastures

2. *E. coli* load reduction resulting from livestock BMP implementation

It is not possible to estimate the current pollutant load for *E. coli* bacteria in the watershed. This is due to several factors: environmental factors affect the viability of *E. coli* since it is a living organism; the viability of *E. coli* is affected by variations in initial bacteria loading, ambient temperature, amount of sunlight or UV rays, and a decrease in survivability over time. In addition, *E. coli* concentrations are difficult to model, and the scope of this WRAPS project does not include modeling for *E. coli*. Instead, the SLT has laid out specific BMPs that are related to livestock management practices to reduce *E. coli* contamination. The phosphorus BMPs implemented in livestock areas will also serve to reduce *E. coli* loading in the watershed.

8. Information and Education

The SLT has determined which Information and Education (I&E) activities will be needed in the Tuttle Creek Watershed. These activities are important because they provide watershed residents with a higher awareness of local watershed issues which will lead to increased adoption rates of BMPs. All I&E activities and events will be evaluated based on productivity, attendance, and achievement of objectives.

A. Information and Education activities and events scheduled in the Tuttle Creek Watershed

Listed below are the I&E activities and events along with their costs and possible sponsoring agencies. *If all listed I&E events and activities take place, the total cost would be **$32,000**.*

Table 45. I&E: Cropland BMP implementation

Cropland BMP Implementation						
BMP	**Target Audience**	**Information/Education Activity/Event**	**Time Frame**	**Estimated Costs**		**Sponsor/Responsible Agency**
Buffers	Landowners and Farmers	Demonstration Project	Annual – Spring	$5,000	per demonstration project	Kansas Rural Center, Tuttle Creek Watershed WRAPS
		Tour/Field Day to Highlight Grassed Buffer	Annual - Summer	$500	per tour or field day	Kansas Rural Center, Tuttle Creek Watershed WRAPS
		Buffer/Riparian Area Tour/Field Day highlighting forested buffers	Annual - Summer	$500	per tour or field day	Kansas Forest Service, Tuttle Creek Watershed WRAPS
		Newspaper Articles	Annual – Fall	$0	No Charge	Conservation Districts, Tuttle Creek Watershed WRAPS
		Extension Newsletter Article	Annual – Fall	$0	No Charge	Conservation Districts, Kansas Research and Extension (KSRE), Tuttle Creek Watershed WRAPS
		One on One Meetings with Producers	Annual - Ongoing	$0	Cost included in Technical Assistance WRAPS Coordinator	Conservation Districts, KSRE, Tuttle Creek Watershed WRAPS
No-till and Cover Crops	Farmers and Rental Operators	Newsletter article	Annual - Spring	$0	No Charge	Conservation Districts, KSRE, Tuttle Creek Watershed WRAPS
		One on One Meetings with Producers	Annual - Ongoing	$0	Cost included with Technical Assistance for No- Till Coordinator	Conservation Districts, KSRE, Tuttle Creek Watershed WRAPS
		Seasonal Informational Meeting (planting)	Annual - Spring	$2,750	per meeting	No-till on the Plains, Tuttle Creek Watershed WRAPS
		Scholarships for 25 producers to attend No- Till Winter Conference	Annual - Winter	$3,750	$150 pre person	No-till on the Plains, Tuttle Creek Watershed WRAPS
Nutrient Management	Farmers	Cost Share for 600 Soil Tests	Annual - Ongoing	$3,000	$5 per test	Conservation Districts, KSRE, Tuttle Creek Watershed WRAPS
		Extension Newsletter Article	Annual - Ongoing	$0	No Charge	Conservation Districts, KSRE, Tuttle Creek Watershed WRAPS
		One on One Meetings with Producers	Annual - Ongoing	$0	Cost included with Technical Assistance for Watershed Specialist	KSRE, Tuttle Creek Watershed WRAPS
Subsurface Fertilizer Application	Farmers	Field Day showcasing the latest subsurface fertilizer equipment	Annual - Winter	$0	No Charge	KSRE, Bruna Implement, Tuttle Creek Watershed WRAPS

Table 46. I&E: Livestock BMP implementation

Livestock BMP Implementation						
BMP	**Target Audience**	**Information/Education Activity/Event**	**Time Frame**	**Estimated Costs**		**Sponsor/Responsible Agency**
Vegetative Filter Strips	Landowners and Ranchers	Demonstration Project	Annual - Spring	$0	Combined with buffer demonstration	Kansas Rural Center, Tuttle Creek Watershed WRAPS
		Tour/Field Day	Annual - Summer	$0	Combined with buffer tour or field day	Kansas Rural Center, Tuttle Creek Watershed WRAPS
		Workshop/Tour	Annual - Winter	$500	per workshop	Kansas Rural Center, Tuttle Creek Watershed WRAPS
		Livestock Filter Strip and Feedlot Relocation Demonstration/Tour	Annual - Winter	$300	per demonstration or tour	Conservation Districts, NCRS, Tuttle Creek Watershed WRAPS
Relocated Feedlot	Landowners and Small Feedlot Operators	Demonstration Project	Annual - Spring	$3,000	per demonstration project	Kansas Rural Center, Tuttle Creek Watershed WRAPS
		Tour/Field Day	Annual - Summer	$500	per tour or field day	Kansas Rural Center, Conservation Districts, Tuttle Creek Watershed WRAPS
		EQIP Program Informational Meeting	Annual - Ongoing	$0	No Charge	Conservation Districts, NRCS, Tuttle Creek Watershed WRAPS
Relocate Pastrure Feeding Site	Ranchers	Demonstration Project	Annual - Spring	$3,000	per demonstration	Kansas Rural Center, Tuttle Creek Watershed WRAPS
		Tour/Field Day	Annual - Summer	$500	per tour or field day	Kansas Rural Center, Conservation Districts, Tuttle Creek Watershed WRAPS
		Grazing Informational Meeting featuring Jim Gerrish	Annual - Fall	$250	per meeting	Kansas Rural Center, Conservation Districts, Tuttle Creek Watershed WRAPS
Off-Stream Watering System	Ranchers	Demonstration Project	Annual - Spring	$3,000	per demonstration	Kansas Rural Center, Tuttle Creek Watershed WRAPS
		Tour/Field Day	Annual - Summer	$500	per tour or field day	Kansas Rural Center, Conservation Districts, Tuttle Creek Watershed WRAPS
		Grazing Informational Meeting featuring Jim Gerrish	Annual - Fall	$0	Combined with relocating pasture feeding site meeting	Kansas Rural Center, Conservation Districts, Tuttle Creek Watershed WRAPS

Table 47. I&E: Streambank BMP implementation

Streambank BMP Implementation						
BMP	**Target Audience**	**Information/Education Activity/Event**	**Time Frame**	**Estimated Costs**		**Sponsor/Responsible Agency**
Streambank Education	Landowners	One on one technical assistance	Annual - Ongoing	$0	Included with Technical Assistance for Watershed Specialist	Conservation Districts, KSRE, Tuttle Creek Watershed WRAPS

Table 48. I&E: Herbicide BMP implementation

Herbicide BMP Implementation						
BMP	**Target Audience**	**Information/Education Activity/Event**	**Time Frame**	**Estimated Costs**		**Sponsor/Responsible Agency**
Use of Alternative Herbicide	Farmers	Workshop highlighting use of organic or non- chemical weed control	Annual - Spring	$2,000	per workshop	Kansas Rural Center, NRCS (EQIP Organic Initiatives Provision), Tuttle Creek Watershed WRAPS
All Herbicide BMPs	Farmers	Workshop highlighting BMPs for herbicide reduction	Annual - Winter	$1,000	per workshop	KSRE, Tuttle Creek Watershed WRAPS

Table 49. I&E: Tuttle Creek Watershed resident education

Watershed Wide Information and Education					
BMP	**Target Audience**	**Information/Education Activity/Event**	**Time Frame**	**Estimated Costs**	**Sponsor/Responsible Agency**
Education of Youth	Educators, K-12 Students	Day on the Farm	Annual - Spring	$500 per event	Conservation Districts, Kansas Farm Bureau, Kansas FFA Organization, KSRE, Tuttle Creek Watershed WRAPS
		Poster, essay and speech contests	Annual - Spring	$200	Conservation Districts, Tuttle Creek Watershed WRAPS
		Envirothon	Annual - Spring	$250	Conservation Districts, Tuttle Creek Watershed WRAPS
Education of Adults	Educators, Adult Education	Extension newsletter article	Annual - Ongoing	$0 No charge	Conservation Districts, Tuttle
		Presentation at annual meeting	Annual – Winter	$0 No charge	Conservation Districts, Tuttle Creek Watershed WRAPS
		Media campaign to promote forestry practices (brochures, news releases, TV, radio, web-based)	Bi-annual - Ongoing	$500 per campaign	Kansas Forest Service, Tuttle Creek Watershed WRAPS
Education of Watershed Residents	Watershed Residents	Media campaign to address urban nutrient runoff (flyers or handouts addressing phosphate and nitrate pollution from urban areas)	Annual - Ongoing	$500 per campaign	Local Environmental Protection Program, Tuttle Creek Watershed WRAPS
Total annual cost for Information and Education if all events are implemented				**$32,000**	

B. Evaluation of Information and Education Activities

All service providers conducting I&E activities funded through the Tuttle Creek WRAPS will be required to include an evaluation component in their project implementation proposals. Evaluation methods will vary based on the 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.

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 or activity, development of a basic logic model identifying long-term, medium-term, and short-term behavior changes or other expected outcomes 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, usefulness of information, etc.
- Pre- and post-surveys to determine the amount of knowledge gained, anticipated behavior changes, need for further learning, etc.
- Follow-up interviews (e.g., one-on-one contacts, phone calls, or e-mails) with selected participants to gather more in-depth input regarding the effectiveness of the I&E activity.

9. Cost of Implementing BMPs and Possible Funding Sources

The SLT has reviewed all the recommended BMPs listed in this WRAPS plan for each individual impairment. The SLT has determined which BMPs will receive implementation funding in each category (cropland, livestock, streambank, and herbicides). An added benefit is that most of the targeted BMPs will be advantageous to more than one impairment. Below are expenses before and after cost share for implementing cropland, livestock, streambank and herbicide BMPs. Cost derivations are located in the appendix.

A. Cropland BMP Implementation Costs

1. Big Blue Targeted Area

Table 50. Costs: Big Blue Targeted Area cropland BMPs before cost share

Big Blue Targeted Area Total Annual Cost* Before Cost-Share with Inflation, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Permanent Vegetation**	**Subsurface Fertilizer Application**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$87,526	$144,206	$45,290	$64,217	$112,661	$33,798	$6,084	$56,330	$45,064	$595,175
2	$90,152	$148,532	$46,648	$66,143	$116,040	$34,812	$6,266	$58,020	$46,416	$613,030
3	$92,856	$152,988	$48,048	$68,127	$119,522	$35,856	$6,454	$59,761	$47,809	$631,421
4	$95,642	$157,577	$49,489	$70,171	$123,107	$36,932	$6,648	$61,554	$49,243	$650,364
5	$98,511	$162,305	$50,974	$72,276	$126,801	$38,040	$6,847	$63,400	$50,720	$669,874
6	$101,467	$167,174	$52,503	$74,445	$130,605	$39,181	$7,053	$65,302	$52,242	$689,971
7	$104,511	$172,189	$54,078	$76,678	$134,523	$40,357	$7,264	$67,261	$53,809	$710,670
8	$107,646	$177,355	$55,700	$78,978	$138,558	$41,568	$7,482	$69,279	$55,423	$731,990
9	$110,875	$182,675	$57,371	$81,348	$142,715	$42,815	$7,707	$71,358	$57,086	$753,950
10	$114,202	$188,156	$59,093	$83,788	$146,997	$44,099	$7,938	$73,498	$58,799	$776,568
11	$117,628	$193,800	$60,865	$86,302	$151,406	$45,422	$8,176	$75,703	$60,563	$799,865
12	$121,157	$199,614	$62,691	$88,891	$155,949	$46,785	$8,421	$77,974	$62,379	$823,861
13	$124,791	$205,603	$64,572	$91,557	$160,627	$48,188	$8,674	$80,314	$64,251	$848,577
14	$128,535	$211,771	$66,509	$94,304	$165,446	$49,634	$8,934	$82,723	$66,178	$874,034
15	$132,391	$218,124	$68,505	$97,133	$170,409	$51,123	$9,202	$85,205	$68,164	$900,255
16	$136,363	$224,668	$70,560	$100,047	$175,522	$52,656	$9,478	$87,761	$70,209	$927,263
17	$140,454	$231,408	$72,676	$103,049	$180,787	$54,236	$9,763	$90,394	$72,315	$955,081
18	$144,667	$238,350	$74,857	$106,140	$186,211	$55,863	$10,055	$93,105	$74,484	$983,733
19	$149,007	$245,500	$77,102	$109,324	$191,797	$57,539	$10,357	$95,899	$76,719	$1,013,245
20	$153,477	$252,865	$79,416	$112,604	$197,551	$59,265	$10,668	$98,776	$79,020	$1,043,643
21	$158,082	$260,451	$81,798	$115,982	$203,478	$61,043	$10,988	$101,739	$81,391	$1,074,952
22	$162,824	$268,265	$84,252	$119,462	$209,582	$62,875	$11,317	$104,791	$83,833	$1,107,200
23	$167,709	$276,313	$86,780	$123,046	$215,869	$64,761	$11,657	$107,935	$86,348	$1,140,416
24	$172,740	$284,602	$89,383	$126,737	$222,345	$66,704	$12,007	$111,173	$88,938	$1,174,629
25	$177,922	$293,140	$92,064	$130,539	$229,016	$68,705	$12,367	$114,508	$91,606	$1,209,868
26	$183,260	$301,935	$94,826	$134,455	$235,886	$70,766	$12,738	$117,943	$94,355	$1,246,164
27	$188,758	$310,993	$97,671	$138,489	$242,963	$72,889	$13,120	$121,481	$97,185	$1,283,549
28	$194,421	$320,322	$100,601	$142,644	$250,252	$75,076	$13,514	$125,126	$100,101	$1,322,055
29	$200,253	$329,932	$103,619	$146,923	$257,759	$77,328	$13,919	$128,880	$103,104	$1,361,717
30	$206,261	$339,830	$106,728	$151,331	$265,492	$79,648	$14,337	$132,746	$106,197	$1,402,568
31	$212,449	$350,025	$109,930	$155,870	$273,457	$82,037	$14,767	$136,728	$109,383	$1,444,645
32	$218,822	$360,526	$113,228	$160,547	$281,661	$84,498	$15,210	$140,830	$112,664	$1,487,985
33	$225,387	$371,341	$116,624	$165,363	$290,110	$87,033	$15,666	$145,055	$116,044	$1,532,624
34	$232,148	$382,482	$120,123	$170,324	$298,814	$89,644	$16,136	$149,407	$119,525	$1,578,603
35	$239,113	$393,956	$123,727	$175,434	$307,778	$92,333	$16,620	$153,889	$123,111	$1,625,961
36	$246,286	$405,775	$127,439	$180,697	$317,012	$95,103	$17,119	$158,506	$126,805	$1,674,740
37	$253,675	$417,948	$131,262	$186,117	$326,522	$97,957	$17,632	$163,261	$130,609	$1,724,982
38	$261,285	$430,486	$135,200	$191,701	$336,318	$100,895	$18,161	$168,159	$134,527	$1,776,732
39	$269,124	$443,401	$139,256	$197,452	$346,407	$103,922	$18,706	$173,204	$138,563	$1,830,034
40	$277,197	$456,703	$143,433	$203,376	$356,799	$107,040	$19,267	$178,400	$142,720	$1,884,935
***3% Inflation**									**Total**	**$44,281,756**

Table 51. Costs: Big Blue Targeted Area cropland BMPs after cost share

Big Blue Targeted Area Total Annual Cost* After Cost-Share with Inflation, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Permanent Vegetation**	**Subsurface Fertilizer Application**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$53,391	$72,103	$4,529	$32,108	$56,330	$16,899	$6,084	$28,165	$18,026	$287,635
2	$54,993	$74,266	$4,665	$33,072	$58,020	$17,406	$6,266	$29,010	$18,566	$296,264
3	$56,642	$76,494	$4,805	$34,064	$59,761	$17,928	$6,454	$29,880	$19,123	$305,152
4	$58,342	$78,789	$4,949	$35,086	$61,554	$18,466	$6,648	$30,777	$19,697	$314,306
5	$60,092	$81,152	$5,097	$36,138	$63,400	$19,020	$6,847	$31,700	$20,288	$323,736
6	$61,895	$83,587	$5,250	$37,222	$65,302	$19,591	$7,053	$32,651	$20,897	$333,448
7	$63,752	$86,095	$5,408	$38,339	$67,261	$20,178	$7,264	$33,631	$21,524	$343,451
8	$65,664	$88,677	$5,570	$39,489	$69,279	$20,784	$7,482	$34,640	$22,169	$353,755
9	$67,634	$91,338	$5,737	$40,674	$71,358	$21,407	$7,707	$35,679	$22,834	$364,367
10	$69,663	$94,078	$5,909	$41,894	$73,498	$22,049	$7,938	$36,749	$23,519	$375,298
11	$71,753	$96,900	$6,087	$43,151	$75,703	$22,711	$8,176	$37,852	$24,225	$386,557
12	$73,905	$99,807	$6,269	$44,445	$77,974	$23,392	$8,421	$38,987	$24,952	$398,154
13	$76,123	$102,801	$6,457	$45,779	$80,314	$24,094	$8,674	$40,157	$25,700	$410,099
14	$78,406	$105,885	$6,651	$47,152	$82,723	$24,817	$8,934	$41,361	$26,471	$422,401
15	$80,759	$109,062	$6,850	$48,567	$85,205	$25,561	$9,202	$42,602	$27,265	$435,074
16	$83,181	$112,334	$7,056	$50,024	$87,761	$26,328	$9,478	$43,880	$28,083	$448,126
17	$85,677	$115,704	$7,268	$51,524	$90,394	$27,118	$9,763	$45,197	$28,926	$461,570
18	$88,247	$119,175	$7,486	$53,070	$93,105	$27,932	$10,055	$46,553	$29,794	$475,417
19	$90,894	$122,750	$7,710	$54,662	$95,899	$28,770	$10,357	$47,949	$30,688	$489,679
20	$93,621	$126,433	$7,942	$56,302	$98,776	$29,633	$10,668	$49,388	$31,608	$504,369
21	$96,430	$130,226	$8,180	$57,991	$101,739	$30,522	$10,988	$50,869	$32,556	$519,501
22	$99,323	$134,132	$8,425	$59,731	$104,791	$31,437	$11,317	$52,395	$33,533	$535,086
23	$102,302	$138,156	$8,678	$61,523	$107,935	$32,380	$11,657	$53,967	$34,539	$551,138
24	$105,372	$142,301	$8,938	$63,368	$111,173	$33,352	$12,007	$55,586	$35,575	$567,672
25	$108,533	$146,570	$9,206	$65,270	$114,508	$34,352	$12,367	$57,254	$36,643	$584,702
26	$111,789	$150,967	$9,483	$67,228	$117,943	$35,383	$12,738	$58,972	$37,742	$602,244
27	$115,142	$155,496	$9,767	$69,244	$121,481	$36,444	$13,120	$60,741	$38,874	$620,311
28	$118,597	$160,161	$10,060	$71,322	$125,126	$37,538	$13,514	$62,563	$40,040	$638,920
29	$122,154	$164,966	$10,362	$73,461	$128,880	$38,664	$13,919	$64,440	$41,241	$658,088
30	$125,819	$169,915	$10,673	$75,665	$132,746	$39,824	$14,337	$66,373	$42,479	$677,830
31	$129,594	$175,012	$10,993	$77,935	$136,728	$41,019	$14,767	$68,364	$43,753	$698,165
32	$133,482	$180,263	$11,323	$80,273	$140,830	$42,249	$15,210	$70,415	$45,066	$719,110
33	$137,486	$185,671	$11,662	$82,681	$145,055	$43,517	$15,666	$72,528	$46,418	$740,684
34	$141,611	$191,241	$12,012	$85,162	$149,407	$44,822	$16,136	$74,703	$47,810	$762,904
35	$145,859	$196,978	$12,373	$87,717	$153,889	$46,167	$16,620	$76,945	$49,245	$785,791
36	$150,235	$202,887	$12,744	$90,348	$158,506	$47,552	$17,119	$79,253	$50,722	$809,365
37	$154,742	$208,974	$13,126	$93,059	$163,261	$48,978	$17,632	$81,630	$52,243	$833,646
38	$159,384	$215,243	$13,520	$95,850	$168,159	$50,448	$18,161	$84,079	$53,811	$858,655
39	$164,165	$221,700	$13,926	$98,726	$173,204	$51,961	$18,706	$86,602	$55,425	$884,415
40	$169,090	$228,352	$14,343	$101,688	$178,400	$53,520	$19,267	$89,200	$57,088	$910,947
3% Inflation									**Total**	**$21,688,030**

2. Little Blue Targeted Area

Table 52. Costs: Little Blue Targeted Area cropland BMPs before cost share

Little Blue Targeted Area Total Annual Cost* Before Cost-Share, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Permanent Vegetation**	**Subsurface Fertilizer Application**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$31,360	$51,668	$16,227	$23,008	$40,366	$12,110	$2,180	$20,183	$16,146	$213,248
2	$32,301	$53,218	$16,714	$23,699	$41,577	$12,473	$2,245	$20,788	$16,631	$219,645
3	$33,270	$54,815	$17,215	$24,410	$42,824	$12,847	$2,312	$21,412	$17,130	$226,234
4	$34,268	$56,459	$17,732	$25,142	$44,109	$13,233	$2,382	$22,054	$17,643	$233,021
5	$35,296	$58,153	$18,264	$25,896	$45,432	$13,630	$2,453	$22,716	$18,173	$240,012
6	$36,355	$59,897	$18,812	$26,673	$46,795	$14,038	$2,527	$23,397	$18,718	$247,212
7	$37,446	$61,694	$19,376	$27,473	$48,199	$14,460	$2,603	$24,099	$19,279	$254,629
8	$38,569	$63,545	$19,957	$28,297	$49,645	$14,893	$2,681	$24,822	$19,858	$262,268
9	$39,726	$65,451	$20,556	$29,146	$51,134	$15,340	$2,761	$25,567	$20,454	$270,136
10	$40,918	$67,415	$21,173	$30,021	$52,668	$15,800	$2,844	$26,334	$21,067	$278,240
11	$42,145	$69,437	$21,808	$30,921	$54,248	$16,274	$2,929	$27,124	$21,699	$286,587
12	$43,410	$71,521	$22,462	$31,849	$55,875	$16,763	$3,017	$27,938	$22,350	$295,184
13	$44,712	$73,666	$23,136	$32,804	$57,552	$17,266	$3,108	$28,776	$23,021	$304,040
14	$46,053	$75,876	$23,830	$33,789	$59,278	$17,783	$3,201	$29,639	$23,711	$313,161
15	$47,435	$78,152	$24,545	$34,802	$61,057	$18,317	$3,297	$30,528	$24,423	$322,556
16	$48,858	$80,497	$25,281	$35,846	$62,888	$18,866	$3,396	$31,444	$25,155	$332,233
17	$50,324	$82,912	$26,040	$36,922	$64,775	$19,432	$3,498	$32,387	$25,910	$342,200
18	$51,833	$85,399	$26,821	$38,029	$66,718	$20,015	$3,603	$33,359	$26,687	$352,466
19	$53,388	$87,961	$27,625	$39,170	$68,720	$20,616	$3,711	$34,360	$27,488	$363,040
20	$54,990	$90,600	$28,454	$40,345	$70,781	$21,234	$3,822	$35,391	$28,313	$373,931
21	$56,640	$93,318	$29,308	$41,556	$72,905	$21,871	$3,937	$36,452	$29,162	$385,149
22	$58,339	$96,118	$30,187	$42,802	$75,092	$22,528	$4,055	$37,546	$30,037	$396,703
23	$60,089	$99,001	$31,093	$44,086	$77,345	$23,203	$4,177	$38,672	$30,938	$408,604
24	$61,892	$101,971	$32,025	$45,409	$79,665	$23,900	$4,302	$39,833	$31,866	$420,863
25	$63,749	$105,030	$32,986	$46,771	$82,055	$24,617	$4,431	$41,028	$32,822	$433,488
26	$65,661	$108,181	$33,976	$48,174	$84,517	$25,355	$4,564	$42,258	$33,807	$446,493
27	$67,631	$111,427	$34,995	$49,620	$87,052	$26,116	$4,701	$43,526	$34,821	$459,888
28	$69,660	$114,770	$36,045	$51,108	$89,664	$26,899	$4,842	$44,832	$35,865	$473,684
29	$71,750	$118,213	$37,126	$52,642	$92,354	$27,706	$4,987	$46,177	$36,941	$487,895
30	$73,902	$121,759	$38,240	$54,221	$95,124	$28,537	$5,137	$47,562	$38,050	$502,532
31	$76,119	$125,412	$39,387	$55,847	$97,978	$29,393	$5,291	$48,989	$39,191	$517,608
32	$78,403	$129,174	$40,569	$57,523	$100,917	$30,275	$5,450	$50,459	$40,367	$533,136
33	$80,755	$133,049	$41,786	$59,249	$103,945	$31,183	$5,613	$51,972	$41,578	$549,130
34	$83,177	$137,041	$43,039	$61,026	$107,063	$32,119	$5,781	$53,532	$42,825	$565,604
35	$85,673	$141,152	$44,331	$62,857	$110,275	$33,083	$5,955	$55,138	$44,110	$582,572
36	$88,243	$145,387	$45,660	$64,742	$113,583	$34,075	$6,133	$56,792	$45,433	$600,049
37	$90,890	$149,748	$47,030	$66,685	$116,991	$35,097	$6,318	$58,495	$46,796	$618,051
38	$93,617	$154,241	$48,441	$68,685	$120,501	$36,150	$6,507	$60,250	$48,200	$636,592
39	$96,425	$158,868	$49,894	$70,746	$124,116	$37,235	$6,702	$62,058	$49,646	$655,690
40	$99,318	$163,634	$51,391	$72,868	$127,839	$38,352	$6,903	$63,920	$51,136	$675,361
***3% Inflation**									**Total**	**$16,079,135**

Table 53. Costs: Little Blue Targeted Area cropland BMPs after cost share

Little Blue Targeted Area Total Annual Cost* After Cost-Share, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Permanent Vegetation**	**Subsurface Fertilizer Application**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$19,130	$25,834	$1,623	$11,504	$20,183	$6,055	$2,180	$10,091	$6,459	$103,058
2	$19,704	$26,609	$1,671	$11,849	$20,788	$6,236	$2,245	$10,394	$6,652	$106,150
3	$20,295	$27,407	$1,722	$12,205	$21,412	$6,424	$2,312	$10,706	$6,852	$109,334
4	$20,903	$28,230	$1,773	$12,571	$22,054	$6,616	$2,382	$11,027	$7,057	$112,614
5	$21,531	$29,076	$1,826	$12,948	$22,716	$6,815	$2,453	$11,358	$7,269	$115,993
6	$22,176	$29,949	$1,881	$13,337	$23,397	$7,019	$2,527	$11,699	$7,487	$119,472
7	$22,842	$30,847	$1,938	$13,737	$24,099	$7,230	$2,603	$12,050	$7,712	$123,056
8	$23,527	$31,773	$1,996	$14,149	$24,822	$7,447	$2,681	$12,411	$7,943	$126,748
9	$24,233	$32,726	$2,056	$14,573	$25,567	$7,670	$2,761	$12,783	$8,181	$130,551
10	$24,960	$33,708	$2,117	$15,010	$26,334	$7,900	$2,844	$13,167	$8,427	$134,467
11	$25,709	$34,719	$2,181	$15,461	$27,124	$8,137	$2,929	$13,562	$8,680	$138,501
12	$26,480	$35,760	$2,246	$15,925	$27,938	$8,381	$3,017	$13,969	$8,940	$142,656
13	$27,274	$36,833	$2,314	$16,402	$28,776	$8,633	$3,108	$14,388	$9,208	$146,936
14	$28,093	$37,938	$2,383	$16,894	$29,639	$8,892	$3,201	$14,820	$9,485	$151,344
15	$28,935	$39,076	$2,454	$17,401	$30,528	$9,158	$3,297	$15,264	$9,769	$155,884
16	$29,803	$40,249	$2,528	$17,923	$31,444	$9,433	$3,396	$15,722	$10,062	$160,561
17	$30,697	$41,456	$2,604	$18,461	$32,387	$9,716	$3,498	$16,194	$10,364	$165,378
18	$31,618	$42,700	$2,682	$19,015	$33,359	$10,008	$3,603	$16,680	$10,675	$170,339
19	$32,567	$43,981	$2,763	$19,585	$34,360	$10,308	$3,711	$17,180	$10,995	$175,449
20	$33,544	$45,300	$2,845	$20,173	$35,391	$10,617	$3,822	$17,695	$11,325	$180,713
21	$34,550	$46,659	$2,931	$20,778	$36,452	$10,936	$3,937	$18,226	$11,665	$186,134
22	$35,587	$48,059	$3,019	$21,401	$37,546	$11,264	$4,055	$18,773	$12,015	$191,718
23	$36,654	$49,501	$3,109	$22,043	$38,672	$11,602	$4,177	$19,336	$12,375	$197,469
24	$37,754	$50,986	$3,203	$22,705	$39,833	$11,950	$4,302	$19,916	$12,746	$203,394
25	$38,887	$52,515	$3,299	$23,386	$41,028	$12,308	$4,431	$20,514	$13,129	$209,495
26	$40,053	$54,091	$3,398	$24,087	$42,258	$12,677	$4,564	$21,129	$13,523	$215,780
27	$41,255	$55,713	$3,499	$24,810	$43,526	$13,058	$4,701	$21,763	$13,928	$222,254
28	$42,492	$57,385	$3,604	$25,554	$44,832	$13,450	$4,842	$22,416	$14,346	$228,921
29	$43,767	$59,106	$3,713	$26,321	$46,177	$13,853	$4,987	$23,088	$14,777	$235,789
30	$45,080	$60,880	$3,824	$27,110	$47,562	$14,269	$5,137	$23,781	$15,220	$242,863
31	$46,433	$62,706	$3,939	$27,924	$48,989	$14,697	$5,291	$24,494	$15,676	$250,148
32	$47,826	$64,587	$4,057	$28,761	$50,459	$15,138	$5,450	$25,229	$16,147	$257,653
33	$49,260	$66,525	$4,179	$29,624	$51,972	$15,592	$5,613	$25,986	$16,631	$265,382
34	$50,738	$68,520	$4,304	$30,513	$53,532	$16,059	$5,781	$26,766	$17,130	$273,344
35	$52,260	$70,576	$4,433	$31,428	$55,138	$16,541	$5,955	$27,569	$17,644	$281,544
36	$53,828	$72,693	$4,566	$32,371	$56,792	$17,037	$6,133	$28,396	$18,173	$289,991
37	$55,443	$74,874	$4,703	$33,342	$58,495	$17,549	$6,318	$29,248	$18,719	$298,690
38	$57,106	$77,120	$4,844	$34,343	$60,250	$18,075	$6,507	$30,125	$19,280	$307,651
39	$58,819	$79,434	$4,989	$35,373	$62,058	$18,617	$6,702	$31,029	$19,858	$316,881
40	$60,584	$81,817	$5,139	$36,434	$63,920	$19,176	$6,903	$31,960	$20,454	$326,387
3% Inflation									**Total**	**$7,770,691**

B. Livestock BMP implementation costs

Table 54. Costs: Targeted livestock area BMPs before cost share

Annual Cost of Implementing Livestock BMPs before Cost-Share *								
Year	Vegetative Filter Strip	Relocated Feedlot	Relocate Pasture Feeding		Off-Stream Watering System			Annual Cost
			Native	Cool Season	Native	Cool Season	Cropland	
1	$714		$4,406		$7,590		$3,795	**$16,505**
2	$735	$6,820	$4,538	$2,269	$7,818	$3,909	$3,909	**$29,998**
3	$757		$4,674		$8,052		$4,026	**$17,510**
4	$780	$7,235	$4,815	$2,407	$8,294	$4,147	$4,147	**$31,825**
5	$804		$4,959		$8,543		$4,271	**$18,577**
6	$828	$7,676	$2,554	$2,554	$4,399	$4,399	$4,399	**$26,809**
7	$853		$2,630		$4,531		$4,531	**$12,546**
8	$878	$8,143	$2,709	$2,709	$4,667	$4,667	$4,667	**$28,442**
9	$904		$2,791		$4,807		$4,807	**$13,310**
10	$932	$8,639	$2,874	$2,874	$4,952	$4,952	$4,952	**$30,174**
11	$960		$2,961		$5,100		$5,100	**$14,121**
12	$988	$9,165	$3,049	$3,049	$5,253	$5,253	$5,253	**$32,012**
13	$1,018		$3,141		$5,411		$5,411	**$14,980**
14	$1,049	$9,723	$3,235	$3,235	$5,573	$5,573	$5,573	**$33,961**
15	$1,080		$3,332		$5,740		$5,740	**$15,893**
16	$1,112	$10,315	$3,432	$3,432	$5,912	$5,912	$5,912	**$36,030**
17	$1,146		$3,535		$6,090		$6,090	**$16,861**
18	$1,180	$10,944	$3,641	$3,641	$6,273	$6,273	$6,273	**$38,224**
19	$1,216		$3,750		$6,461		$6,461	**$17,887**
20	$1,252	$11,610	$3,863	$3,863	$6,655	$6,655	$6,655	**$40,552**
21	$1,290		$3,979		$6,854		$6,854	**$18,977**
22	$1,328	$12,317	$4,098	$4,098	$7,060	$7,060	$7,060	**$43,021**
23	$1,368		$4,221		$7,272		$7,272	**$20,132**
24	$1,409	$13,067	$4,348	$4,348	$7,490	$7,490	$7,490	**$45,641**
25	$1,451		$4,478		$7,714		$7,714	**$21,359**
26	$1,495	$13,863	$4,613	$4,613	$7,946	$7,946	$7,946	**$48,421**
27	$1,540		$4,751		$8,184		$8,184	**$22,659**
28	$1,586	$14,707	$4,893	$4,893	$8,430	$8,430	$8,430	**$51,370**
29	$1,634		$5,040		$8,683		$8,683	**$24,039**
30	$1,683	$15,603	$5,192	$5,192	$8,943	$8,943	$8,943	**$54,498**
31	$1,733		$5,347		$9,211		$9,211	**$25,503**
32	$1,785	$16,553	$5,508	$5,508	$9,488	$9,488	$9,488	**$57,817**
33	$1,839		$5,673		$9,772		$9,772	**$27,056**
34	$1,894	$17,561	$5,843	$5,843	$10,066	$10,066	$10,066	**$61,338**
35	$1,951		$6,018		$10,368		$10,368	**$28,704**
36	$2,009	$18,631	$6,199	$6,199	$10,679	$10,679	$10,679	**$65,073**
37	$2,069		$6,385		$10,999		$10,999	**$30,452**
38	$2,131	$19,765	$6,576	$6,576	$11,329	$11,329	$11,329	**$69,036**
39	$2,195		$6,774		$11,669		$11,669	**$32,307**
40	$2,261	$20,969	$6,977	$6,977	$12,019	$12,019	$12,019	**$73,241**
**** 3% inflation***							**Total**	**$1,306,860**

Table 55. Costs: Targeted livestock area BMPs after EQIP cost share

Annual Cost of Implementing Livestock BMPs with 50% EQIP Cost-Share *								
Year	Vegetative Filter Strip	Relocated Feedlot	Relocate Pasture Feeding		Off-Stream Watering System			Annual Cost
			Native	Cool Season	Native	Cool Season	Cropland	
1	$357		$2,203		$3,795		$1,898	**$8,253**
2	$368	$3,410	$2,269	$1,135	$3,909	$1,954	$1,954	**$14,999**
3	$379		$2,337		$4,026		$2,013	**$8,755**
4	$390	$3,617	$2,407	$1,204	$4,147	$2,073	$2,073	**$15,912**
5	$402		$2,479		$4,271		$2,136	**$9,288**
6	$414	$3,838	$1,277	$1,277	$2,200	$2,200	$2,200	**$13,405**
7	$426		$1,315		$2,266		$2,266	**$6,273**
8	$439	$4,071	$1,355	$1,355	$2,334	$2,334	$2,334	**$14,221**
9	$452		$1,395		$2,404		$2,404	**$6,655**
10	$466	$4,319	$1,437	$1,437	$2,476	$2,476	$2,476	**$15,087**
11	$480		$1,480		$2,550		$2,550	**$7,060**
12	$494	$4,583	$1,525	$1,525	$2,627	$2,627	$2,627	**$16,006**
13	$509		$1,570		$2,705		$2,705	**$7,490**
14	$524	$4,862	$1,618	$1,618	$2,787	$2,787	$2,787	**$16,981**
15	$540		$1,666		$2,870		$2,870	**$7,946**
16	$556	$5,158	$1,716	$1,716	$2,956	$2,956	$2,956	**$18,015**
17	$573		$1,768		$3,045		$3,045	**$8,430**
18	$590	$5,472	$1,821	$1,821	$3,136	$3,136	$3,136	**$19,112**
19	$608		$1,875		$3,230		$3,230	**$8,944**
20	$626	$5,805	$1,931	$1,931	$3,327	$3,327	$3,327	**$20,276**
21	$645		$1,989		$3,427		$3,427	**$9,488**
22	$664	$6,159	$2,049	$2,049	$3,530	$3,530	$3,530	**$21,511**
23	$684		$2,111		$3,636		$3,636	**$10,066**
24	$705	$6,534	$2,174	$2,174	$3,745	$3,745	$3,745	**$22,821**
25	$726		$2,239		$3,857		$3,857	**$10,679**
26	$747	$6,931	$2,306	$2,306	$3,973	$3,973	$3,973	**$24,210**
27	$770		$2,375		$4,092		$4,092	**$11,330**
28	$793	$7,354	$2,447	$2,447	$4,215	$4,215	$4,215	**$25,685**
29	$817		$2,520		$4,341		$4,341	**$12,020**
30	$841	$7,801	$2,596	$2,596	$4,472	$4,472	$4,472	**$27,249**
31	$867		$2,674		$4,606		$4,606	**$12,752**
32	$893	$8,277	$2,754	$2,754	$4,744	$4,744	$4,744	**$28,908**
33	$919		$2,836		$4,886		$4,886	**$13,528**
34	$947	$8,781	$2,922	$2,922	$5,033	$5,033	$5,033	**$30,669**
35	$975		$3,009		$5,184		$5,184	**$14,352**
36	$1,005	$9,315	$3,099	$3,099	$5,339	$5,339	$5,339	**$32,537**
37	$1,035		$3,192		$5,499		$5,499	**$15,226**
38	$1,066	$9,883	$3,288	$3,288	$5,664	$5,664	$5,664	**$34,518**
39	$1,098		$3,387		$5,834		$5,834	**$16,153**
40	$1,131	$10,484	$3,488	$3,488	$6,009	$6,009	$6,009	**$36,620**
**** 3% inflation***							**Total**	**$653,430**

C. Streambank BMP implementation costs

Table 56. Costs: Streambank targeted area

Streambank Costs		
Year	**Streambank Stabilization (feet)**	**Cost***
1	4,750	458,755
2	4,750	472,518
3	4,750	486,693
4	4,750	501,294
5	4,750	516,333
6	4,750	531,823
7	4,750	547,777
8	4,750	564,211
9	4,750	581,137
10	4,750	598,571
11	4,750	616,528
12	4,750	635,024
13	4,750	654,075
14	4,750	673,697
15	4,750	693,908
16	4,750	714,725
17	4,750	736,167
18	4,750	758,252
19	4,750	781,000
20	4,750	804,430
21	4,750	828,563
22	4,750	853,419
23	4,750	879,022
24	4,750	905,393
25	4,750	932,554
26	4,750	960,531
27	4,750	989,347
28	4,750	1,019,027
29	4,750	1,049,598
30	4,750	1,081,086
31	4,750	1,113,519
32	4,750	1,146,924
33	4,750	1,181,332
34	4,750	1,216,772
35	4,750	1,253,275
36	4,750	1,290,873
37	4,750	1,329,600
38	4,750	1,369,488
39	4,750	1,410,572
40	4,750	1,452,889
3% inflation	**Total**	**34,590,705**

D. Herbicide BMP implementation costs

Table 57. Costs: Cropland herbicide BMPs

Annual Herbicide Load Reductions *						
Year	**Use Alternative Herbicide**	**Vegetative Buffers**	**Split Application**	**Early Application**	**Reduced Soil Applied Rate**	**Total Annual Reduction**
1	$9,244	$0	$15,406	$15,406	$2,773	**$42,830**
2	$9,244	$0	$15,406	$15,406	$2,773	**$44,114**
3	$9,244	$0	$15,406	$15,406	$2,773	**$45,438**
4	$9,244	$0	$15,406	$15,406	$2,773	**$46,801**
5	$9,244	$0	$15,406	$15,406	$2,773	**$48,205**
6	$9,244	$0	$15,406	$15,406	$2,773	**$49,651**
7	$9,244	$0	$15,406	$15,406	$2,773	**$51,141**
8	$9,244	$0	$15,406	$15,406	$2,773	**$52,675**
9	$9,244	$0	$15,406	$15,406	$2,773	**$54,255**
10	$9,244	$0	$15,406	$15,406	$2,773	**$55,883**
11	$9,244	$0	$15,406	$15,406	$2,773	**$57,559**
12	$9,244	$0	$15,406	$15,406	$2,773	**$59,286**
13	$9,244	$0	$15,406	$15,406	$2,773	**$61,065**
14	$9,244	$0	$15,406	$15,406	$2,773	**$62,897**
15	$9,244	$0	$15,406	$15,406	$2,773	**$64,784**
16	$9,244	$0	$15,406	$15,406	$2,773	**$66,727**
17	$9,244	$0	$15,406	$15,406	$2,773	**$68,729**
18	$9,244	$0	$15,406	$15,406	$2,773	**$70,791**
19	$9,244	$0	$15,406	$15,406	$2,773	**$72,915**
20	$9,244	$0	$15,406	$15,406	$2,773	**$75,102**
21	$9,244	$0	$15,406	$15,406	$2,773	**$77,355**
22	$9,244	$0	$15,406	$15,406	$2,773	**$79,676**
23	$9,244	$0	$15,406	$15,406	$2,773	**$82,066**
24	$9,244	$0	$15,406	$15,406	$2,773	**$84,528**
25	$9,244	$0	$15,406	$15,406	$2,773	**$87,064**
26	$9,244	$0	$15,406	$15,406	$2,773	**$89,676**
27	$9,244	$0	$15,406	$15,406	$2,773	**$92,366**
28	$9,244	$0	$15,406	$15,406	$2,773	**$95,137**
29	$9,244	$0	$15,406	$15,406	$2,773	**$97,991**
30	$9,244	$0	$15,406	$15,406	$2,773	**$100,931**
31	$9,244	$0	$15,406	$15,406	$2,773	**$103,959**
32	$9,244	$0	$15,406	$15,406	$2,773	**$107,077**
33	$9,244	$0	$15,406	$15,406	$2,773	**$110,290**
34	$9,244	$0	$15,406	$15,406	$2,773	**$113,598**
35	$9,244	$0	$15,406	$15,406	$2,773	**$117,006**
36	$9,244	$0	$15,406	$15,406	$2,773	**$120,517**
37	$9,244	$0	$15,406	$15,406	$2,773	**$124,132**
38	$9,244	$0	$15,406	$15,406	$2,773	**$127,856**
39	$9,244	$0	$15,406	$15,406	$2,773	**$131,692**
40	$9,244	$0	$15,406	$15,406	$2,773	**$135,642**
**** 3% inflation***					**Total**	**$3,229,405**

E. Technical assistance for BMP implementation costs

Table 58. Technical assistance required for BMP implementation

Technical Assistance to Aid in BMP Implementation			
BMPs To Be Implemented		**Technical Assistance**	**Projected Annual Cost**
Cropland	No-till cultivation	WRAPS Coordinator Watershed Specialist	$50,000 $45,000
	Nutrient management plans		
	Establish grassed waterways		
	Build new and revamp old terraces		
	Utilize cover crops		
	Establish buffer strips along crop fields		
	Water retention structures		
	Establish permanent vegetation		
	Implement subsurface fertilizer application		
	Use alternative herbicides (no alachlor/atrazine)		
	Split application		
	Early application (prior to April 15th)		
	Reduced soil applied rate		
Livestock	Establish vegetative filter strips along creeks		
	Relocate small feedlots away from streams		
	Relocate pasture feeding sites away from streams		
	Promote alternative watering sites away from streams		
Streambank	Stabilization: buffers, borders, restoration		
		Total	**$95,000**

F. Total costs for BMP implementation

Table 59. Total Annual Cost for BMP Implementation

Total Annual WRAPS Cost with Cost-Share* by Targeted Area								
Year	**Big Blue**	**Little Blue**	**Livestock**	**Streambank**	**Herbicides**	**I&E**	**TA**	**Total Annual Cost**
1	$287,635	$103,058	$8,253	$458,755	$42,830	$32,000	$95,000	$1,027,530
2	$296,264	$106,150	$14,999	$472,518	$44,114	$32,960	$97,850	$1,064,854
3	$305,152	$109,334	$8,755	$486,693	$45,438	$33,949	$100,786	$1,090,106
4	$314,306	$112,614	$15,912	$501,294	$46,801	$34,967	$103,809	$1,129,704
5	$323,736	$115,993	$9,288	$516,333	$48,205	$36,016	$106,923	$1,156,494
6	$333,448	$119,472	$13,405	$531,823	$49,651	$37,097	$110,131	$1,195,026
7	$343,451	$123,056	$6,273	$547,777	$51,141	$38,210	$113,435	$1,223,343
8	$353,755	$126,748	$14,221	$564,211	$52,675	$39,356	$116,838	$1,267,804
9	$364,367	$130,551	$6,655	$581,137	$54,255	$40,537	$120,343	$1,297,845
10	$375,298	$134,467	$15,087	$598,571	$55,883	$41,753	$123,953	$1,345,013
11	$386,557	$138,501	$7,060	$616,528	$57,559	$43,005	$127,672	$1,376,884
12	$398,154	$142,656	$16,006	$635,024	$59,286	$44,295	$131,502	$1,426,924
13	$410,099	$146,936	$7,490	$654,075	$61,065	$45,624	$135,447	$1,460,736
14	$422,401	$151,344	$16,981	$673,697	$62,897	$46,993	$139,511	$1,513,824
15	$435,074	$155,884	$7,946	$693,908	$64,784	$48,403	$143,696	$1,549,695
16	$448,126	$160,561	$18,015	$714,725	$66,727	$49,855	$148,007	$1,606,016
17	$461,570	$165,378	$8,430	$736,167	$68,729	$51,351	$152,447	$1,644,071
18	$475,417	$170,339	$19,112	$758,252	$70,791	$52,891	$157,021	$1,703,822
19	$489,679	$175,449	$8,944	$781,000	$72,915	$54,478	$161,731	$1,744,195
20	$504,369	$180,713	$20,276	$804,430	$75,102	$56,112	$166,583	$1,807,585
21	$519,501	$186,134	$9,488	$828,563	$77,355	$57,796	$171,581	$1,850,417
22	$535,086	$191,718	$21,511	$853,419	$79,676	$59,529	$176,728	$1,917,667
23	$551,138	$197,469	$10,066	$879,022	$82,066	$61,315	$182,030	$1,963,107
24	$567,672	$203,394	$22,821	$905,393	$84,528	$63,155	$187,491	$2,034,452
25	$584,702	$209,495	$10,679	$932,554	$87,064	$65,049	$193,115	$2,082,660
26	$602,244	$215,780	$24,210	$960,531	$89,676	$67,001	$198,909	$2,158,351
27	$620,311	$222,254	$11,330	$989,347	$92,366	$69,011	$204,876	$2,209,494
28	$638,920	$228,921	$25,685	$1,019,027	$95,137	$71,081	$211,022	$2,289,794
29	$658,088	$235,789	$12,020	$1,049,598	$97,991	$73,214	$217,353	$2,344,052
30	$677,830	$242,863	$27,249	$1,081,086	$100,931	$75,410	$223,874	$2,429,243
31	$698,165	$250,148	$12,752	$1,113,519	$103,959	$77,672	$230,590	$2,486,805
32	$719,110	$257,653	$28,908	$1,146,924	$107,077	$80,003	$237,508	$2,577,184
33	$740,684	$265,382	$13,528	$1,181,332	$110,290	$82,403	$244,633	$2,638,252
34	$762,904	$273,344	$30,669	$1,216,772	$113,598	$84,875	$251,972	$2,734,134
35	$785,791	$281,544	$14,352	$1,253,275	$117,006	$87,421	$259,531	$2,798,921
36	$809,365	$289,991	$32,537	$1,290,873	$120,517	$90,044	$267,317	$2,900,643
37	$833,646	$298,690	$15,226	$1,329,600	$124,132	$92,745	$275,336	$2,969,375
38	$858,655	$307,651	$34,518	$1,369,488	$127,856	$95,527	$283,597	$3,077,292
39	$884,415	$316,881	$16,153	$1,410,572	$131,692	$98,393	$292,104	$3,150,210
40	$910,947	$326,387	$36,620	$1,452,889	$135,642	$101,345	$300,868	$3,264,699
3% Inflation							**Total**	**$77,508,222**

G. Potential Funding Sources and Service Providers

1. Funding Sources

Potential funding sources for these BMPs include, but are but not limited to, the following organizations and programs:

Table 60. Potential funding sources for BMP implementation

Potential BMP Funding Sources	
Potential Funding Sources	**Potential Funding Programs**
Natural Resources Conservation Service (NRCS)	Conservation Reserve Program (CRP)
	Environmental Quality Incentives Program (EQIP)
	Farmable Wetlands Program (FWP)
	Forestland Enhancement Program (FLEP)
	Grassland Reserve Program (GRP)
	State Acres for Wildlife Enhancement (SAFE)
	Regional Conservation Partnership Program (RCPP)
	Wetland Reserve Program (WRP)
	Wildlife Habitat Incentive Program (WHIP)
Conservation Districts	
EPA/KDHE	319 Funding Grants
Kansas Alliance for Wetlands and Streams	
Kansas Department of Wildlife and Parks	Partnering for Wildlife
Kansas Forest Service	
Kansas Wildlife Department	Kansas Reservoir Protection Initiative
No-till on the Plains	
State Conservation Commission	
US Fish and Wildlife	

2. Technical Service Providers

Technical Service Providers are often needed to provide assistance and advice to landowners when choosing the most efficient BMP for implementation, especially as some BMPs require additional assistance to implement as they require design work or extra planning. Technical Service Providers also can help producers find alternate funding to aid in BMP implementation. All service providers are responsible for evaluating the installed or implemented BMPs and/or other services provided and will report to SLT for completion approval.

Table 61. Potential service providers for BMP implementation

Services Needed to Implement BMP				
BMP		**Technical Assistance**	**Information and Education**	**Service Provider ****
Cropland	Nutrient Management Plans	Development of management plan	BMP workshops	NRCS, FSA, KRC, DOC, No-Till on the Plains, KFS, KSRE, CD, KDWP
	No-Till Cultivation	Design, cost share and maintenance	BMP workshops, tours, field days	
	Establish Grassed Waterways			
	Build New and Revamp Old Terraces			
	Utilize Cover Crops			
	Establish Buffer Strips along Crop Fields			
	Water Retention Structures			
	Establish Permanent Vegetation			
	Implement Subsurface Fertilizer Application			
	Use Alternative Herbicides (no Alachlor/Atrazine)			
	Vegetative Buffers			
	Split Application			
	Early Application (prior to April 15th)			
	Reduced Soil Applied Rate			
	Implement Subsurface Fertilizer Application			
Livestock	Establish Vegetative Filter Strips along creeks	Design, cost share and maintenance	BMP workshops, field days, tours	KSRE, NRCS, DOC, KRC, KAWS, No-Till on the Plains, CD, KDWP
	Relocate Small Feedlots away from streams			
	Relocate Pasture Feeding Sites away from streams			
	Promote Alternative Watering Sites away from the stream			
Streambank	Riparian Buffers	Design, cost share and maintenance	BMP workshops, field days, tours	KAWS, NRCS, DOC, FSA, KFS, KRC, KSRE, CD, KDWP,
	Field Borders			
	Bottomland timber in wetlands			
	Streambank Stabilization			
***** See Appendix for service provider directory***				

10. Timeframe

The interim timeframe for all BMP implementation is 10 years from the date of publication of this WRAPS plan. The plan will be reviewed every five years, starting in 2020.

Table 62. Tuttle Creek Watershed impairment review schedule

Review Schedule for Pollutants and BMPS					
Review Year	Sediment	Phosphorus	Herbicides	*E. coli*	BMP Placement
2020	X	X	X	X	X
2025			X	X	X
2030	X	X	X	X	X
2035			X	X	X
2040	X	X	X	X	X
2045			X	X	X
2050	X	X	X	X	X

Targeting and BMP implementation might shift over time in order to achieve TMDLs. The present timelines are as follows:

- The timeframe for meeting the **sediment TMDL** is 40 years.
- The timeframe for this WRAPS estimate will not meet the **eutrophication (phosphorus) TMDL**. Phosphorus reduction in the Tuttle Creek Watershed will have to be reduced by 95 percent in order to meet the TMDL. This amount does not include the reductions that must take place in the area of the watershed existing in Nebraska. Future cooperation with Nebraska is needed to achieve phosphorus reductions adequate to meet the TMDL. A Targeted Watershed Grant exists between Kansas and Nebraska at this time and needs to be supported by the WRAPS process. However, this SLT has no authority in BMP implementation in another state at this time. There are two programs that address interstate water quality activity: an EPA Targeted Watershed Grant and the Blue River Compact. Both of these are discussed in Section 2 of this report.
- The timeframe for meeting the **alachlor and atrazine (herbicides) TMDLs** will be 37 years.
- There is no timeframe estimate on ***E. coli* bacteria TMDL** reduction, due to the unavailability of an *E. coli* bacteria model.

11. Measurable Milestones

A. Measurable milestones for BMP implementation

Milestones will be determined by number of acres treated, projects installed, contacts made to residents of the watershed, and water quality parameters at the end of every five years. The SLT will examine these criteria to determine if adequate progress has been made on BMP implementations to date. If they determine that adequate progress has not been made, they will readjust the implementation projects in order to achieve the TMDL by the end of 40 years, as stipulated in this WRAPS plan.

Table 63. Big Blue Targeted Area: Goals for cropland BMP adoption

Big Blue Targeted Area Cropland BMP Adoption Milestones, acres											
	Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Permanent Vegetation**	**Subsurface Fertilizer Application**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
Short Term	1	1,127	901	676	1,127	901	225	225	451	901	6,534
	2	1,127	901	676	1,127	901	225	225	451	901	6,534
	3	1,127	901	676	1,127	901	225	225	451	901	6,534
	4	1,127	901	676	1,127	901	225	225	451	901	6,534
	5	1,127	901	676	1,127	901	225	225	451	901	6,534
	Accumulative sub-Total	*5,633*	*4,506*	*3,380*	*5,633*	*4,506*	*1,127*	*1,127*	*2,253*	*4,505*	*37,177*
	6	1,127	901	676	1,127	901	225	225	451	901	6,534
	7	1,127	901	676	1,127	901	225	225	451	901	6,534
	8	1,127	901	676	1,127	901	225	225	451	901	6,534
	9	1,127	901	676	1,127	901	225	225	451	901	6,534
	10	1,127	901	676	1,127	901	225	225	451	901	6,534
	Accumulative sub-Total	*11,266*	*9,013*	*6,760*	*11,266*	*9,013*	*2,253*	*2,253*	*4,506*	*9,011*	*78,860*
Medium Term	11	1,127	901	676	1,127	901	225	225	451	901	6,534
	12	1,127	901	676	1,127	901	225	225	451	901	6,534
	13	1,127	901	676	1,127	901	225	225	451	901	6,534
	14	1,127	901	676	1,127	901	225	225	451	901	6,534
	15	1,127	901	676	1,127	901	225	225	451	901	6,534
	Accumulative sub-Total	*16,899*	*13,519*	*10,139*	*16,899*	*13,519*	*3,380*	*3,380*	*6,760*	*13,518*	*111,531*
	16	1,127	901	676	1,127	901	225	225	451	901	6,534
	17	1,127	901	676	1,127	901	225	225	451	901	6,534
	18	1,127	901	676	1,127	901	225	225	451	901	6,534
	19	1,127	901	676	1,127	901	225	225	451	901	6,534
	20	1,127	901	676	1,127	901	225	225	451	901	6,534
	Accumulative sub-Total	*22,532*	*18,026*	*13,519*	*22,532*	*18,026*	*4,506*	*4,506*	*9,013*	*18,024*	*144,203*
Long Term	21	1,127	901	676	1,127	901	225	225	451	901	6,534
	22	1,127	901	676	1,127	901	225	225	451	901	6,534
	23	1,127	901	676	1,127	901	225	225	451	901	6,534
	24	1,127	901	676	1,127	901	225	225	451	901	6,534
	25	1,127	901	676	1,127	901	225	225	451	901	6,534
	Accumulative sub-Total	*28,165*	*22,532*	*16,899*	*28,165*	*22,532*	*5,633*	*5,633*	*11,266*	*22,531*	*176,874*
	26	1,127	901	676	1,127	901	225	225	451	901	6,534
	27	1,127	901	676	1,127	901	225	225	451	901	6,534
	28	1,127	901	676	1,127	901	225	225	451	901	6,534
	29	1,127	901	676	1,127	901	225	225	451	901	6,534
	30	1,127	901	676	1,127	901	225	225	451	901	6,534
	Accumulative sub-Total	*33,798*	*27,039*	*20,279*	*33,798*	*27,039*	*6,760*	*6,760*	*13,519*	*27,037*	*209,546*
	31	1,127	901	676	1,127	901	225	225	451	901	6,534
	32	1,127	901	676	1,127	901	225	225	451	901	6,534
	33	1,127	901	676	1,127	901	225	225	451	901	6,534
	34	1,127	901	676	1,127	901	225	225	451	901	6,534
	35	1,127	901	676	1,127	901	225	225	451	901	6,534
	Accumulative sub-Total	*39,431*	*31,545*	*23,659*	*39,431*	*31,545*	*7,886*	*7,886*	*15,772*	*31,544*	*242,217*
	36	1,127	901	676	1,127	901	225	225	451	901	6,534
	37	1,127	901	676	1,127	901	225	225	451	901	6,534
	38	1,127	901	676	1,127	901	225	225	451	901	6,534
	39	1,127	901	676	1,127	901	225	225	451	901	6,534
	40	1,127	901	676	1,127	901	225	225	451	901	6,534
	Accumulative Total	**45,064**	**36,051**	**27,039**	**45,064**	**36,051**	**9,013**	**9,013**	**18,026**	**36,051**	**261,373**

Table 64. Little Blue Targeted Area: Goals for cropland BMP adoption

Little Blue Targeted Area Cropland BMP Adoption Milestones, acres											
	Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Permanent Vegetation**	**Subsurface Fertilizer Application**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
Short Term	1	404	323	242	404	323	81	81	161	323	2,341
	2	404	323	242	404	323	81	81	161	323	2,341
	3	404	323	242	404	323	81	81	161	323	2,341
	4	404	323	242	404	323	81	81	161	323	2,341
	5	404	323	242	404	323	81	81	161	323	2,341
	Accumulative sub-Total	*2,018*	*1,615*	*1,211*	*2,018*	*1,615*	*404*	*404*	*807*	*1,615*	*11,706*
	6	404	323	242	404	323	81	81	161	323	2,341
	7	404	323	242	404	323	81	81	161	323	2,341
	8	404	323	242	404	323	81	81	161	323	2,341
	9	404	323	242	404	323	81	81	161	323	2,341
	10	404	323	242	404	323	81	81	161	323	2,341
	Accumulative sub-Total	*4,037*	*3,229*	*2,422*	*4,037*	*3,229*	*807*	*807*	*1,615*	*3,229*	*23,412*
Medium Term	11	404	323	242	404	323	81	81	161	323	2,341
	12	404	323	242	404	323	81	81	161	323	2,341
	13	404	323	242	404	323	81	81	161	323	2,341
	14	404	323	242	404	323	81	81	161	323	2,341
	15	404	323	242	404	323	81	81	161	323	2,341
	Accumulative sub-Total	*6,055*	*4,844*	*3,633*	*6,055*	*4,844*	*1,211*	*1,211*	*2,422*	*4,844*	*35,118*
	16	404	323	242	404	323	81	81	161	323	2,341
	17	404	323	242	404	323	81	81	161	323	2,341
	18	404	323	242	404	323	81	81	161	323	2,341
	19	404	323	242	404	323	81	81	161	323	2,341
	20	404	323	242	404	323	81	81	161	323	2,341
	Accumulative sub-Total	*8,073*	*6,459*	*4,844*	*8,073*	*6,459*	*1,615*	*1,615*	*3,229*	*6,459*	*46,824*
Long Term	21	404	323	242	404	323	81	81	161	323	2,341
	22	404	323	242	404	323	81	81	161	323	2,341
	23	404	323	242	404	323	81	81	161	323	2,341
	24	404	323	242	404	323	81	81	161	323	2,341
	25	404	323	242	404	323	81	81	161	323	2,341
	Accumulative sub-Total	*10,091*	*8,073*	*6,055*	*10,091*	*8,073*	*2,018*	*2,018*	*4,037*	*8,073*	*58,530*
	26	404	323	242	404	323	81	81	161	323	2,341
	27	404	323	242	404	323	81	81	161	323	2,341
	28	404	323	242	404	323	81	81	161	323	2,341
	29	404	323	242	404	323	81	81	161	323	2,341
	30	404	323	242	404	323	81	81	161	323	2,341
	Accumulative sub-Total	*12,110*	*9,688*	*7,266*	*12,110*	*9,688*	*2,422*	*2,422*	*4,844*	*9,688*	*70,236*
	31	404	323	242	404	323	81	81	161	323	2,341
	32	404	323	242	404	323	81	81	161	323	2,341
	33	404	323	242	404	323	81	81	161	323	2,341
	34	404	323	242	404	323	81	81	161	323	2,341
	35	404	323	242	404	323	81	81	161	323	2,341
	Accumulative sub-Total	*14,128*	*11,302*	*8,477*	*14,128*	*11,302*	*2,826*	*2,826*	*5,651*	*11,302*	*81,942*
	36	404	323	242	404	323	81	81	161	323	2,341
	37	404	323	242	404	323	81	81	161	323	2,341
	38	404	323	242	404	323	81	81	161	323	2,341
	39	404	323	242	404	323	81	81	161	323	2,341
	40	404	323	242	404	323	81	81	161	323	2,341
	Accumulative Total	**16,146**	**12,917**	**9,688**	**16,146**	**12,917**	**3,229**	**3,229**	**6,459**	**12,917**	**93,648**

Table 65. Goals for livestock BMP adoption

	Livestock BMPs Adopted Each Year, projects								
	Year	Vegetative Filter Strip	Relocated Feedlot	Relocate Pasture Feeding Site		Off-Stream Watering System			Annual Total
				Native	Cool Season	Native	Cool Season	Cropland	
Short Term	1	1		2		2		1	6
	2	1	1	2	1	2	1	1	9
	3	1		2		2		1	6
	4	1	1	2	1	2	1	1	9
	5	1		2		2		1	6
	Accumulative sub-Total	*5*	*2*	*10*	*2*	*10*	*2*	*5*	36
	6	1	1	2	1	2	1	1	9
	7	1		2		2		1	6
	8	1	1	2	1	2	1	1	9
	9	1		2		2		1	6
	10	1	1	2	1	2	1	1	9
	Accumulative sub-Total	*10*	*5*	*20*	*5*	*20*	*5*	*10*	75
Medium Term	11	1		2		2		1	6
	12	1	1	2	1	2	1	1	9
	13	1		2		2		1	6
	14	1	1	2	1	2	1	1	9
	15	1		2		2		1	6
	Accumulative sub-Total	*15*	*7*	*30*	*7*	*30*	*7*	*15*	111
	16	1	1	2	1	2	1	1	9
	17	1		2		2		1	6
	18	1	1	2	1	2	1	1	9
	19	1		2		2		1	6
	20	1	1	2	1	2	1	1	9
	Accumulative sub-Total	*20*	*10*	*40*	*10*	*40*	*10*	*20*	150
Long Term	21	1		2		2		1	6
	22	1	1	2	1	2	1	1	9
	23	1		2		2		1	6
	24	1	1	2	1	2	1	1	9
	25	1		2		2		1	6
	Accumulative sub-Total	*25*	*12*	*50*	*12*	*50*	*12*	*25*	186
	26	1	1	2	1	2	1	1	9
	27	1		2		2		1	6
	28	1	1	2	1	2	1	1	9
	29	1		2		2		1	6
	30	1	1	2	1	2	1	1	9
	Accumulative sub-Total	*30*	*15*	*60*	*15*	*60*	*15*	*30*	225
	31	1		2		2		1	6
	32	1	1	2	1	2	1	1	9
	33	1		2		2		1	6
	34	1	1	2	1	2	1	1	9
	35	1		2		2		1	6
	Accumulative sub-Total	*35*	*17*	*70*	*17*	*70*	*17*	*35*	261
	36	1	1	2	1	2	1	1	9
	37	1		2		2		1	6
	38	1	1	2	1	2	1	1	9
	39	1		2		2		1	6
	40	1	1	2	1	2	1	1	9
	Accumulative Total	**40**	**20**	**80**	**20**	**80**	**20**	**40**	300

Table 66. Goals for herbicide BMP adoption

Herbicide BMPs Adopted Annually, acres							
	Year	**Use Alternative Herbicide**	**Vegetative Buffers**	**Split Application**	**Early Application (Before April 15)**	**Reduced Soil Applied Rate**	**Annual Total**
Short Term	1	1,541	2,054	2,568	2,568	1,541	10,271
	2	1,541	2,054	2,568	2,568	1,541	10,271
	3	1,541	2,054	2,568	2,568	1,541	10,271
	4	1,541	2,054	2,568	2,568	1,541	10,271
	5	1,541	2,054	2,568	2,568	1,541	10,271
	Accumulative sub-Total	*7,703*	*10,271*	*12,839*	*12,839*	*7,703*	51,354
	6	1,541	2,054	2,568	2,568	1,541	10,271
	7	1,541	2,054	2,568	2,568	1,541	10,271
	8	1,541	2,054	2,568	2,568	1,541	10,271
	9	1,541	2,054	2,568	2,568	1,541	10,271
	10	1,541	2,054	2,568	2,568	1,541	10,271
	Accumulative sub-Total	*15,406*	*20,542*	*25,677*	*25,677*	*15,406*	102,709
Medium Term	11	1,541	2,054	2,568	2,568	1,541	10,271
	12	1,541	2,054	2,568	2,568	1,541	10,271
	13	1,541	2,054	2,568	2,568	1,541	10,271
	14	1,541	2,054	2,568	2,568	1,541	10,271
	15	1,541	2,054	2,568	2,568	1,541	10,271
	Accumulative sub-Total	*23,109*	*30,813*	*38,516*	*38,516*	*23,109*	154,063
	16	1,541	2,054	2,568	2,568	1,541	10,271
	17	1,541	2,054	2,568	2,568	1,541	10,271
	18	1,541	2,054	2,568	2,568	1,541	10,271
	19	1,541	2,054	2,568	2,568	1,541	10,271
	20	1,541	2,054	2,568	2,568	1,541	10,271
	Accumulative sub-Total	*30,813*	*41,084*	*51,354*	*51,354*	*30,813*	205,418
Long Term	21	1,541	2,054	2,568	2,568	1,541	10,271
	22	1,541	2,054	2,568	2,568	1,541	10,271
	23	1,541	2,054	2,568	2,568	1,541	10,271
	24	1,541	2,054	2,568	2,568	1,541	10,271
	25	1,541	2,054	2,568	2,568	1,541	10,271
	Total	*38,516*	*51,354*	*64,193*	*64,193*	*38,516*	256,772
	26	1,541	2,054	2,568	2,568	1,541	10,271
	27	1,541	2,054	2,568	2,568	1,541	10,271
	28	1,541	2,054	2,568	2,568	1,541	10,271
	29	1,541	2,054	2,568	2,568	1,541	10,271
	30	1,541	2,054	2,568	2,568	1,541	10,271
	Accumulative sub-Total	*46,219*	*61,625*	*77,032*	*77,032*	*46,219*	308,127
	31	1,541	2,054	2,568	2,568	1,541	10,271
	32	1,541	2,054	2,568	2,568	1,541	10,271
	33	1,541	2,054	2,568	2,568	1,541	10,271
	34	1,541	2,054	2,568	2,568	1,541	10,271
	35	1,541	2,054	2,568	2,568	1,541	10,271
	Accumulative sub-Total	*53,922*	*71,896*	*89,870*	*89,870*	*53,922*	359,481
	36	1,541	2,054	2,568	2,568	1,541	10,271
	37	1,541	2,054	2,568	2,568	1,541	10,271
	38	1,541	2,054	2,568	2,568	1,541	10,271
	39	1,541	2,054	2,568	2,568	1,541	10,271
	40	1,541	2,054	2,568	2,568	1,541	10,271
	Accumulative Total	**61,625**	**82,167**	**102,709**	**102,709**	**61,625**	**410,835**

Table 67. Goals for streambank BMP adoption rate

Streambank Adoption Rate, feet		
	Year	**Streambank Stabilization (feet)**
Short Term	1	4,750
	2	4,750
	3	4,750
	4	4,750
	5	4,750
	Accumulative sub-Total	*23,750*
	6	4,750
	7	4,750
	8	4,750
	9	4,750
	10	4,750
	Accumulative sub-Total	*47,500*
Medium Term	11	4,750
	12	4,750
	13	4,750
	14	4,750
	15	4,750
	Accumulative sub-Total	*71,250*
	16	4,750
	17	4,750
	18	4,750
	19	4,750
	20	4,750
	Accumulative sub-Total	*95,000*
Long Term	21	4,750
	22	4,750
	23	4,750
	24	4,750
	25	4,750
	Accumulative sub-Total	*118,750*
	26	4,750
	27	4,750
	28	4,750
	29	4,750
	30	4,750
	Accumulative sub-Total	*142,500*
	31	4,750
	32	4,750
	33	4,750
	34	4,750
	35	4,750
	Accumulative sub-Total	*166,250*
	36	4,750
	37	4,750
	38	4,750
	39	4,750
	40	4,750
	Accumulative Total	**190,000**

B. Benchmarks to measure water quality and social progress

Over a 10- to 40-year time frame, the Tuttle Creek Watershed WRAPS plan hopes to improve water quality throughout the watershed and in Tuttle Creek Lake. To monitor these improvements, measurements taken at Tuttle Creek Lake are important because it is the drainage endpoint of the watershed. Social indicators of success also will be examined by tracking traffic in Tuttle Creek Lake Park. This is because a good 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 criteria listed in **Table 68**, the SLT will assess and revise the overall strategy plan for the watershed. New goals will be set and new BMPs will be implemented in order to achieve improved water quality. Coordination with KDHE TMDL staff, Water Plan staff and the SLT will be held every five years to discuss benchmarks and TMDL update plans. Using data obtained by KDHE, KSU or the Kansas City District Army Corps of Engineers, the following indicator and parameter criteria shall be used to assess progress toward successful implementation to abate pollutant loads.

Table 68. Benchmarks measuring water quality progress in the watershed

Benchmarks to Measure Progress		
Impairment Addressed	**Criteria to Measure Water Quality Progress**	**Information Source**
Sediment	Number of acres of buffers and grassed waterways installed indicating that there would be a reduction in sediment into Tuttle Creek Lake	NRCS
	Post-2010 average TSS and TP data from KDHE field collection on all streams should show decline in values from those seen in 2000-2009	KDHE
	Tuttle Creek Lake TSS < 10 mg/L and turbidity < 20 NTU	KDHE
	In-stream TSS < 100 mg/L	KDHE
	Boat ramps should continue to function within the pool range of 1070-1075 feet msl	COE
	COE bathymetric survey in 2010 and KWO/KBS bathymetry in 2020 should be within 15% of one another	COE, KWO, KBS
	Fewer high event stream flow rates entering Tuttle Creek Lake indicating better retention and slower release of storm water in the upper end of the watershed	USGS
	Conservation storage in Tuttle Creek Lake will be 270,000 acre feet	COE
Sediment and Nutrients	Secchi disc depth > 1.0 meters in Tuttle Creek Lake	KDHE
	The difference in TSS and TP loads between the Stateline and Waterville and Blue Rapids should decline from those differences seen in 2000-2009	KDHE
Nutrients	No algal blooms are reported as the lake clarity improves	KDHE
	In-lake phosphorus levels should average < 200 ppb	KDHE
	In-stream phosphorus levels should average < 200 ppb	KDHE
	In-lake chlorophyll levels should average < 10 ppb as the lake becomes less turbid	KDHE
Fecal Coliform Bacteria	Number of livestock that have been relocated from close proximity to a stream indicating that there would be a reduction in fecal coliform bacteria into Tuttle Creek Lake	Watershed Specialist
	No beach closures at Tuttle Creek Lake	KDHE
	No health advisories will be issued warning citizens to stay out of the Big and Little Blue Rivers and tributaries because of high bacteria counts	KDHE
	Over time, the distribution of bacteria index values determined from routind KDHE sampling will shift downward such that the upper quartile (75%) will be in the vicinity of 1.03 (75% of the samples during April-October will be below 500 counts) and the upper decile (90%) will be 1.14 (90% of samples during April-October will be below 1,000 counts). However, because of the excessively large bacteria counts seen in the streams system currently, the shorter term indicator will simply be some reduction in the upper quartile and upper decile index values from current conditions seen above.	KDHE
	Bacteria levels should be reduced such that no more than 10% of samples taken between April and October exceed 300 on the Big Blue and 450 on the Little Blue, Mill Creek and the Black Vermillion.	KDHE
Herbicide	Reduction in the amount of alachlor and atrazine that is applied to crops indicating that there would be lower rates of atrazine concentration in Tuttle Creek Lake	Farmer's Cooperatives and Herbicide Sales
	Alachlor should never exceed 2 ppb. Average monthly atrazine levels should exceed 3 ppb once every three years and the running annual average should never exceed 3 ppb for Tuttle Creek and the Blue River drainage; no samples should ever exceed 170 ppb; and elevated atrazine should only be seen in Tuttle Creek Lake in May and June above the Randolph causeway while the lake is in flood pool; elevated atrazine should never been found in streams below mean daily flow.	KDHE
Impairment Addressed	**Social Indicators to Measure Water Quality Progress**	**Information Source**
Sediment, Nutrients, E. coli and Herbicides	Visitor traffic to Tuttle Creek Lake	KDWP
	Boating traffic in Tuttle Creek Lake	KDWP
	Quantity and quality of fishing in Tuttle Creek Lake	KDWP
	Economic indicators indicating effect of Tuttle Creek Lake's impact on local businesses	Riley County Economic Development
	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

The goals of the Tuttle Creek watershed plan will be to restore water quality for uses supportive of aquatic life, primary contact recreation and public water supply for Tuttle Creek Lake, the Big Blue, Little Blue and Black Vermillion rivers and their tributaries. This restoration plan will take 40 years of BMP implementation.

1. Sediment and Phosphorus Milestones in 2020

At the end of 10 years, the SLT will be able to examine water quality data for suspended solids (sediment determination) and phosphorus (eutrophication determination) to determine if progress has been made to improve water quality. It is estimated that it will require 10 years to see progress after BMP implementation on phosphorus and sediment reduction in the waterways. KDHE has outlined water quality goals for total phosphorus and total suspended solids. These goals are presented below.

Table 69. Water quality goals for sediment and phosphorus

	Sediment (median of data collected during indicated period), ppm			Total Phosphorus (median of data collected during indicated period), ppb		
Sampling Sites	**Current Condition (2000-2009)**	**Improved Condition (2010-2019)**	**Reduction Needed**	**Current Condition (2000-2009)**	**Improved Condition (2010-2019)**	**Reduction Needed**
Blue Rapids (Blue River)	107	70	**37**	623	560	**63**
Waterville (Little Blue River)	47	35	**12**	366	300	**66**
Black Vermillion River	55	40	**15**	259	230	**29**
Hanover (Mill Creek)	37	30	**7**	255	180	**75**

2. Herbicide milestones in 2020

Alachlor and atrazine milestones are to be reviewed at the end of 10 years. The impact of BMP implementations will be obvious by this time. Because KDHE has not set any milestones for alachlor at this time, only atrazine milestones will be covered. KDHE has set the atrazine milestones as:

- Atrazine will not exceed 3ppb on any streams during the year, except during the high flow months of May and June, and
- When exceedances do occur in May and June, they take place when flows exceed the indicated monthly flows.

If atrazine does exceed 3 ppb during the months of May and June, then the stream flows should be greater than:

- Big Blue at Marysville: 1,900 cfs (cubic feet per second)
- Little Blue River at Barnes: 1,000 cfs
- Black Vermillion River at Frankfort: 300 cfs
- Mill Creek near Hanover: 200 cfs

3. *E. coli* bacteria milestones in 2020

Bacteria reductions can be observed in 10 years after the onset of implementation of BMPs. KDHE has determined that the 10-year milestone for bacteria should be based on the percentage

of April to October samples that are less than the 427 count criterion for the Little Blue, Big Blue and Black Vermillion Rivers. At the end of 10 years, there should be at least 60 to 65 percent of the samples that are under 427. Current percentage (2009) is 50 to 55 percent. This will be a reduction of 10 to 15 percent in number of sample exceedances.

C. BMP implementation milestones from 2020 to 2050

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

12. Monitoring

The SLT will review KDHE sampling data annually. 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 that result 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, and they will also be continued into the future. 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. Each site is tested for nutrients, metals, ammonia, solid fractions, turbidity, alkalinity, pH, dissolved oxygen, *E. coli* bacteria and chemicals. However, 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, as discussed earlier in this publication, atrazine is primarily a concern during spring and summer rainfall events, so testing for atrazine in the winter is unnecessary.

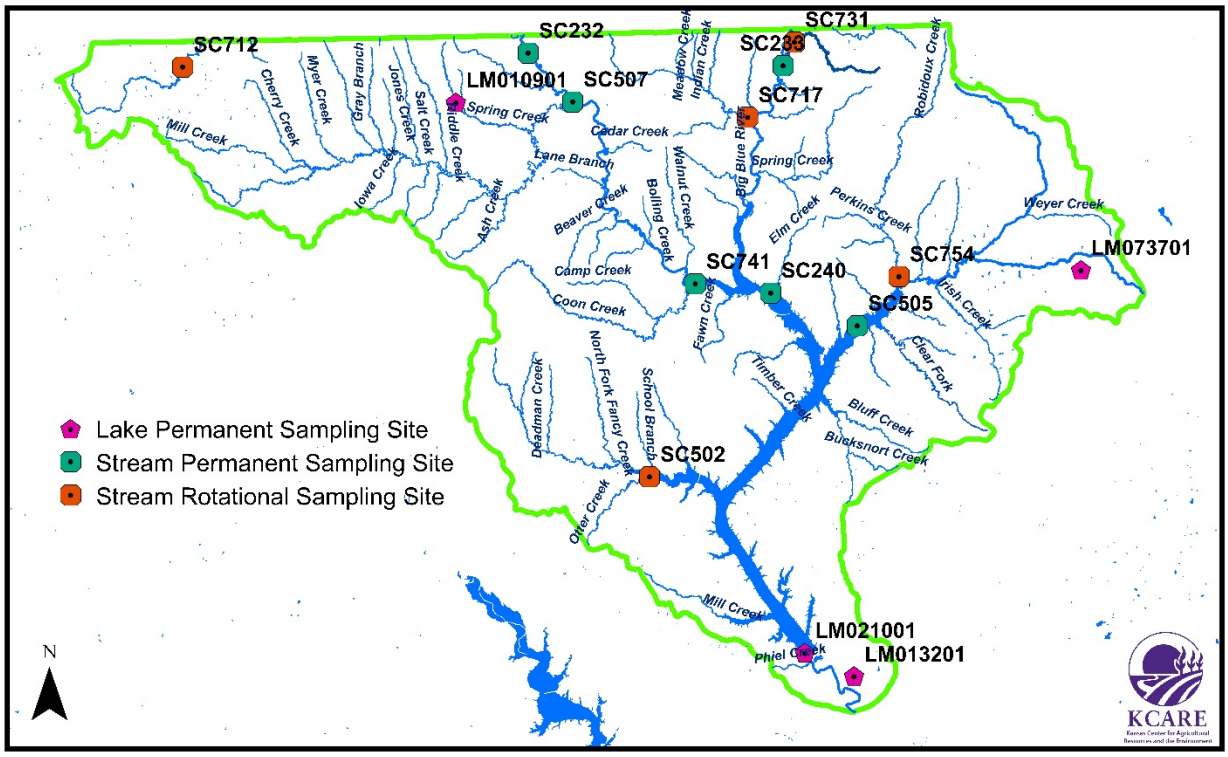


Figure 30. Water monitoring sites in the Tuttle Creek Watershed

USGS collects stream flow data, which is available for SLT review. At publication time of this report, depending on the sampling site, up to six different parameters are sampled: water temperature, specific conductance, gage height, discharge, precipitation and turbidity. Samples are taken automatically every 15 minutes. Reviewing this data will determine whether runoff events in the upper reaches of the watershed have been slowed by BMPs such as dry ponds and sediment basins.

The Corps of Engineers have sampling sites in Tuttle Creek Lake. There are four sampling sites in the watershed sampled monthly, from April through September. Samples are analyzed for T-orthoP, total suspended solids, alkalinity, total phosphorus, total Kjeldahl nitrogen, ammonia, nitrate nitrogen and total organic carbon. In the spring, the samples are also analyzed for atrazine and alachlor, temperature, pH, dissolved oxygen, turbidity and phycocyanin (chlorophyll determination).

Much of the evaluative information can be obtained through the existing networks and sampling plans of KDHE and the Kansas City District, U.S. Army Corps of Engineers. Public engagement can be obtained through observations of lake clarity, ease of boating, and the physical appearance of Tuttle Creek Lake. Some communications with the Corps of Engineers will supplement any information on the conditions in the Blue River drainage and on Tuttle Creek Lake.

The SLT will use monitoring data to direct their evaluation of water quality progress. There are no sampling gaps that can be determined at this time; currently, there are sufficient water quality milestones developed by KDHE and approved by the SLT. Adequate data is being generated in order to support BMP placement and further water quality improvement, and analysis of this data will be adequate to determine effectiveness of implemented BMPs. If the SLT decides in the future that more data is required, they can discuss this with KDHE. All 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 in this report.

KDHE will be requested to meet with the SLT annually to review the monitoring data accumulated by their sites. However, the overall strategy and alterations of the WRAPS plan will be discussed with KDHE immediately after each update of the 303d list and subsequent TMDL designation. The upcoming year for this in the Tuttle Creek watershed is 2020. 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. In examining water quality progress in the watershed, total suspended solids and total phosphorus will be reviewed and analyzed for progress every 10 years due to the lag time of water quality effects after BMP implementation. *E. coli* bacteria and atrazine will be reviewed for progress every five years.

13. Review of the WRAPS Plan

In the year 2024, this WRAPS plan will be reviewed and revised according to results acquired from monitoring data. At this time, the SLT will review the following criteria in addition to any other concerns that may occur at that time:

The SLT will ask KDHE for a report on the milestone achievements in **sediment**, **phosphorus**, **herbicide** (alachlor and atrazine) and ***E. coli* bacteria** load reductions.

- **Sediment:** the 2024 milestone for sediment should be based on the percentage of samples measuring less than 70 ppm for Blue River, 35 ppm for Little Blue River, 40 for the Black Vermillion River and 30 for Mill Creek.
- **Phosphorus:** the 2024 milestone for phosphorus should be based on the percentage of samples measuring less than 560 ppm for Blue River, 300 ppm for Little Blue River, 230 for the Black Vermillion River and 180 for Mill Creek.
- **Herbicides:** alachlor does not exceed 2 ppb on any streams during the year except during the high flow months of May and June; atrazine does not exceed 3ppb on any streams during the year except during the high flow months of May and June; and when exceedances do occur in May and June, they take place when flows exceed the indicated monthly flows.
- ***E. coli* bacteria:** the 2024 milestone for bacteria should be based on the percentage of April to October samples measuring less than the 427 count criterion for Little Blue, Big Blue and Black Vermillion Rivers. In 2024, there should be at least 60 to 65 percent of the samples measuring under 427.

The SLT will request various reports when necessary. These include:

- Reports from KDHE concerning revising the watershed TMDLs, including possible nutrient and/or sediment criteria, revised load allocations distributed between Kansas and Nebraska, and new wasteload allocations defined for the point sources in the Kansas portion of the drainage.
- Reports from KDHE and COE on trends in water quality in Tuttle Creek Lake.
- A report on emergence of nitrogen as pollutant of concern.

In turn, the SLT will provide various reports when necessary. These include:

- progress towards achieving the benchmarks listed in this report;
- progress towards achieving the BMP adoption rates in this report; and
- discuss necessary adjustments and revisions needed in the targets listed in this plan.

14. Appendix

A. Potential Service Providers

Table 70. Service provider list

Organization	Programs	Purpose	Technical or Financial Assistance	Phone	Website address
Environmental Protection Agency	Clean Water State Revolving Fund Program	Provides low cost loans to communities for water pollution control activities.	Financial	913-551-7003	www.epa.gov
	Watershed Protection	To conduct holistic strategies for restoring and protecting aquatic resources based on hydrology rather than political boundaries.			
Glacial Hills RC&D	Natural resource development and protection	Plan and Implement projects and programs that improve environmental quality of life.	Technical	785-945-6292	http://www.glacialhillsrcd.com/
Kansas Alliance for Wetlands and Streams	Streambank Stabilization, Wetland Restoration Cost Share Programs	The Kansas Alliance for Wetlands and Streams (KAWS) organized in 1996 to promote the protection, enhancement, restoration and establishment wetlands and streams in Kansas.	Technical	785-463-5804 NE Chapter	www.kaws.org
Kansas Dept. of Agriculture	Watershed structures permitting.	Available for watershed districts and multipurpose small lakes development.	Technical and Financial	785-296-2933	www.accesskansas.org/k da
Kansas Dept. of Health and Environment	Nonpoint Source Pollution Program:	Provide funds for projects that will reduce nonpoint source pollution.	Technical and Financial	785-296-5500	www.kdhe.state.ks.us
	Municipal and livestock waste				
	Livestock waste Municipal waste	Compliance monitoring.			
	State Revolving Loan Fund	Makes low interest loans for projects to improve and protect water quality.			
Kansas Department of Wildlife, Parks and Tourism	Land and Water Conservation Funds	Provides funds to preserve develop and assure access to outdoor recreation.	Technical Funds	620-672-5911	www.kdwp.state.ks.us/about/grants.html
	Conservation Easements for Riparian and Wetland Areas	To provide easements to secure and enhance quality areas in the state.		785-296-2780	
	Wildlife Habitat Improvement Program	To provide limited assistance for development of wildlife habitat.		620-672-5911	
	North American Waterfowl Conservation Act	To provide up to 50 percent cost share for the purchase and/or development of wetlands and wildlife habitat.		620-342-0658	
	MARSH program in coordination with Ducks Unlimited	May provide up to 100 percent of funding for small wetland projects.		620-672-5911	
	Chickadee Checkoff	Projects help with eagles, songbirds, threatened and endangered species, turtles, lizards, butterflies, and stream darters. Funding is an optional donation line item on			
	Walk In Hunting Program	Landowners receive a payment incentive to allow public hunting on their property.			
	F.I.S.H. Program	Landowners receive a payment incentive to allow public fishing access to their ponds and streams.			
Kansas Forest Service	Conservation Tree Planting Program	Provides low cost trees and shrubs for conservation plantings.	Technical	785-532-3312	www.kansasforests.org
	Riparian and Wetland Protection Program	Work closely with other agencies to promote and assist with establishment of riparian forestland and manage existing stands.		785-532-3310	
Kansas Rural Center	The Heartland Network	The Center is committed to economically viable, environmentally sound and socially sustainable rural culture.	Technical and Financial	785-873-3431	http://www.kansasruralcenter.org
	Clean Water Farms - River Friendly Farms				
	Sustainable Food Systems Project				
	Cost share programs				
Kansas Rural Water Association	Technical assistance for Water Systems with Sorce Water Protection Planning	Provide education, technical assistance and leadership to public water and wastewater utilities to enhance the public health and to sustain Kansas' communities.	Technical	785-336-3760	http://www.krwa.net

Table 69. Service Provider List (continued)

Organization	Programs	Purpose	Technical or Financial Assistance	Phone	Website address
Kansas State Research and Extension	Water Quality Programs	Provide programs, expertise and educational materials that relate to minimizing the impact of rural and urban activities on water quality.	Technical	785-532-7108	www.kcare.ksu.edu
	Waste Management Programs Kansas Center for Agricultural Resources and Environment (KCARE)				
	Kansas Center for Agricultural Resources and Environment (KCARE)				
	Kansas Environmental Leadership Program (KELP)	Educational program to develop leadership for improved water quality.		785.532.5813	www.ksre.ksu.edu/kelp
	Kansas Local Government Water Quality Planning and Management	Provide guidance to local governments on water protection programs.		785-532-0416	www.ksre.ksu.edu/olg
	Rangeland and Natural Area Services	Reduce non-point source pollution emanating		785-532-2732	www.k- state.edu/waterlink/
	WaterLINK	Service-learning projects available to college and university faculty and community watersheds in Kansas.		785-532-3039	
	Kansas Pride: Healthy Ecosystems/Healthy Communities	Help citizens appraise their local natural resources and develop short and long term plans and activities to protect, sustain and restore their resources for the future.			www.kansaspridepor gram.ksu.edu/healthyecosys tems/
	Citizen Science	Education combined with volunteer soil and water testing for enhanced natural resource stewardship.		785-532-1443	www.ksre.ksu.edu/kswat
Kansas Water Office	Public Information and Education	Provide information and education to the public on Kansas Water Resources	Technical and Financial	785-296-3185	www.kwo.org
No-Till on the Plains	Field days, seasonal meetings, tours and technical consulting.	Provide information and assistance concerning continuous no-till farming practices.	Technical	888-330-5142	www.notill.org
Division of Conservatioin and Conservation Districts	Water Resources Cost Share Program	Provide cost share assistance to landowners for establishment of water conservation practices.	Technical and Financial	Clay County Conservation District 785-632-3550	http://agriculture.ks.gov/divisions-programs/division-of-conservation
	Nonpoint Source Pollution Control Fund	Provides financial assistance for nonpoint pollution control projects which help restore		Marshall County Conservation District 785-	
	Riparian and Wetland Protection Program	Funds to assist with wetland and riparian development and enhancement.		Nemaha County Conservation District 785-	
	Stream Rehabilitation Program	Assist with streams that have been adversely altered by channel modifications.		Pottawatomie County Conservation District 785-	http://www.kacdnet.org/
	Kansas Water Quality Buffer Initiative	Compliments Conservation Reserve Program by offering additional financial incentives for grass filters and riparian forest buffers.		Riley County Conservation District 785-537-7864	
	Watershed district and multipurpose lakes	Programs are available for watershed district and multipurpose small lakes.		Washington County Conservation District 785-325-2321	
US Army Corps of Engineers	Planning Assistance to states	Assistance in development of plans for development, utilization and conservation of water and related land resources of drainage.	Technical	816-983-3157	www.usace.army.mil
	Environmental Restoration	Funding assistance for aquatic ecosystem restoration.		816-983-3157	
US Fish and and Wildife	Fish and Wildlife Enhancement Program	Supports field operations which include technical assistance on wetland design.	Technica	785-539-3474	www.fws.gov
	Private Lands Program	Contracts to restore, enhance, or create wetlands.		785-539-3474	
USDA Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA)	Conservation Compliance	Primarily for the technical assistance to develop conservation plans on cropland.	Technical and Financial	Clay County 785-632-3550	www.ks.nrcs.usda.gov
	Conservation Operations	To provide technical assistance on private land for development and application of Resource Management Plans.		Marshall County 785-562-5343	
	Watershed Planning and Operations	Primarily focused on high priority areas where agricultural improvements will meet water quality objectives.		Nemaha County 785-336-2164	
	Wetland Reserve Program	Cost share and easements to restore wetlands.		Pottawatomie County 785-457-3661	
	Wildlife Habitat Incentives Program	Cost share to establish wildlife habitat which includes wetlands and riparian areas.		Riley County 785-776-7582	
	Grassland Reserve Program, EQIP and Conservation Reserve Program	Improve and protect rangeland resources with cost-sharing practices, rental agreements, and easement purchases.		Washington County-325-2253	

B. BMP Definitions

1. Cropland BMPs

a. 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; and
- 75 percent erosion reduction efficiency, 40 percent phosphorous reduction efficiency.

b. Nutrient management plan
- Managing the amount, source, placement, form and timing of the application of nutrients and soil amendments;
- Intensive soil testing; and
- 25 percent erosion and 25 percent P reduction efficiency.

c. 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, a one-acre waterway will treat 10 acres of cropland; and
- 40 percent erosion reduction efficiency, 40 percent phosphorous reduction efficiency.

d. Terraces
- Earth embankment and/or channel constructed across the slope to intercept runoff water and trap soil;
- One of the oldest/most common BMPs; and
- 30 percent erosion reduction efficiency, 30 percent phosphorous reduction efficiency.

e. Cover crops
- A cover crop is a crop of a specific plant that is grown primarily for the benefit of the soil rather than the crop yield;
- Cover crops commonly are used to suppress weeds, manage soil erosion, help build and improve soil fertility and quality, and control diseases and pests;
- Cover crops are typically grasses or legumes but may be comprised of other green plants; and
- Cover crops can reduce erosion from wind and water, sequester carbon in plant biomass and soils to increase soil organic matter content, capture and recycle excess nutrients in the soil profile, promote biological nitrogen fixation, increase biodiversity, promote weed suppression, provide supplemental forage, promote soil moisture management, and reduce particulate emissions into the atmosphere.[23]

[23] Kansas Department of Health and Environment. http://www.kdheks.gov/nps/downloads/AnnualReport2006.pdf

f. Riparian 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, a one acre buffer treats 15 acres of cropland; and
   - 50 percent erosion reduction efficiency, 50 percent phosphorous reduction efficiency.

g. Water retention structures
   - May include sediment basin that acts as a water impoundment, made by constructing an earthen dam;
   - May include grade stabilization structures that control runoff and prevent gully erosion;
   - Traps sediment and nutrients from leaving the edge of the field;
   - Provides source of water; and
   - 50 percent soil erosion, nitrogen, and phosphorus reduction efficiency.

h. Establish permanent vegetation
   - Establishing permanent vegetation on sites that have or are expected to have high erosion rates, and on sites that have physical, chemical, or biological conditions that prevent the establishment of vegetation using normal practices;
   - Establishing permanent vegetation can stabilize areas with existing or expected high rates of soil erosion by water and wind; and
   - Establishing permanent vegetation can restore degraded sites that cannot be stabilized through normal methods.

i. Subsurface fertilizer application
   - Placing or injecting fertilizer beneath the soil surface;
   - Reduces fertilizer runoff; and
   - 0 percent soil and 50 percent P reduction efficiency.

2. Livestock BMPs

a. 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 (i.e., needs to be as large as the feedlot); and
   - 10-year lifespan, requires periodic mowing or haying, average P reduction: 50 percent.

b. 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.

- Pasture: move feeding sites in a pasture away from a stream, waterway, or body of water to increase the filtration and waste removal (i.e., move bale feeders away from the stream).
- Average P reduction: 30-80 percent

c. Alternative (off-stream) watering system
   - Watering system designed so that livestock do not enter stream or body of water;
   - Studies show cattle will drink from tank over a stream or pond 80 percent of the time; and
   - 10- to 25-year lifespan, with average P reduction of 30-98 percent, with greater efficiencies for limited stream access.

3. Streambank

Some streambank BMPs that may be utilized are riparian buffers, field borders, bottomland timber in wetlands and/or streambank restoration.

4. Herbicide

a. Use Alternate Herbicide/No alachlor or atrazine: use NO alachlor or atrazine on the crop field.

b. Vegetative Buffer:
   - Area of field maintained in permanent vegetation to help reduce sediment, nutrient and herbicide loss from agricultural fields, improve runoff water quality, and provide habitat for wildlife;
   - On average for Kansas fields, a one acre buffer treats 15 acres of cropland; and
   - 50 percent erosion reduction efficiency, 50 percent phosphorous reduction efficiency.

c. Split Applications of Herbicide: Apply atrazine and tank-mixes as split applications. For example, apply one-half to two-thirds of the atrazine before April 15 and one-third to one-half before or immediately following planting. Using split applications reduces the amount of atrazine available for runoff at any one time. In addition, the early application is made at a less vulnerable time for atrazine runoff. This BMP has the potential to reduce atrazine runoff by 25 percent, compared to applying all the atrazine at planting time.

d. Early Application
   - Apply herbicide before April 15 of each crop season.
   - Less herbicide sitting on fields during high rainfall seasons results in less herbicide runoff into nearby water segments.

e. Reduced Soil Applied Rate: There is a direct relationship between atrazine application rate and runoff amount. The lower the rate of atrazine applied, the less the potential runoff. Using lower atrazine rates and/or formulations with lower atrazine rates can still provide excellent control of pigweed and other small-seeded broadleaf weeds. Reducing atrazine rates by one-third potentially reduces atrazine runoff by 33 percent.

C. Budget Derivations

1. Cropland

Summarized Derivation of Cropland BMP Cost Estimates

- No-till: Cost is $78 per treated acre with a 39 percent cost share.
- Nutrient management plan: Cost is $57 per treated acre with a 39 percent cost share.
- Grassed waterway: Cost is $160 per treated acre with a 50 percent cost share.
- Terraces: Cost is $125 per treated acre with a 50 percent cost share.
- Cover crops: Cost is $50 per treated acre for a one-time cost share.
- Riparian vegetative buffer: Cost is $67 per treated acre with a 90 percent cost share.
- Water retention structures: Cost is $125 per treated acre with 50 percent cost share.
- Establish permanent vegetation: Cost is $150 per treated acre with 50 percent cost share.
- Subsurface fertilizer application: Cost is $27 per treated acre with no cost share.

2. Livestock

Summarized Derivation of Livestock BMP Cost Estimates

- Vegetative filter strip: Cost is $714 per unit with 50 percent cost share.
- Relocated feedlot: Cost is $6,621 with 50 percent cost share. Cost includes the cost of fencing, a new watering system, concrete, and labor.
- Relocated pasture feeding site: Cost is $2,203 with 50 percent cost share. Cost includes the cost of building ¼ mile of fence, a permeable surface, and labor.
- Off-stream watering system: Cost is $3,795 with 50 percent cost share.

3. Streambank

Summarized Derivation of Streambank BMP Cost Estimates

A 2009 study conducted by Kansas State University Agricultural Economists calculated that streambank stabilization costs an average of $41.66 per linear foot, including all engineering and design costs. Sites are extremely variable.

4. Herbicide

Determination of Herbicide Application

- Use of alternative herbicide/ no alachlor or atrazine: Cost share is $6 per treated acre.
- Vegetative buffers: No cost share is provided as costs will be covered under cropland or livestock categories.
- Split application: Cost share is $6 per treated acre.
- Early application (prior to April 15): Cost share is $6 per treated acre.
- Reduced soil applied rate: Cost share is $1.80 per treated acre.

D. 40-Year project tables by sub-watershed

1. Cropland BMP Implementation in the Big and Little Blue Sub Watersheds

Big Blue Targeted Area - HUC 10270205

Sub Watershed 201 Annual Adoption (treated acres), Cropland BMPs										
Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Adoption
1	118	94	71	118	94	24	24	47	94	684
2	118	94	71	118	94	24	24	47	94	684
3	118	94	71	118	94	24	24	47	94	684
4	118	94	71	118	94	24	24	47	94	684
5	118	94	71	118	94	24	24	47	94	684
6	118	94	71	118	94	24	24	47	94	684
7	118	94	71	118	94	24	24	47	94	684
8	118	94	71	118	94	24	24	47	94	684
9	118	94	71	118	94	24	24	47	94	684
10	118	94	71	118	94	24	24	47	94	684
11	118	94	71	118	94	24	24	47	94	684
12	118	94	71	118	94	24	24	47	94	684
13	118	94	71	118	94	24	24	47	94	684
14	118	94	71	118	94	24	24	47	94	684
15	118	94	71	118	94	24	24	47	94	684
16	118	94	71	118	94	24	24	47	94	684

17	118	94	71	118	94	24	24	47	94	684
18	118	94	71	118	94	24	24	47	94	684
19	118	94	71	118	94	24	24	47	94	684
20	118	94	71	118	94	24	24	47	94	684
21	118	94	71	118	94	24	24	47	94	684
22	118	94	71	118	94	24	24	47	94	684
23	118	94	71	118	94	24	24	47	94	684
24	118	94	71	118	94	24	24	47	94	684
25	118	94	71	118	94	24	24	47	94	684
26	118	94	71	118	94	24	24	47	94	684
27	118	94	71	118	94	24	24	47	94	684
28	118	94	71	118	94	24	24	47	94	684
29	118	94	71	118	94	24	24	47	94	684
30	118	94	71	118	94	24	24	47	94	684
31	118	94	71	118	94	24	24	47	94	684
32	118	94	71	118	94	24	24	47	94	684
33	118	94	71	118	94	24	24	47	94	684
34	118	94	71	118	94	24	24	47	94	684
35	118	94	71	118	94	24	24	47	94	684
36	118	94	71	118	94	24	24	47	94	684
37	118	94	71	118	94	24	24	47	94	684
38	118	94	71	118	94	24	24	47	94	684
39	118	94	71	118	94	24	24	47	94	684
40	118	94	71	118	94	24	24	47	94	684
Sub Watershed 204 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	109	87	65	109	87	22	22	44	87	631
2	109	87	65	109	87	22	22	44	87	631
3	109	87	65	109	87	22	22	44	87	631
4	109	87	65	109	87	22	22	44	87	631
5	109	87	65	109	87	22	22	44	87	631
6	109	87	65	109	87	22	22	44	87	631
7	109	87	65	109	87	22	22	44	87	631
8	109	87	65	109	87	22	22	44	87	631
9	109	87	65	109	87	22	22	44	87	631
10	109	87	65	109	87	22	22	44	87	631
11	109	87	65	109	87	22	22	44	87	631
12	109	87	65	109	87	22	22	44	87	631
13	109	87	65	109	87	22	22	44	87	631
14	109	87	65	109	87	22	22	44	87	631
15	109	87	65	109	87	22	22	44	87	631
16	109	87	65	109	87	22	22	44	87	631
17	109	87	65	109	87	22	22	44	87	631
18	109	87	65	109	87	22	22	44	87	631
19	109	87	65	109	87	22	22	44	87	631
20	109	87	65	109	87	22	22	44	87	631
21	109	87	65	109	87	22	22	44	87	631
22	109	87	65	109	87	22	22	44	87	631
23	109	87	65	109	87	22	22	44	87	631
24	109	87	65	109	87	22	22	44	87	631
25	109	87	65	109	87	22	22	44	87	631
26	109	87	65	109	87	22	22	44	87	631
27	109	87	65	109	87	22	22	44	87	631
28	109	87	65	109	87	22	22	44	87	631
29	109	87	65	109	87	22	22	44	87	631
30	109	87	65	109	87	22	22	44	87	631
31	109	87	65	109	87	22	22	44	87	631
32	109	87	65	109	87	22	22	44	87	631
33	109	87	65	109	87	22	22	44	87	631

34	109	87	65	109	87	22	22	44	87	631
35	109	87	65	109	87	22	22	44	87	631
36	109	87	65	109	87	22	22	44	87	631
37	109	87	65	109	87	22	22	44	87	631
38	109	87	65	109	87	22	22	44	87	631
39	109	87	65	109	87	22	22	44	87	631
40	109	87	65	109	87	22	22	44	87	631
Sub Watershed 301 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	185	148	111	185	148	37	37	74	148	1,072
2	185	148	111	185	148	37	37	74	148	1,072
3	185	148	111	185	148	37	37	74	148	1,072
4	185	148	111	185	148	37	37	74	148	1,072
5	185	148	111	185	148	37	37	74	148	1,072
6	185	148	111	185	148	37	37	74	148	1,072
7	185	148	111	185	148	37	37	74	148	1,072
8	185	148	111	185	148	37	37	74	148	1,072
9	185	148	111	185	148	37	37	74	148	1,072
10	185	148	111	185	148	37	37	74	148	1,072
11	185	148	111	185	148	37	37	74	148	1,072
12	185	148	111	185	148	37	37	74	148	1,072
13	185	148	111	185	148	37	37	74	148	1,072
14	185	148	111	185	148	37	37	74	148	1,072
15	185	148	111	185	148	37	37	74	148	1,072
16	185	148	111	185	148	37	37	74	148	1,072
17	185	148	111	185	148	37	37	74	148	1,072
18	185	148	111	185	148	37	37	74	148	1,072
19	185	148	111	185	148	37	37	74	148	1,072
20	185	148	111	185	148	37	37	74	148	1,072
21	185	148	111	185	148	37	37	74	148	1,072
22	185	148	111	185	148	37	37	74	148	1,072
23	185	148	111	185	148	37	37	74	148	1,072
24	185	148	111	185	148	37	37	74	148	1,072
25	185	148	111	185	148	37	37	74	148	1,072
26	185	148	111	185	148	37	37	74	148	1,072
27	185	148	111	185	148	37	37	74	148	1,072
28	185	148	111	185	148	37	37	74	148	1,072
29	185	148	111	185	148	37	37	74	148	1,072
30	185	148	111	185	148	37	37	74	148	1,072
31	185	148	111	185	148	37	37	74	148	1,072
32	185	148	111	185	148	37	37	74	148	1,072
33	185	148	111	185	148	37	37	74	148	1,072
34	185	148	111	185	148	37	37	74	148	1,072
35	185	148	111	185	148	37	37	74	148	1,072
36	185	148	111	185	148	37	37	74	148	1,072
37	185	148	111	185	148	37	37	74	148	1,072
38	185	148	111	185	148	37	37	74	148	1,072
39	185	148	111	185	148	37	37	74	148	1,072
40	185	148	111	185	148	37	37	74	148	1,072
Sub Watershed 302 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	178	143	107	178	143	36	36	71	143	1,034
2	178	143	107	178	143	36	36	71	143	1,034
3	178	143	107	178	143	36	36	71	143	1,034
4	178	143	107	178	143	36	36	71	143	1,034

5	178	143	107	178	143	36	36	71	143	1,034
6	178	143	107	178	143	36	36	71	143	1,034
7	178	143	107	178	143	36	36	71	143	1,034
8	178	143	107	178	143	36	36	71	143	1,034
9	178	143	107	178	143	36	36	71	143	1,034
10	178	143	107	178	143	36	36	71	143	1,034
11	178	143	107	178	143	36	36	71	143	1,034
12	178	143	107	178	143	36	36	71	143	1,034
13	178	143	107	178	143	36	36	71	143	1,034
14	178	143	107	178	143	36	36	71	143	1,034
15	178	143	107	178	143	36	36	71	143	1,034
16	178	143	107	178	143	36	36	71	143	1,034
17	178	143	107	178	143	36	36	71	143	1,034
18	178	143	107	178	143	36	36	71	143	1,034
19	178	143	107	178	143	36	36	71	143	1,034
20	178	143	107	178	143	36	36	71	143	1,034
21	178	143	107	178	143	36	36	71	143	1,034
22	178	143	107	178	143	36	36	71	143	1,034
23	178	143	107	178	143	36	36	71	143	1,034
24	178	143	107	178	143	36	36	71	143	1,034
25	178	143	107	178	143	36	36	71	143	1,034
26	178	143	107	178	143	36	36	71	143	1,034
27	178	143	107	178	143	36	36	71	143	1,034
28	178	143	107	178	143	36	36	71	143	1,034
29	178	143	107	178	143	36	36	71	143	1,034
30	178	143	107	178	143	36	36	71	143	1,034
31	178	143	107	178	143	36	36	71	143	1,034
32	178	143	107	178	143	36	36	71	143	1,034
33	178	143	107	178	143	36	36	71	143	1,034
34	178	143	107	178	143	36	36	71	143	1,034
35	178	143	107	178	143	36	36	71	143	1,034
36	178	143	107	178	143	36	36	71	143	1,034
37	178	143	107	178	143	36	36	71	143	1,034
38	178	143	107	178	143	36	36	71	143	1,034
39	178	143	107	178	143	36	36	71	143	1,034
40	178	143	107	178	143	36	36	71	143	1,034
Sub Watershed 306 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	88	71	53	88	71	18	18	35	71	512
2	88	71	53	88	71	18	18	35	71	512
3	88	71	53	88	71	18	18	35	71	512
4	88	71	53	88	71	18	18	35	71	512
5	88	71	53	88	71	18	18	35	71	512
6	88	71	53	88	71	18	18	35	71	512
7	88	71	53	88	71	18	18	35	71	512
8	88	71	53	88	71	18	18	35	71	512
9	88	71	53	88	71	18	18	35	71	512
10	88	71	53	88	71	18	18	35	71	512
11	88	71	53	88	71	18	18	35	71	512
12	88	71	53	88	71	18	18	35	71	512
13	88	71	53	88	71	18	18	35	71	512
14	88	71	53	88	71	18	18	35	71	512
15	88	71	53	88	71	18	18	35	71	512
16	88	71	53	88	71	18	18	35	71	512
17	88	71	53	88	71	18	18	35	71	512
18	88	71	53	88	71	18	18	35	71	512
19	88	71	53	88	71	18	18	35	71	512
20	88	71	53	88	71	18	18	35	71	512
21	88	71	53	88	71	18	18	35	71	512

22	88	71	53	88	71	18	18	35	71	512
23	88	71	53	88	71	18	18	35	71	512
24	88	71	53	88	71	18	18	35	71	512
25	88	71	53	88	71	18	18	35	71	512
26	88	71	53	88	71	18	18	35	71	512
27	88	71	53	88	71	18	18	35	71	512
28	88	71	53	88	71	18	18	35	71	512
29	88	71	53	88	71	18	18	35	71	512
30	88	71	53	88	71	18	18	35	71	512
31	88	71	53	88	71	18	18	35	71	512
32	88	71	53	88	71	18	18	35	71	512
33	88	71	53	88	71	18	18	35	71	512
34	88	71	53	88	71	18	18	35	71	512
35	88	71	53	88	71	18	18	35	71	512
36	88	71	53	88	71	18	18	35	71	512
37	88	71	53	88	71	18	18	35	71	512
38	88	71	53	88	71	18	18	35	71	512
39	88	71	53	88	71	18	18	35	71	512
40	88	71	53	88	71	18	18	35	71	512
Sub Watershed 401 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	138	111	83	138	111	28	28	55	111	802
2	138	111	83	138	111	28	28	55	111	802
3	138	111	83	138	111	28	28	55	111	802
4	138	111	83	138	111	28	28	55	111	802
5	138	111	83	138	111	28	28	55	111	802
6	138	111	83	138	111	28	28	55	111	802
7	138	111	83	138	111	28	28	55	111	802
8	138	111	83	138	111	28	28	55	111	802
9	138	111	83	138	111	28	28	55	111	802
10	138	111	83	138	111	28	28	55	111	802
11	138	111	83	138	111	28	28	55	111	802
12	138	111	83	138	111	28	28	55	111	802
13	138	111	83	138	111	28	28	55	111	802
14	138	111	83	138	111	28	28	55	111	802
15	138	111	83	138	111	28	28	55	111	802
16	138	111	83	138	111	28	28	55	111	802
17	138	111	83	138	111	28	28	55	111	802
18	138	111	83	138	111	28	28	55	111	802
19	138	111	83	138	111	28	28	55	111	802
20	138	111	83	138	111	28	28	55	111	802
21	138	111	83	138	111	28	28	55	111	802
22	138	111	83	138	111	28	28	55	111	802
23	138	111	83	138	111	28	28	55	111	802
24	138	111	83	138	111	28	28	55	111	802
25	138	111	83	138	111	28	28	55	111	802
26	138	111	83	138	111	28	28	55	111	802
27	138	111	83	138	111	28	28	55	111	802
28	138	111	83	138	111	28	28	55	111	802
29	138	111	83	138	111	28	28	55	111	802
30	138	111	83	138	111	28	28	55	111	802
31	138	111	83	138	111	28	28	55	111	802
32	138	111	83	138	111	28	28	55	111	802
33	138	111	83	138	111	28	28	55	111	802
34	138	111	83	138	111	28	28	55	111	802
35	138	111	83	138	111	28	28	55	111	802
36	138	111	83	138	111	28	28	55	111	802
37	138	111	83	138	111	28	28	55	111	802
38	138	111	83	138	111	28	28	55	111	802

39	138	111	83	138	111	28	28	55	111	802
40	138	111	83	138	111	28	28	55	111	802
Sub Watershed 402 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	67	54	40	67	54	13	13	27	54	389
2	67	54	40	67	54	13	13	27	54	389
3	67	54	40	67	54	13	13	27	54	389
4	67	54	40	67	54	13	13	27	54	389
5	67	54	40	67	54	13	13	27	54	389
6	67	54	40	67	54	13	13	27	54	389
7	67	54	40	67	54	13	13	27	54	389
8	67	54	40	67	54	13	13	27	54	389
9	67	54	40	67	54	13	13	27	54	389
10	67	54	40	67	54	13	13	27	54	389
11	67	54	40	67	54	13	13	27	54	389
12	67	54	40	67	54	13	13	27	54	389
13	67	54	40	67	54	13	13	27	54	389
14	67	54	40	67	54	13	13	27	54	389
15	67	54	40	67	54	13	13	27	54	389
16	67	54	40	67	54	13	13	27	54	389
17	67	54	40	67	54	13	13	27	54	389
18	67	54	40	67	54	13	13	27	54	389
19	67	54	40	67	54	13	13	27	54	389
20	67	54	40	67	54	13	13	27	54	389
21	67	54	40	67	54	13	13	27	54	389
22	67	54	40	67	54	13	13	27	54	389
23	67	54	40	67	54	13	13	27	54	389
24	67	54	40	67	54	13	13	27	54	389
25	67	54	40	67	54	13	13	27	54	389
26	67	54	40	67	54	13	13	27	54	389
27	67	54	40	67	54	13	13	27	54	389
28	67	54	40	67	54	13	13	27	54	389
29	67	54	40	67	54	13	13	27	54	389
30	67	54	40	67	54	13	13	27	54	389
31	67	54	40	67	54	13	13	27	54	389
32	67	54	40	67	54	13	13	27	54	389
33	67	54	40	67	54	13	13	27	54	389
34	67	54	40	67	54	13	13	27	54	389
35	67	54	40	67	54	13	13	27	54	389
36	67	54	40	67	54	13	13	27	54	389
37	67	54	40	67	54	13	13	27	54	389
38	67	54	40	67	54	13	13	27	54	389
39	67	54	40	67	54	13	13	27	54	389
40	67	54	40	67	54	13	13	27	54	389
Sub Watershed 403 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	81	65	49	81	65	16	16	33	65	472
2	81	65	49	81	65	16	16	33	65	472
3	81	65	49	81	65	16	16	33	65	472
4	81	65	49	81	65	16	16	33	65	472
5	81	65	49	81	65	16	16	33	65	472
6	81	65	49	81	65	16	16	33	65	472
7	81	65	49	81	65	16	16	33	65	472
8	81	65	49	81	65	16	16	33	65	472

9	81	65	49	81	65	16	16	33	65	472
10	81	65	49	81	65	16	16	33	65	472
11	81	65	49	81	65	16	16	33	65	472
12	81	65	49	81	65	16	16	33	65	472
13	81	65	49	81	65	16	16	33	65	472
14	81	65	49	81	65	16	16	33	65	472
15	81	65	49	81	65	16	16	33	65	472
16	81	65	49	81	65	16	16	33	65	472
17	81	65	49	81	65	16	16	33	65	472
18	81	65	49	81	65	16	16	33	65	472
19	81	65	49	81	65	16	16	33	65	472
20	81	65	49	81	65	16	16	33	65	472
21	81	65	49	81	65	16	16	33	65	472
22	81	65	49	81	65	16	16	33	65	472
23	81	65	49	81	65	16	16	33	65	472
24	81	65	49	81	65	16	16	33	65	472
25	81	65	49	81	65	16	16	33	65	472
26	81	65	49	81	65	16	16	33	65	472
27	81	65	49	81	65	16	16	33	65	472
28	81	65	49	81	65	16	16	33	65	472
29	81	65	49	81	65	16	16	33	65	472
30	81	65	49	81	65	16	16	33	65	472
31	81	65	49	81	65	16	16	33	65	472
32	81	65	49	81	65	16	16	33	65	472
33	81	65	49	81	65	16	16	33	65	472
34	81	65	49	81	65	16	16	33	65	472
35	81	65	49	81	65	16	16	33	65	472
36	81	65	49	81	65	16	16	33	65	472
37	81	65	49	81	65	16	16	33	65	472
38	81	65	49	81	65	16	16	33	65	472
39	81	65	49	81	65	16	16	33	65	472
40	81	65	49	81	65	16	16	33	65	472
Sub Watershed 501 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	162	129	97	162	129	32	32	65	129	939
2	162	129	97	162	129	32	32	65	129	939
3	162	129	97	162	129	32	32	65	129	939
4	162	129	97	162	129	32	32	65	129	939
5	162	129	97	162	129	32	32	65	129	939
6	162	129	97	162	129	32	32	65	129	939
7	162	129	97	162	129	32	32	65	129	939
8	162	129	97	162	129	32	32	65	129	939
9	162	129	97	162	129	32	32	65	129	939
10	162	129	97	162	129	32	32	65	129	939
11	162	129	97	162	129	32	32	65	129	939
12	162	129	97	162	129	32	32	65	129	939
13	162	129	97	162	129	32	32	65	129	939
14	162	129	97	162	129	32	32	65	129	939
15	162	129	97	162	129	32	32	65	129	939
16	162	129	97	162	129	32	32	65	129	939
17	162	129	97	162	129	32	32	65	129	939
18	162	129	97	162	129	32	32	65	129	939
19	162	129	97	162	129	32	32	65	129	939
20	162	129	97	162	129	32	32	65	129	939
21	162	129	97	162	129	32	32	65	129	939
22	162	129	97	162	129	32	32	65	129	939
23	162	129	97	162	129	32	32	65	129	939
24	162	129	97	162	129	32	32	65	129	939
25	162	129	97	162	129	32	32	65	129	939

26	162	129	97	162	129	32	32	65	129	939
27	162	129	97	162	129	32	32	65	129	939
28	162	129	97	162	129	32	32	65	129	939
29	162	129	97	162	129	32	32	65	129	939
30	162	129	97	162	129	32	32	65	129	939
31	162	129	97	162	129	32	32	65	129	939
32	162	129	97	162	129	32	32	65	129	939
33	162	129	97	162	129	32	32	65	129	939
34	162	129	97	162	129	32	32	65	129	939
35	162	129	97	162	129	32	32	65	129	939
36	162	129	97	162	129	32	32	65	129	939
37	162	129	97	162	129	32	32	65	129	939
38	162	129	97	162	129	32	32	65	129	939
39	162	129	97	162	129	32	32	65	129	939
40	162	129	97	162	129	32	32	65	129	939

Little Blue Targeted Area - HUC 10270207

Sub Watershed 505 Annual Adoption (treated acres), Cropland BMPs										
Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Adoption
1	78	62	47	78	62	16	16	31	62	388
2	78	62	47	78	62	16	16	31	62	388
3	78	62	47	78	62	16	16	31	62	388
4	78	62	47	78	62	16	16	31	62	388
5	78	62	47	78	62	16	16	31	62	388
6	78	62	47	78	62	16	16	31	62	388
7	78	62	47	78	62	16	16	31	62	388
8	78	62	47	78	62	16	16	31	62	388
9	78	62	47	78	62	16	16	31	62	388
10	78	62	47	78	62	16	16	31	62	388
11	78	62	47	78	62	16	16	31	62	388
12	78	62	47	78	62	16	16	31	62	388
13	78	62	47	78	62	16	16	31	62	388
14	78	62	47	78	62	16	16	31	62	388
15	78	62	47	78	62	16	16	31	62	388
16	78	62	47	78	62	16	16	31	62	388
17	78	62	47	78	62	16	16	31	62	388
18	78	62	47	78	62	16	16	31	62	388
19	78	62	47	78	62	16	16	31	62	388
20	78	62	47	78	62	16	16	31	62	388
21	78	62	47	78	62	16	16	31	62	388
22	78	62	47	78	62	16	16	31	62	388
23	78	62	47	78	62	16	16	31	62	388
24	78	62	47	78	62	16	16	31	62	388
25	78	62	47	78	62	16	16	31	62	388
26	78	62	47	78	62	16	16	31	62	388
27	78	62	47	78	62	16	16	31	62	388
28	78	62	47	78	62	16	16	31	62	388
29	78	62	47	78	62	16	16	31	62	388
30	78	62	47	78	62	16	16	31	62	388
31	78	62	47	78	62	16	16	31	62	388
32	78	62	47	78	62	16	16	31	62	388
33	78	62	47	78	62	16	16	31	62	388
34	78	62	47	78	62	16	16	31	62	388
35	78	62	47	78	62	16	16	31	62	388
36	78	62	47	78	62	16	16	31	62	388
37	78	62	47	78	62	16	16	31	62	388
38	78	62	47	78	62	16	16	31	62	388
39	78	62	47	78	62	16	16	31	62	388

40	78	62	47	78	62	16	16	31	62	388
Sub Watershed 601 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	83	67	50	83	67	17	17	33	67	417
2	83	67	50	83	67	17	17	33	67	417
3	83	67	50	83	67	17	17	33	67	417
4	83	67	50	83	67	17	17	33	67	417
5	83	67	50	83	67	17	17	33	67	417
6	83	67	50	83	67	17	17	33	67	417
7	83	67	50	83	67	17	17	33	67	417
8	83	67	50	83	67	17	17	33	67	417
9	83	67	50	83	67	17	17	33	67	417
10	83	67	50	83	67	17	17	33	67	417
11	83	67	50	83	67	17	17	33	67	417
12	83	67	50	83	67	17	17	33	67	417
13	83	67	50	83	67	17	17	33	67	417
14	83	67	50	83	67	17	17	33	67	417
15	83	67	50	83	67	17	17	33	67	417
16	83	67	50	83	67	17	17	33	67	417
17	83	67	50	83	67	17	17	33	67	417
18	83	67	50	83	67	17	17	33	67	417
19	83	67	50	83	67	17	17	33	67	417
20	83	67	50	83	67	17	17	33	67	417
21	83	67	50	83	67	17	17	33	67	417
22	83	67	50	83	67	17	17	33	67	417
23	83	67	50	83	67	17	17	33	67	417
24	83	67	50	83	67	17	17	33	67	417
25	83	67	50	83	67	17	17	33	67	417
26	83	67	50	83	67	17	17	33	67	417
27	83	67	50	83	67	17	17	33	67	417
28	83	67	50	83	67	17	17	33	67	417
29	83	67	50	83	67	17	17	33	67	417
30	83	67	50	83	67	17	17	33	67	417
31	83	67	50	83	67	17	17	33	67	417
32	83	67	50	83	67	17	17	33	67	417
33	83	67	50	83	67	17	17	33	67	417
34	83	67	50	83	67	17	17	33	67	417
35	83	67	50	83	67	17	17	33	67	417
36	83	67	50	83	67	17	17	33	67	417
37	83	67	50	83	67	17	17	33	67	417
38	83	67	50	83	67	17	17	33	67	417
39	83	67	50	83	67	17	17	33	67	417
40	83	67	50	83	67	17	17	33	67	417
Sub Watershed 602 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	57	46	34	57	46	11	11	23	46	286
2	57	46	34	57	46	11	11	23	46	286
3	57	46	34	57	46	11	11	23	46	286
4	57	46	34	57	46	11	11	23	46	286
5	57	46	34	57	46	11	11	23	46	286
6	57	46	34	57	46	11	11	23	46	286
7	57	46	34	57	46	11	11	23	46	286
8	57	46	34	57	46	11	11	23	46	286
9	57	46	34	57	46	11	11	23	46	286

10	57	46	34	57	46	11	11	23	46	286
11	57	46	34	57	46	11	11	23	46	286
12	57	46	34	57	46	11	11	23	46	286
13	57	46	34	57	46	11	11	23	46	286
14	57	46	34	57	46	11	11	23	46	286
15	57	46	34	57	46	11	11	23	46	286
16	57	46	34	57	46	11	11	23	46	286
17	57	46	34	57	46	11	11	23	46	286
18	57	46	34	57	46	11	11	23	46	286
19	57	46	34	57	46	11	11	23	46	286
20	57	46	34	57	46	11	11	23	46	286
21	57	46	34	57	46	11	11	23	46	286
22	57	46	34	57	46	11	11	23	46	286
23	57	46	34	57	46	11	11	23	46	286
24	57	46	34	57	46	11	11	23	46	286
25	57	46	34	57	46	11	11	23	46	286
26	57	46	34	57	46	11	11	23	46	286
27	57	46	34	57	46	11	11	23	46	286
28	57	46	34	57	46	11	11	23	46	286
29	57	46	34	57	46	11	11	23	46	286
30	57	46	34	57	46	11	11	23	46	286
31	57	46	34	57	46	11	11	23	46	286
32	57	46	34	57	46	11	11	23	46	286
33	57	46	34	57	46	11	11	23	46	286
34	57	46	34	57	46	11	11	23	46	286
35	57	46	34	57	46	11	11	23	46	286
36	57	46	34	57	46	11	11	23	46	286
37	57	46	34	57	46	11	11	23	46	286
38	57	46	34	57	46	11	11	23	46	286
39	57	46	34	57	46	11	11	23	46	286
40	57	46	34	57	46	11	11	23	46	286
Sub Watershed 603 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	73	59	44	73	59	15	15	29	59	367
2	73	59	44	73	59	15	15	29	59	367
3	73	59	44	73	59	15	15	29	59	367
4	73	59	44	73	59	15	15	29	59	367
5	73	59	44	73	59	15	15	29	59	367
6	73	59	44	73	59	15	15	29	59	367
7	73	59	44	73	59	15	15	29	59	367
8	73	59	44	73	59	15	15	29	59	367
9	73	59	44	73	59	15	15	29	59	367
10	73	59	44	73	59	15	15	29	59	367
11	73	59	44	73	59	15	15	29	59	367
12	73	59	44	73	59	15	15	29	59	367
13	73	59	44	73	59	15	15	29	59	367
14	73	59	44	73	59	15	15	29	59	367
15	73	59	44	73	59	15	15	29	59	367
16	73	59	44	73	59	15	15	29	59	367
17	73	59	44	73	59	15	15	29	59	367
18	73	59	44	73	59	15	15	29	59	367
19	73	59	44	73	59	15	15	29	59	367
20	73	59	44	73	59	15	15	29	59	367
21	73	59	44	73	59	15	15	29	59	367
22	73	59	44	73	59	15	15	29	59	367
23	73	59	44	73	59	15	15	29	59	367
24	73	59	44	73	59	15	15	29	59	367
25	73	59	44	73	59	15	15	29	59	367
26	73	59	44	73	59	15	15	29	59	367

27	73	59	44	73	59	15	15	29	59	367
28	73	59	44	73	59	15	15	29	59	367
29	73	59	44	73	59	15	15	29	59	367
30	73	59	44	73	59	15	15	29	59	367
31	73	59	44	73	59	15	15	29	59	367
32	73	59	44	73	59	15	15	29	59	367
33	73	59	44	73	59	15	15	29	59	367
34	73	59	44	73	59	15	15	29	59	367
35	73	59	44	73	59	15	15	29	59	367
36	73	59	44	73	59	15	15	29	59	367
37	73	59	44	73	59	15	15	29	59	367
38	73	59	44	73	59	15	15	29	59	367
39	73	59	44	73	59	15	15	29	59	367
40	73	59	44	73	59	15	15	29	59	367
Sub Watershed 606 Annual Adoption (treated acres), Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Adoption**
1	112	90	67	112	90	22	22	45	90	560
2	112	90	67	112	90	22	22	45	90	560
3	112	90	67	112	90	22	22	45	90	560
4	112	90	67	112	90	22	22	45	90	560
5	112	90	67	112	90	22	22	45	90	560
6	112	90	67	112	90	22	22	45	90	560
7	112	90	67	112	90	22	22	45	90	560
8	112	90	67	112	90	22	22	45	90	560
9	112	90	67	112	90	22	22	45	90	560
10	112	90	67	112	90	22	22	45	90	560
11	112	90	67	112	90	22	22	45	90	560
12	112	90	67	112	90	22	22	45	90	560
13	112	90	67	112	90	22	22	45	90	560
14	112	90	67	112	90	22	22	45	90	560
15	112	90	67	112	90	22	22	45	90	560
16	112	90	67	112	90	22	22	45	90	560
17	112	90	67	112	90	22	22	45	90	560
18	112	90	67	112	90	22	22	45	90	560
19	112	90	67	112	90	22	22	45	90	560
20	112	90	67	112	90	22	22	45	90	560
21	112	90	67	112	90	22	22	45	90	560
22	112	90	67	112	90	22	22	45	90	560
23	112	90	67	112	90	22	22	45	90	560
24	112	90	67	112	90	22	22	45	90	560
25	112	90	67	112	90	22	22	45	90	560
26	112	90	67	112	90	22	22	45	90	560
27	112	90	67	112	90	22	22	45	90	560
28	112	90	67	112	90	22	22	45	90	560
29	112	90	67	112	90	22	22	45	90	560
30	112	90	67	112	90	22	22	45	90	560
31	112	90	67	112	90	22	22	45	90	560
32	112	90	67	112	90	22	22	45	90	560
33	112	90	67	112	90	22	22	45	90	560
34	112	90	67	112	90	22	22	45	90	560
35	112	90	67	112	90	22	22	45	90	560
36	112	90	67	112	90	22	22	45	90	560
37	112	90	67	112	90	22	22	45	90	560
38	112	90	67	112	90	22	22	45	90	560
39	112	90	67	112	90	22	22	45	90	560
40	112	90	67	112	90	22	22	45	90	560

2. Cropland BMP Implementation: Sediment Load Reduction by HUC 12 Sub Watersheds

Big Blue Targeted Area - HUC 10270205

Sub Watershed 201 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Load Reduction
1	476	203	191	159	152	121	0	127	203	1,633
2	953	407	381	318	305	241	0	254	407	3,265
3	1,429	610	572	476	457	362	0	381	610	4,898
4	1,906	813	762	635	610	483	0	508	813	6,530
5	2,382	1,016	953	794	762	603	0	635	1,016	8,163
6	2,859	1,220	1,143	953	915	724	0	762	1,220	9,796
7	3,335	1,423	1,334	1,112	1,067	845	0	889	1,423	11,428
8	3,812	1,626	1,525	1,271	1,220	966	0	1,016	1,626	13,061
9	4,288	1,830	1,715	1,429	1,372	1,086	0	1,143	1,830	14,694
10	4,764	2,033	1,906	1,588	1,525	1,207	0	1,271	2,033	16,326
11	5,241	2,236	2,096	1,747	1,677	1,328	0	1,398	2,236	17,959
12	5,717	2,439	2,287	1,906	1,830	1,448	0	1,525	2,439	19,591
13	6,194	2,643	2,478	2,065	1,982	1,569	0	1,652	2,643	21,224
14	6,670	2,846	2,668	2,223	2,134	1,690	0	1,779	2,846	22,857
15	7,147	3,049	2,859	2,382	2,287	1,810	0	1,906	3,049	24,489
16	7,623	3,253	3,049	2,541	2,439	1,931	0	2,033	3,253	26,122
17	8,100	3,456	3,240	2,700	2,592	2,052	0	2,160	3,456	27,755
18	8,576	3,659	3,430	2,859	2,744	2,173	0	2,287	3,659	29,387
19	9,052	3,862	3,621	3,017	2,897	2,293	0	2,414	3,862	31,020
20	9,529	4,066	3,812	3,176	3,049	2,414	0	2,541	4,066	32,652
21	10,005	4,269	4,002	3,335	3,202	2,535	0	2,668	4,269	34,285
22	10,482	4,472	4,193	3,494	3,354	2,655	0	2,795	4,472	35,918
23	10,958	4,676	4,383	3,653	3,507	2,776	0	2,922	4,676	37,550
24	11,435	4,879	4,574	3,812	3,659	2,897	0	3,049	4,879	39,183
25	11,911	5,082	4,764	3,970	3,812	3,017	0	3,176	5,082	40,816
26	12,388	5,285	4,955	4,129	3,964	3,138	0	3,303	5,285	42,448
27	12,864	5,489	5,146	4,288	4,116	3,259	0	3,430	5,489	44,081
28	13,340	5,692	5,336	4,447	4,269	3,380	0	3,557	5,692	45,713
29	13,817	5,895	5,527	4,606	4,421	3,500	0	3,685	5,895	47,346
30	14,293	6,099	5,717	4,764	4,574	3,621	0	3,812	6,099	48,979
31	14,770	6,302	5,908	4,923	4,726	3,742	0	3,939	6,302	50,611
32	15,246	6,505	6,099	5,082	4,879	3,862	0	4,066	6,505	52,244
33	15,723	6,708	6,289	5,241	5,031	3,983	0	4,193	6,708	53,877
34	16,199	6,912	6,480	5,400	5,184	4,104	0	4,320	6,912	55,509
35	16,676	7,115	6,670	5,559	5,336	4,224	0	4,447	7,115	57,142
36	17,152	7,318	6,861	5,717	5,489	4,345	0	4,574	7,318	58,774
37	17,629	7,521	7,051	5,876	5,641	4,466	0	4,701	7,521	60,407
38	18,105	7,725	7,242	6,035	5,794	4,587	0	4,828	7,725	62,040
39	18,581	7,928	7,433	6,194	5,946	4,707	0	4,955	7,928	63,672
40	19,058	8,131	7,623	6,353	6,099	4,828	0	5,082	8,131	65,305
Sub Watershed 204 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Load Reduction
1	550	235	220	183	176	139	0	147	235	1,886
2	1,101	470	440	367	352	279	0	293	470	3,771
3	1,651	704	660	550	528	418	0	440	704	5,657
4	2,201	939	880	734	704	558	0	587	939	7,543
5	2,751	1,174	1,101	917	880	697	0	734	1,174	9,428
6	3,302	1,409	1,321	1,101	1,057	836	0	880	1,409	11,314
7	3,852	1,644	1,541	1,284	1,233	976	0	1,027	1,644	13,200

8	4,402	1,878	1,761	1,467	1,409	1,115	0	1,174	1,878	15,086
9	4,953	2,113	1,981	1,651	1,585	1,255	0	1,321	2,113	16,971
10	5,503	2,348	2,201	1,834	1,761	1,394	0	1,467	2,348	18,857
11	6,053	2,583	2,421	2,018	1,937	1,534	0	1,614	2,583	20,743
12	6,604	2,818	2,641	2,201	2,113	1,673	0	1,761	2,818	22,628
13	7,154	3,052	2,862	2,385	2,289	1,812	0	1,908	3,052	24,514
14	7,704	3,287	3,082	2,568	2,465	1,952	0	2,054	3,287	26,400
15	8,254	3,522	3,302	2,751	2,641	2,091	0	2,201	3,522	28,285
16	8,805	3,757	3,522	2,935	2,818	2,231	0	2,348	3,757	30,171
17	9,355	3,992	3,742	3,118	2,994	2,370	0	2,495	3,992	32,057
18	9,905	4,226	3,962	3,302	3,170	2,509	0	2,641	4,226	33,943
19	10,456	4,461	4,182	3,485	3,346	2,649	0	2,788	4,461	35,828
20	11,006	4,696	4,402	3,669	3,522	2,788	0	2,935	4,696	37,714
21	11,556	4,931	4,623	3,852	3,698	2,928	0	3,082	4,931	39,600
22	12,107	5,165	4,843	4,036	3,874	3,067	0	3,228	5,165	41,485
23	12,657	5,400	5,063	4,219	4,050	3,206	0	3,375	5,400	43,371
24	13,207	5,635	5,283	4,402	4,226	3,346	0	3,522	5,635	45,257
25	13,757	5,870	5,503	4,586	4,402	3,485	0	3,669	5,870	47,142
26	14,308	6,105	5,723	4,769	4,578	3,625	0	3,815	6,105	49,028
27	14,858	6,339	5,943	4,953	4,755	3,764	0	3,962	6,339	50,914
28	15,408	6,574	6,163	5,136	4,931	3,903	0	4,109	6,574	52,799
29	15,959	6,809	6,383	5,320	5,107	4,043	0	4,256	6,809	54,685
30	16,509	7,044	6,604	5,503	5,283	4,182	0	4,402	7,044	56,571
31	17,059	7,279	6,824	5,686	5,459	4,322	0	4,549	7,279	58,457
32	17,610	7,513	7,044	5,870	5,635	4,461	0	4,696	7,513	60,342
33	18,160	7,748	7,264	6,053	5,811	4,601	0	4,843	7,748	62,228
34	18,710	7,983	7,484	6,237	5,987	4,740	0	4,989	7,983	64,114
35	19,260	8,218	7,704	6,420	6,163	4,879	0	5,136	8,218	65,999
36	19,811	8,453	7,924	6,604	6,339	5,019	0	5,283	8,453	67,885
37	20,361	8,687	8,144	6,787	6,516	5,158	0	5,430	8,687	69,771
38	20,911	8,922	8,365	6,970	6,692	5,298	0	5,576	8,922	71,656
39	21,462	9,157	8,585	7,154	6,868	5,437	0	5,723	9,157	73,542
40	22,012	9,392	8,805	7,337	7,044	5,576	0	5,870	9,392	75,428
Sub Watershed 301 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	911	389	364	304	291	231	0	243	389	3,120
2	1,821	777	728	607	583	461	0	486	777	6,240
3	2,732	1,166	1,093	911	874	692	0	728	1,166	9,361
4	3,642	1,554	1,457	1,214	1,166	923	0	971	1,554	12,481
5	4,553	1,943	1,821	1,518	1,457	1,153	0	1,214	1,943	15,601
6	5,463	2,331	2,185	1,821	1,748	1,384	0	1,457	2,331	18,721
7	6,374	2,720	2,550	2,125	2,040	1,615	0	1,700	2,720	21,842
8	7,285	3,108	2,914	2,428	2,331	1,845	0	1,943	3,108	24,962
9	8,195	3,497	3,278	2,732	2,622	2,076	0	2,185	3,497	28,082
10	9,106	3,885	3,642	3,035	2,914	2,307	0	2,428	3,885	31,202
11	10,016	4,274	4,007	3,339	3,205	2,537	0	2,671	4,274	34,322
12	10,927	4,662	4,371	3,642	3,497	2,768	0	2,914	4,662	37,443
13	11,837	5,051	4,735	3,946	3,788	2,999	0	3,157	5,051	40,563
14	12,748	5,439	5,099	4,249	4,079	3,229	0	3,399	5,439	43,683
15	13,659	5,828	5,463	4,553	4,371	3,460	0	3,642	5,828	46,803
16	14,569	6,216	5,828	4,856	4,662	3,691	0	3,885	6,216	49,924
17	15,480	6,605	6,192	5,160	4,954	3,922	0	4,128	6,605	53,044
18	16,390	6,993	6,556	5,463	5,245	4,152	0	4,371	6,993	56,164
19	17,301	7,382	6,920	5,767	5,536	4,383	0	4,614	7,382	59,284
20	18,211	7,770	7,285	6,070	5,828	4,614	0	4,856	7,770	62,404
21	19,122	8,159	7,649	6,374	6,119	4,844	0	5,099	8,159	65,525
22	20,033	8,547	8,013	6,678	6,410	5,075	0	5,342	8,547	68,645
23	20,943	8,936	8,377	6,981	6,702	5,306	0	5,585	8,936	71,765
24	21,854	9,324	8,741	7,285	6,993	5,536	0	5,828	9,324	74,885

25	22,764	9,713	9,106	7,588	7,285	5,767	0	6,070	9,713	78,006
26	23,675	10,101	9,470	7,892	7,576	5,998	0	6,313	10,101	81,126
27	24,585	10,490	9,834	8,195	7,867	6,228	0	6,556	10,490	84,246
28	25,496	10,878	10,198	8,499	8,159	6,459	0	6,799	10,878	87,366
29	26,407	11,267	10,563	8,802	8,450	6,690	0	7,042	11,267	90,486
30	27,317	11,655	10,927	9,106	8,741	6,920	0	7,285	11,655	93,607
31	28,228	12,044	11,291	9,409	9,033	7,151	0	7,527	12,044	96,727
32	29,138	12,432	11,655	9,713	9,324	7,382	0	7,770	12,432	99,847
33	30,049	12,821	12,020	10,016	9,616	7,612	0	8,013	12,821	102,967
34	30,959	13,209	12,384	10,320	9,907	7,843	0	8,256	13,209	106,088
35	31,870	13,598	12,748	10,623	10,198	8,074	0	8,499	13,598	109,208
36	32,781	13,986	13,112	10,927	10,490	8,304	0	8,741	13,986	112,328
37	33,691	14,375	13,476	11,230	10,781	8,535	0	8,984	14,375	115,448
38	34,602	14,763	13,841	11,534	11,073	8,766	0	9,227	14,763	118,569
39	35,512	15,152	14,205	11,837	11,364	8,996	0	9,470	15,152	121,689
40	36,423	15,540	14,569	12,141	11,655	9,227	0	9,713	15,540	124,809
Sub Watershed 302 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	878	375	351	293	281	223	0	234	375	3,010
2	1,757	750	703	586	562	445	0	468	750	6,020
3	2,635	1,124	1,054	878	843	668	0	703	1,124	9,030
4	3,514	1,499	1,405	1,171	1,124	890	0	937	1,499	12,040
5	4,392	1,874	1,757	1,464	1,405	1,113	0	1,171	1,874	15,050
6	5,271	2,249	2,108	1,757	1,687	1,335	0	1,405	2,249	18,060
7	6,149	2,624	2,460	2,050	1,968	1,558	0	1,640	2,624	21,070
8	7,027	2,998	2,811	2,342	2,249	1,780	0	1,874	2,998	24,080
9	7,906	3,373	3,162	2,635	2,530	2,003	0	2,108	3,373	27,090
10	8,784	3,748	3,514	2,928	2,811	2,225	0	2,342	3,748	30,101
11	9,663	4,123	3,865	3,221	3,092	2,448	0	2,577	4,123	33,111
12	10,541	4,498	4,216	3,514	3,373	2,670	0	2,811	4,498	36,121
13	11,419	4,872	4,568	3,806	3,654	2,893	0	3,045	4,872	39,131
14	12,298	5,247	4,919	4,099	3,935	3,115	0	3,279	5,247	42,141
15	13,176	5,622	5,271	4,392	4,216	3,338	0	3,514	5,622	45,151
16	14,055	5,997	5,622	4,685	4,498	3,561	0	3,748	5,997	48,161
17	14,933	6,371	5,973	4,978	4,779	3,783	0	3,982	6,371	51,171
18	15,812	6,746	6,325	5,271	5,060	4,006	0	4,216	6,746	54,181
19	16,690	7,121	6,676	5,563	5,341	4,228	0	4,451	7,121	57,191
20	17,568	7,496	7,027	5,856	5,622	4,451	0	4,685	7,496	60,201
21	18,447	7,871	7,379	6,149	5,903	4,673	0	4,919	7,871	63,211
22	19,325	8,245	7,730	6,442	6,184	4,896	0	5,153	8,245	66,221
23	20,204	8,620	8,081	6,735	6,465	5,118	0	5,388	8,620	69,231
24	21,082	8,995	8,433	7,027	6,746	5,341	0	5,622	8,995	72,241
25	21,960	9,370	8,784	7,320	7,027	5,563	0	5,856	9,370	75,251
26	22,839	9,745	9,136	7,613	7,308	5,786	0	6,090	9,745	78,261
27	23,717	10,119	9,487	7,906	7,590	6,008	0	6,325	10,119	81,271
28	24,596	10,494	9,838	8,199	7,871	6,231	0	6,559	10,494	84,281
29	25,474	10,869	10,190	8,491	8,152	6,453	0	6,793	10,869	87,291
30	26,353	11,244	10,541	8,784	8,433	6,676	0	7,027	11,244	90,302
31	27,231	11,619	10,892	9,077	8,714	6,899	0	7,262	11,619	93,312
32	28,109	11,993	11,244	9,370	8,995	7,121	0	7,496	11,993	96,322
33	28,988	12,368	11,595	9,663	9,276	7,344	0	7,730	12,368	99,332
34	29,866	12,743	11,947	9,955	9,557	7,566	0	7,964	12,743	102,342
35	30,745	13,118	12,298	10,248	9,838	7,789	0	8,199	13,118	105,352
36	31,623	13,493	12,649	10,541	10,119	8,011	0	8,433	13,493	108,362
37	32,502	13,867	13,001	10,834	10,400	8,234	0	8,667	13,867	111,372
38	33,380	14,242	13,352	11,127	10,682	8,456	0	8,901	14,242	114,382
39	34,258	14,617	13,703	11,419	10,963	8,679	0	9,136	14,617	117,392
40	35,137	14,992	14,055	11,712	11,244	8,901	0	9,370	14,992	120,402

Sub Watershed 306 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	372	159	149	124	119	94	0	99	159	1,274
2	744	317	298	248	238	188	0	198	317	2,549
3	1,116	476	446	372	357	283	0	298	476	3,823
4	1,488	635	595	496	476	377	0	397	635	5,097
5	1,859	793	744	620	595	471	0	496	793	6,372
6	2,231	952	893	744	714	565	0	595	952	7,646
7	2,603	1,111	1,041	868	833	659	0	694	1,111	8,921
8	2,975	1,269	1,190	992	952	754	0	793	1,269	10,195
9	3,347	1,428	1,339	1,116	1,071	848	0	893	1,428	11,469
10	3,719	1,587	1,488	1,240	1,190	942	0	992	1,587	12,744
11	4,091	1,745	1,636	1,364	1,309	1,036	0	1,091	1,745	14,018
12	4,463	1,904	1,785	1,488	1,428	1,131	0	1,190	1,904	15,292
13	4,835	2,063	1,934	1,612	1,547	1,225	0	1,289	2,063	16,567
14	5,207	2,221	2,083	1,736	1,666	1,319	0	1,388	2,221	17,841
15	5,578	2,380	2,231	1,859	1,785	1,413	0	1,488	2,380	19,115
16	5,950	2,539	2,380	1,983	1,904	1,507	0	1,587	2,539	20,390
17	6,322	2,697	2,529	2,107	2,023	1,602	0	1,686	2,697	21,664
18	6,694	2,856	2,678	2,231	2,142	1,696	0	1,785	2,856	22,938
19	7,066	3,015	2,826	2,355	2,261	1,790	0	1,884	3,015	24,213
20	7,438	3,174	2,975	2,479	2,380	1,884	0	1,983	3,174	25,487
21	7,810	3,332	3,124	2,603	2,499	1,978	0	2,083	3,332	26,762
22	8,182	3,491	3,273	2,727	2,618	2,073	0	2,182	3,491	28,036
23	8,554	3,650	3,421	2,851	2,737	2,167	0	2,281	3,650	29,310
24	8,925	3,808	3,570	2,975	2,856	2,261	0	2,380	3,808	30,585
25	9,297	3,967	3,719	3,099	2,975	2,355	0	2,479	3,967	31,859
26	9,669	4,126	3,868	3,223	3,094	2,450	0	2,578	4,126	33,133
27	10,041	4,284	4,016	3,347	3,213	2,544	0	2,678	4,284	34,408
28	10,413	4,443	4,165	3,471	3,332	2,638	0	2,777	4,443	35,682
29	10,785	4,602	4,314	3,595	3,451	2,732	0	2,876	4,602	36,956
30	11,157	4,760	4,463	3,719	3,570	2,826	0	2,975	4,760	38,231
31	11,529	4,919	4,611	3,843	3,689	2,921	0	3,074	4,919	39,505
32	11,901	5,078	4,760	3,967	3,808	3,015	0	3,174	5,078	40,779
33	12,273	5,236	4,909	4,091	3,927	3,109	0	3,273	5,236	42,054
34	12,644	5,395	5,058	4,215	4,046	3,203	0	3,372	5,395	43,328
35	13,016	5,554	5,207	4,339	4,165	3,297	0	3,471	5,554	44,603
36	13,388	5,712	5,355	4,463	4,284	3,392	0	3,570	5,712	45,877
37	13,760	5,871	5,504	4,587	4,403	3,486	0	3,669	5,871	47,151
38	14,132	6,030	5,653	4,711	4,522	3,580	0	3,769	6,030	48,426
39	14,504	6,188	5,802	4,835	4,641	3,674	0	3,868	6,188	49,700
40	14,876	6,347	5,950	4,959	4,760	3,769	0	3,967	6,347	50,974
Sub Watershed 401 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	564	241	226	188	180	143	0	150	241	1,932
2	1,128	481	451	376	361	286	0	301	481	3,865
3	1,692	722	677	564	541	429	0	451	722	5,797
4	2,256	962	902	752	722	571	0	602	962	7,729
5	2,820	1,203	1,128	940	902	714	0	752	1,203	9,662
6	3,383	1,444	1,353	1,128	1,083	857	0	902	1,444	11,594
7	3,947	1,684	1,579	1,316	1,263	1,000	0	1,053	1,684	13,526
8	4,511	1,925	1,805	1,504	1,444	1,143	0	1,203	1,925	15,459
9	5,075	2,165	2,030	1,692	1,624	1,286	0	1,353	2,165	17,391

10	5,639	2,406	2,256	1,880	1,805	1,429	0	1,504	2,406	19,323
11	6,203	2,647	2,481	2,068	1,985	1,571	0	1,654	2,647	21,256
12	6,767	2,887	2,707	2,256	2,165	1,714	0	1,805	2,887	23,188
13	7,331	3,128	2,932	2,444	2,346	1,857	0	1,955	3,128	25,120
14	7,895	3,368	3,158	2,632	2,526	2,000	0	2,105	3,368	27,052
15	8,459	3,609	3,383	2,820	2,707	2,143	0	2,256	3,609	28,985
16	9,023	3,850	3,609	3,008	2,887	2,286	0	2,406	3,850	30,917
17	9,586	4,090	3,835	3,195	3,068	2,429	0	2,556	4,090	32,849
18	10,150	4,331	4,060	3,383	3,248	2,571	0	2,707	4,331	34,782
19	10,714	4,571	4,286	3,571	3,429	2,714	0	2,857	4,571	36,714
20	11,278	4,812	4,511	3,759	3,609	2,857	0	3,008	4,812	38,646
21	11,842	5,053	4,737	3,947	3,789	3,000	0	3,158	5,053	40,579
22	12,406	5,293	4,962	4,135	3,970	3,143	0	3,308	5,293	42,511
23	12,970	5,534	5,188	4,323	4,150	3,286	0	3,459	5,534	44,443
24	13,534	5,774	5,414	4,511	4,331	3,429	0	3,609	5,774	46,376
25	14,098	6,015	5,639	4,699	4,511	3,571	0	3,759	6,015	48,308
26	14,662	6,256	5,865	4,887	4,692	3,714	0	3,910	6,256	50,240
27	15,225	6,496	6,090	5,075	4,872	3,857	0	4,060	6,496	52,173
28	15,789	6,737	6,316	5,263	5,053	4,000	0	4,211	6,737	54,105
29	16,353	6,977	6,541	5,451	5,233	4,143	0	4,361	6,977	56,037
30	16,917	7,218	6,767	5,639	5,414	4,286	0	4,511	7,218	57,970
31	17,481	7,459	6,992	5,827	5,594	4,429	0	4,662	7,459	59,902
32	18,045	7,699	7,218	6,015	5,774	4,571	0	4,812	7,699	61,834
33	18,609	7,940	7,444	6,203	5,955	4,714	0	4,962	7,940	63,767
34	19,173	8,180	7,669	6,391	6,135	4,857	0	5,113	8,180	65,699
35	19,737	8,421	7,895	6,579	6,316	5,000	0	5,263	8,421	67,631
36	20,301	8,662	8,120	6,767	6,496	5,143	0	5,414	8,662	69,564
37	20,865	8,902	8,346	6,955	6,677	5,286	0	5,564	8,902	71,496
38	21,428	9,143	8,571	7,143	6,857	5,429	0	5,714	9,143	73,428
39	21,992	9,383	8,797	7,331	7,038	5,571	0	5,865	9,383	75,361
40	22,556	9,624	9,023	7,519	7,218	5,714	0	6,015	9,624	77,293
Sub Watershed 402 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	273	117	109	91	87	69	0	73	117	937
2	547	233	219	182	175	138	0	146	233	1,873
3	820	350	328	273	262	208	0	219	350	2,810
4	1,093	466	437	364	350	277	0	292	466	3,747
5	1,367	583	547	456	437	346	0	364	583	4,683
6	1,640	700	656	547	525	415	0	437	700	5,620
7	1,913	816	765	638	612	485	0	510	816	6,556
8	2,187	933	875	729	700	554	0	583	933	7,493
9	2,460	1,050	984	820	787	623	0	656	1,050	8,430
10	2,733	1,166	1,093	911	875	692	0	729	1,166	9,366
11	3,007	1,283	1,203	1,002	962	762	0	802	1,283	10,303
12	3,280	1,399	1,312	1,093	1,050	831	0	875	1,399	11,240
13	3,553	1,516	1,421	1,184	1,137	900	0	948	1,516	12,176
14	3,827	1,633	1,531	1,276	1,225	969	0	1,020	1,633	13,113
15	4,100	1,749	1,640	1,367	1,312	1,039	0	1,093	1,749	14,049
16	4,373	1,866	1,749	1,458	1,399	1,108	0	1,166	1,866	14,986
17	4,647	1,983	1,859	1,549	1,487	1,177	0	1,239	1,983	15,923
18	4,920	2,099	1,968	1,640	1,574	1,246	0	1,312	2,099	16,859
19	5,193	2,216	2,077	1,731	1,662	1,316	0	1,385	2,216	17,796
20	5,467	2,332	2,187	1,822	1,749	1,385	0	1,458	2,332	18,733
21	5,740	2,449	2,296	1,913	1,837	1,454	0	1,531	2,449	19,669
22	6,013	2,566	2,405	2,004	1,924	1,523	0	1,604	2,566	20,606
23	6,287	2,682	2,515	2,096	2,012	1,593	0	1,676	2,682	21,542
24	6,560	2,799	2,624	2,187	2,099	1,662	0	1,749	2,799	22,479
25	6,833	2,916	2,733	2,278	2,187	1,731	0	1,822	2,916	23,416
26	7,107	3,032	2,843	2,369	2,274	1,800	0	1,895	3,032	24,352

27	7,380	3,149	2,952	2,460	2,362	1,870	0	1,968	3,149	25,289
28	7,653	3,265	3,061	2,551	2,449	1,939	0	2,041	3,265	26,226
29	7,927	3,382	3,171	2,642	2,537	2,008	0	2,114	3,382	27,162
30	8,200	3,499	3,280	2,733	2,624	2,077	0	2,187	3,499	28,099
31	8,473	3,615	3,389	2,824	2,711	2,147	0	2,260	3,615	29,035
32	8,747	3,732	3,499	2,916	2,799	2,216	0	2,332	3,732	29,972
33	9,020	3,849	3,608	3,007	2,886	2,285	0	2,405	3,849	30,909
34	9,293	3,965	3,717	3,098	2,974	2,354	0	2,478	3,965	31,845
35	9,567	4,082	3,827	3,189	3,061	2,424	0	2,551	4,082	32,782
36	9,840	4,198	3,936	3,280	3,149	2,493	0	2,624	4,198	33,719
37	10,113	4,315	4,045	3,371	3,236	2,562	0	2,697	4,315	34,655
38	10,387	4,432	4,155	3,462	3,324	2,631	0	2,770	4,432	35,592
39	10,660	4,548	4,264	3,553	3,411	2,701	0	2,843	4,548	36,528
40	10,933	4,665	4,373	3,644	3,499	2,770	0	2,916	4,665	37,465
Sub Watershed 403 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	332	142	133	111	106	84	0	89	142	1,138
2	664	283	266	221	213	168	0	177	283	2,276
3	996	425	399	332	319	252	0	266	425	3,414
4	1,329	567	531	443	425	337	0	354	567	4,552
5	1,661	709	664	554	531	421	0	443	709	5,691
6	1,993	850	797	664	638	505	0	531	850	6,829
7	2,325	992	930	775	744	589	0	620	992	7,967
8	2,657	1,134	1,063	886	850	673	0	709	1,134	9,105
9	2,989	1,275	1,196	996	957	757	0	797	1,275	10,243
10	3,321	1,417	1,329	1,107	1,063	841	0	886	1,417	11,381
11	3,654	1,559	1,461	1,218	1,169	926	0	974	1,559	12,519
12	3,986	1,701	1,594	1,329	1,275	1,010	0	1,063	1,701	13,657
13	4,318	1,842	1,727	1,439	1,382	1,094	0	1,151	1,842	14,796
14	4,650	1,984	1,860	1,550	1,488	1,178	0	1,240	1,984	15,934
15	4,982	2,126	1,993	1,661	1,594	1,262	0	1,329	2,126	17,072
16	5,314	2,267	2,126	1,771	1,701	1,346	0	1,417	2,267	18,210
17	5,646	2,409	2,259	1,882	1,807	1,430	0	1,506	2,409	19,348
18	5,978	2,551	2,391	1,993	1,913	1,515	0	1,594	2,551	20,486
19	6,311	2,693	2,524	2,104	2,019	1,599	0	1,683	2,693	21,624
20	6,643	2,834	2,657	2,214	2,126	1,683	0	1,771	2,834	22,762
21	6,975	2,976	2,790	2,325	2,232	1,767	0	1,860	2,976	23,901
22	7,307	3,118	2,923	2,436	2,338	1,851	0	1,949	3,118	25,039
23	7,639	3,259	3,056	2,546	2,445	1,935	0	2,037	3,259	26,177
24	7,971	3,401	3,189	2,657	2,551	2,019	0	2,126	3,401	27,315
25	8,303	3,543	3,321	2,768	2,657	2,104	0	2,214	3,543	28,453
26	8,636	3,685	3,454	2,879	2,763	2,188	0	2,303	3,685	29,591
27	8,968	3,826	3,587	2,989	2,870	2,272	0	2,391	3,826	30,729
28	9,300	3,968	3,720	3,100	2,976	2,356	0	2,480	3,968	31,867
29	9,632	4,110	3,853	3,211	3,082	2,440	0	2,569	4,110	33,006
30	9,964	4,251	3,986	3,321	3,189	2,524	0	2,657	4,251	34,144
31	10,296	4,393	4,119	3,432	3,295	2,608	0	2,746	4,393	35,282
32	10,628	4,535	4,251	3,543	3,401	2,693	0	2,834	4,535	36,420
33	10,961	4,676	4,384	3,654	3,507	2,777	0	2,923	4,676	37,558
34	11,293	4,818	4,517	3,764	3,614	2,861	0	3,011	4,818	38,696
35	11,625	4,960	4,650	3,875	3,720	2,945	0	3,100	4,960	39,834
36	11,957	5,102	4,783	3,986	3,826	3,029	0	3,189	5,102	40,972
37	12,289	5,243	4,916	4,096	3,933	3,113	0	3,277	5,243	42,111
38	12,621	5,385	5,048	4,207	4,039	3,197	0	3,366	5,385	43,249
39	12,953	5,527	5,181	4,318	4,145	3,282	0	3,454	5,527	44,387
40	13,286	5,668	5,314	4,429	4,251	3,366	0	3,543	5,668	45,525

Sub Watershed 501 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	758	323	303	253	242	192	0	202	323	2,596
2	1,515	646	606	505	485	384	0	404	646	5,192
3	2,273	970	909	758	727	576	0	606	970	7,788
4	3,030	1,293	1,212	1,010	970	768	0	808	1,293	10,383
5	3,788	1,616	1,515	1,263	1,212	960	0	1,010	1,616	12,979
6	4,545	1,939	1,818	1,515	1,454	1,151	0	1,212	1,939	15,575
7	5,303	2,263	2,121	1,768	1,697	1,343	0	1,414	2,263	18,171
8	6,060	2,586	2,424	2,020	1,939	1,535	0	1,616	2,586	20,767
9	6,818	2,909	2,727	2,273	2,182	1,727	0	1,818	2,909	23,363
10	7,575	3,232	3,030	2,525	2,424	1,919	0	2,020	3,232	25,959
11	8,333	3,555	3,333	2,778	2,667	2,111	0	2,222	3,555	28,554
12	9,091	3,879	3,636	3,030	2,909	2,303	0	2,424	3,879	31,150
13	9,848	4,202	3,939	3,283	3,151	2,495	0	2,626	4,202	33,746
14	10,606	4,525	4,242	3,535	3,394	2,687	0	2,828	4,525	36,342
15	11,363	4,848	4,545	3,788	3,636	2,879	0	3,030	4,848	38,938
16	12,121	5,172	4,848	4,040	3,879	3,071	0	3,232	5,172	41,534
17	12,878	5,495	5,151	4,293	4,121	3,262	0	3,434	5,495	44,130
18	13,636	5,818	5,454	4,545	4,363	3,454	0	3,636	5,818	46,725
19	14,393	6,141	5,757	4,798	4,606	3,646	0	3,838	6,141	49,321
20	15,151	6,464	6,060	5,050	4,848	3,838	0	4,040	6,464	51,917
21	15,908	6,788	6,363	5,303	5,091	4,030	0	4,242	6,788	54,513
22	16,666	7,111	6,666	5,555	5,333	4,222	0	4,444	7,111	57,109
23	17,424	7,434	6,969	5,808	5,576	4,414	0	4,646	7,434	59,705
24	18,181	7,757	7,272	6,060	5,818	4,606	0	4,848	7,757	62,301
25	18,939	8,080	7,575	6,313	6,060	4,798	0	5,050	8,080	64,896
26	19,696	8,404	7,878	6,565	6,303	4,990	0	5,252	8,404	67,492
27	20,454	8,727	8,181	6,818	6,545	5,182	0	5,454	8,727	70,088
28	21,211	9,050	8,485	7,070	6,788	5,374	0	5,656	9,050	72,684
29	21,969	9,373	8,788	7,323	7,030	5,565	0	5,858	9,373	75,280
30	22,726	9,697	9,091	7,575	7,272	5,757	0	6,060	9,697	77,876
31	23,484	10,020	9,394	7,828	7,515	5,949	0	6,262	10,020	80,472
32	24,241	10,343	9,697	8,080	7,757	6,141	0	6,464	10,343	83,067
33	24,999	10,666	10,000	8,333	8,000	6,333	0	6,666	10,666	85,663
34	25,757	10,989	10,303	8,586	8,242	6,525	0	6,868	10,989	88,259
35	26,514	11,313	10,606	8,838	8,485	6,717	0	7,070	11,313	90,855
36	27,272	11,636	10,909	9,091	8,727	6,909	0	7,272	11,636	93,451
37	28,029	11,959	11,212	9,343	8,969	7,101	0	7,474	11,959	96,047
38	28,787	12,282	11,515	9,596	9,212	7,293	0	7,676	12,282	98,643
39	29,544	12,606	11,818	9,848	9,454	7,485	0	7,878	12,606	101,238
40	30,302	12,929	12,121	10,101	9,697	7,676	0	8,080	12,929	103,834

Little Blue Targeted Area - HUC 10270207

Sub Watershed 505 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	168	72	67	56	54	43	0	45	72	577
2	337	144	135	112	108	85	0	90	144	1,153
3	505	215	202	168	162	128	0	135	215	1,730
4	673	287	269	224	215	170	0	179	287	2,306
5	841	359	337	280	269	213	0	224	359	2,883
6	1,010	431	404	337	323	256	0	269	431	3,459
7	1,178	503	471	393	377	298	0	314	503	4,036
8	1,346	574	538	449	431	341	0	359	574	4,612

9	1,514	646	606	505	485	384	0	404	646	5,189
10	1,683	718	673	561	538	426	0	449	718	5,765
11	1,851	790	740	617	592	469	0	494	790	6,342
12	2,019	861	808	673	646	511	0	538	861	6,919
13	2,187	933	875	729	700	554	0	583	933	7,495
14	2,356	1,005	942	785	754	597	0	628	1,005	8,072
15	2,524	1,077	1,010	841	808	639	0	673	1,077	8,648
16	2,692	1,149	1,077	897	861	682	0	718	1,149	9,225
17	2,860	1,220	1,144	953	915	725	0	763	1,220	9,801
18	3,029	1,292	1,211	1,010	969	767	0	808	1,292	10,378
19	3,197	1,364	1,279	1,066	1,023	810	0	852	1,364	10,954
20	3,365	1,436	1,346	1,122	1,077	852	0	897	1,436	11,531
21	3,533	1,508	1,413	1,178	1,131	895	0	942	1,508	12,107
22	3,702	1,579	1,481	1,234	1,184	938	0	987	1,579	12,684
23	3,870	1,651	1,548	1,290	1,238	980	0	1,032	1,651	13,261
24	4,038	1,723	1,615	1,346	1,292	1,023	0	1,077	1,723	13,837
25	4,206	1,795	1,683	1,402	1,346	1,066	0	1,122	1,795	14,414
26	4,375	1,866	1,750	1,458	1,400	1,108	0	1,167	1,866	14,990
27	4,543	1,938	1,817	1,514	1,454	1,151	0	1,211	1,938	15,567
28	4,711	2,010	1,884	1,570	1,508	1,193	0	1,256	2,010	16,143
29	4,879	2,082	1,952	1,626	1,561	1,236	0	1,301	2,082	16,720
30	5,048	2,154	2,019	1,683	1,615	1,279	0	1,346	2,154	17,296
31	5,216	2,225	2,086	1,739	1,669	1,321	0	1,391	2,225	17,873
32	5,384	2,297	2,154	1,795	1,723	1,364	0	1,436	2,297	18,449
33	5,552	2,369	2,221	1,851	1,777	1,407	0	1,481	2,369	19,026
34	5,721	2,441	2,288	1,907	1,831	1,449	0	1,525	2,441	19,603
35	5,889	2,513	2,356	1,963	1,884	1,492	0	1,570	2,513	20,179
36	6,057	2,584	2,423	2,019	1,938	1,534	0	1,615	2,584	20,756
37	6,225	2,656	2,490	2,075	1,992	1,577	0	1,660	2,656	21,332
38	6,394	2,728	2,557	2,131	2,046	1,620	0	1,705	2,728	21,909
39	6,562	2,800	2,625	2,187	2,100	1,662	0	1,750	2,800	22,485
40	6,730	2,872	2,692	2,243	2,154	1,705	0	1,795	2,872	23,062
Sub Watershed 601 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	243	104	97	81	78	62	0	65	104	833
2	486	208	195	162	156	123	0	130	208	1,667
3	730	311	292	243	233	185	0	195	311	2,500
4	973	415	389	324	311	246	0	259	415	3,334
5	1,216	519	486	405	389	308	0	324	519	4,167
6	1,459	623	584	486	467	370	0	389	623	5,000
7	1,702	726	681	567	545	431	0	454	726	5,834
8	1,946	830	778	649	623	493	0	519	830	6,667
9	2,189	934	876	730	700	555	0	584	934	7,501
10	2,432	1,038	973	811	778	616	0	649	1,038	8,334
11	2,675	1,141	1,070	892	856	678	0	713	1,141	9,167
12	2,919	1,245	1,167	973	934	739	0	778	1,245	10,001
13	3,162	1,349	1,265	1,054	1,012	801	0	843	1,349	10,834
14	3,405	1,453	1,362	1,135	1,090	863	0	908	1,453	11,668
15	3,648	1,557	1,459	1,216	1,167	924	0	973	1,557	12,501
16	3,891	1,660	1,557	1,297	1,245	986	0	1,038	1,660	13,334
17	4,135	1,764	1,654	1,378	1,323	1,047	0	1,103	1,764	14,168
18	4,378	1,868	1,751	1,459	1,401	1,109	0	1,167	1,868	15,001
19	4,621	1,972	1,848	1,540	1,479	1,171	0	1,232	1,972	15,835
20	4,864	2,075	1,946	1,621	1,557	1,232	0	1,297	2,075	16,668
21	5,107	2,179	2,043	1,702	1,634	1,294	0	1,362	2,179	17,501
22	5,351	2,283	2,140	1,784	1,712	1,355	0	1,427	2,283	18,335
23	5,594	2,387	2,238	1,865	1,790	1,417	0	1,492	2,387	19,168
24	5,837	2,490	2,335	1,946	1,868	1,479	0	1,557	2,490	20,002

25	6,080	2,594	2,432	2,027	1,946	1,540	0	1,621	2,594	20,835
26	6,323	2,698	2,529	2,108	2,024	1,602	0	1,686	2,698	21,668
27	6,567	2,802	2,627	2,189	2,101	1,664	0	1,751	2,802	22,502
28	6,810	2,906	2,724	2,270	2,179	1,725	0	1,816	2,906	23,335
29	7,053	3,009	2,821	2,351	2,257	1,787	0	1,881	3,009	24,169
30	7,296	3,113	2,919	2,432	2,335	1,848	0	1,946	3,113	25,002
31	7,540	3,217	3,016	2,513	2,413	1,910	0	2,011	3,217	25,835
32	7,783	3,321	3,113	2,594	2,490	1,972	0	2,075	3,321	26,669
33	8,026	3,424	3,210	2,675	2,568	2,033	0	2,140	3,424	27,502
34	8,269	3,528	3,308	2,756	2,646	2,095	0	2,205	3,528	28,336
35	8,512	3,632	3,405	2,837	2,724	2,156	0	2,270	3,632	29,169
36	8,756	3,736	3,502	2,919	2,802	2,218	0	2,335	3,736	30,002
37	8,999	3,839	3,600	3,000	2,880	2,280	0	2,400	3,839	30,836
38	9,242	3,943	3,697	3,081	2,957	2,341	0	2,465	3,943	31,669
39	9,485	4,047	3,794	3,162	3,035	2,403	0	2,529	4,047	32,503
40	9,728	4,151	3,891	3,243	3,113	2,465	0	2,594	4,151	33,336
Sub Watershed 602 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	167	71	67	56	53	42	0	44	71	571
2	333	142	133	111	107	84	0	89	142	1,142
3	500	213	200	167	160	127	0	133	213	1,714
4	667	284	267	222	213	169	0	178	284	2,285
5	833	356	333	278	267	211	0	222	356	2,856
6	1,000	427	400	333	320	253	0	267	427	3,427
7	1,167	498	467	389	373	296	0	311	498	3,999
8	1,334	569	533	445	427	338	0	356	569	4,570
9	1,500	640	600	500	480	380	0	400	640	5,141
10	1,667	711	667	556	533	422	0	445	711	5,712
11	1,834	782	733	611	587	465	0	489	782	6,283
12	2,000	853	800	667	640	507	0	533	853	6,855
13	2,167	925	867	722	693	549	0	578	925	7,426
14	2,334	996	934	778	747	591	0	622	996	7,997
15	2,500	1,067	1,000	833	800	633	0	667	1,067	8,568
16	2,667	1,138	1,067	889	853	676	0	711	1,138	9,140
17	2,834	1,209	1,134	945	907	718	0	756	1,209	9,711
18	3,001	1,280	1,200	1,000	960	760	0	800	1,280	10,282
19	3,167	1,351	1,267	1,056	1,014	802	0	845	1,351	10,853
20	3,334	1,422	1,334	1,111	1,067	845	0	889	1,422	11,424
21	3,501	1,494	1,400	1,167	1,120	887	0	934	1,494	11,996
22	3,667	1,565	1,467	1,222	1,174	929	0	978	1,565	12,567
23	3,834	1,636	1,534	1,278	1,227	971	0	1,022	1,636	13,138
24	4,001	1,707	1,600	1,334	1,280	1,014	0	1,067	1,707	13,709
25	4,167	1,778	1,667	1,389	1,334	1,056	0	1,111	1,778	14,281
26	4,334	1,849	1,734	1,445	1,387	1,098	0	1,156	1,849	14,852
27	4,501	1,920	1,800	1,500	1,440	1,140	0	1,200	1,920	15,423
28	4,668	1,991	1,867	1,556	1,494	1,182	0	1,245	1,991	15,994
29	4,834	2,063	1,934	1,611	1,547	1,225	0	1,289	2,063	16,565
30	5,001	2,134	2,000	1,667	1,600	1,267	0	1,334	2,134	17,137
31	5,168	2,205	2,067	1,723	1,654	1,309	0	1,378	2,205	17,708
32	5,334	2,276	2,134	1,778	1,707	1,351	0	1,422	2,276	18,279
33	5,501	2,347	2,200	1,834	1,760	1,394	0	1,467	2,347	18,850
34	5,668	2,418	2,267	1,889	1,814	1,436	0	1,511	2,418	19,422
35	5,834	2,489	2,334	1,945	1,867	1,478	0	1,556	2,489	19,993
36	6,001	2,560	2,400	2,000	1,920	1,520	0	1,600	2,560	20,564
37	6,168	2,632	2,467	2,056	1,974	1,563	0	1,645	2,632	21,135
38	6,335	2,703	2,534	2,112	2,027	1,605	0	1,689	2,703	21,706
39	6,501	2,774	2,600	2,167	2,080	1,647	0	1,734	2,774	22,278
40	6,668	2,845	2,667	2,223	2,134	1,689	0	1,778	2,845	22,849

Sub Watershed 603 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	271	115	108	90	87	69	0	72	115	927
2	541	231	216	180	173	137	0	144	231	1,854
3	812	346	325	271	260	206	0	216	346	2,782
4	1,082	462	433	361	346	274	0	289	462	3,709
5	1,353	577	541	451	433	343	0	361	577	4,636
6	1,624	693	649	541	520	411	0	433	693	5,563
7	1,894	808	758	631	606	480	0	505	808	6,491
8	2,165	924	866	722	693	548	0	577	924	7,418
9	2,435	1,039	974	812	779	617	0	649	1,039	8,345
10	2,706	1,155	1,082	902	866	686	0	722	1,155	9,272
11	2,977	1,270	1,191	992	952	754	0	794	1,270	10,200
12	3,247	1,385	1,299	1,082	1,039	823	0	866	1,385	11,127
13	3,518	1,501	1,407	1,173	1,126	891	0	938	1,501	12,054
14	3,788	1,616	1,515	1,263	1,212	960	0	1,010	1,616	12,981
15	4,059	1,732	1,624	1,353	1,299	1,028	0	1,082	1,732	13,909
16	4,330	1,847	1,732	1,443	1,385	1,097	0	1,155	1,847	14,836
17	4,600	1,963	1,840	1,533	1,472	1,165	0	1,227	1,963	15,763
18	4,871	2,078	1,948	1,624	1,559	1,234	0	1,299	2,078	16,690
19	5,141	2,194	2,057	1,714	1,645	1,302	0	1,371	2,194	17,618
20	5,412	2,309	2,165	1,804	1,732	1,371	0	1,443	2,309	18,545
21	5,682	2,425	2,273	1,894	1,818	1,440	0	1,515	2,425	19,472
22	5,953	2,540	2,381	1,984	1,905	1,508	0	1,587	2,540	20,399
23	6,224	2,655	2,489	2,075	1,992	1,577	0	1,660	2,655	21,326
24	6,494	2,771	2,598	2,165	2,078	1,645	0	1,732	2,771	22,254
25	6,765	2,886	2,706	2,255	2,165	1,714	0	1,804	2,886	23,181
26	7,035	3,002	2,814	2,345	2,251	1,782	0	1,876	3,002	24,108
27	7,306	3,117	2,922	2,435	2,338	1,851	0	1,948	3,117	25,035
28	7,577	3,233	3,031	2,526	2,425	1,919	0	2,020	3,233	25,963
29	7,847	3,348	3,139	2,616	2,511	1,988	0	2,093	3,348	26,890
30	8,118	3,464	3,247	2,706	2,598	2,057	0	2,165	3,464	27,817
31	8,388	3,579	3,355	2,796	2,684	2,125	0	2,237	3,579	28,744
32	8,659	3,695	3,464	2,886	2,771	2,194	0	2,309	3,695	29,672
33	8,930	3,810	3,572	2,977	2,857	2,262	0	2,381	3,810	30,599
34	9,200	3,925	3,680	3,067	2,944	2,331	0	2,453	3,925	31,526
35	9,471	4,041	3,788	3,157	3,031	2,399	0	2,526	4,041	32,453
36	9,741	4,156	3,897	3,247	3,117	2,468	0	2,598	4,156	33,381
37	10,012	4,272	4,005	3,337	3,204	2,536	0	2,670	4,272	34,308
38	10,283	4,387	4,113	3,428	3,290	2,605	0	2,742	4,387	35,235
39	10,553	4,503	4,221	3,518	3,377	2,673	0	2,814	4,503	36,162
40	10,824	4,618	4,330	3,608	3,464	2,742	0	2,886	4,618	37,090
Sub Watershed 606 Annual Soil Erosion Reduction, Cropland BMPs (tons)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	360	153	144	120	115	91	0	96	153	1,233
2	719	307	288	240	230	182	0	192	307	2,465
3	1,079	460	432	360	345	273	0	288	460	3,698
4	1,439	614	575	480	460	364	0	384	614	4,930
5	1,798	767	719	599	575	456	0	480	767	6,163
6	2,158	921	863	719	691	547	0	575	921	7,395
7	2,518	1,074	1,007	839	806	638	0	671	1,074	8,628
8	2,877	1,228	1,151	959	921	729	0	767	1,228	9,860

9	3,237	1,381	1,295	1,079	1,036	820	0	863	1,381	11,093
10	3,597	1,535	1,439	1,199	1,151	911	0	959	1,535	12,325
11	3,956	1,688	1,583	1,319	1,266	1,002	0	1,055	1,688	13,558
12	4,316	1,842	1,726	1,439	1,381	1,093	0	1,151	1,842	14,790
13	4,676	1,995	1,870	1,559	1,496	1,185	0	1,247	1,995	16,023
14	5,036	2,148	2,014	1,679	1,611	1,276	0	1,343	2,148	17,255
15	5,395	2,302	2,158	1,798	1,726	1,367	0	1,439	2,302	18,488
16	5,755	2,455	2,302	1,918	1,842	1,458	0	1,535	2,455	19,720
17	6,115	2,609	2,446	2,038	1,957	1,549	0	1,631	2,609	20,953
18	6,474	2,762	2,590	2,158	2,072	1,640	0	1,726	2,762	22,185
19	6,834	2,916	2,734	2,278	2,187	1,731	0	1,822	2,916	23,418
20	7,194	3,069	2,877	2,398	2,302	1,822	0	1,918	3,069	24,650
21	7,553	3,223	3,021	2,518	2,417	1,914	0	2,014	3,223	25,883
22	7,913	3,376	3,165	2,638	2,532	2,005	0	2,110	3,376	27,115
23	8,273	3,530	3,309	2,758	2,647	2,096	0	2,206	3,530	28,348
24	8,632	3,683	3,453	2,877	2,762	2,187	0	2,302	3,683	29,580
25	8,992	3,837	3,597	2,997	2,877	2,278	0	2,398	3,837	30,813
26	9,352	3,990	3,741	3,117	2,993	2,369	0	2,494	3,990	32,045
27	9,711	4,144	3,885	3,237	3,108	2,460	0	2,590	4,144	33,278
28	10,071	4,297	4,028	3,357	3,223	2,551	0	2,686	4,297	34,510
29	10,431	4,450	4,172	3,477	3,338	2,642	0	2,782	4,450	35,743
30	10,790	4,604	4,316	3,597	3,453	2,734	0	2,877	4,604	36,975
31	11,150	4,757	4,460	3,717	3,568	2,825	0	2,973	4,757	38,208
32	11,510	4,911	4,604	3,837	3,683	2,916	0	3,069	4,911	39,440
33	11,869	5,064	4,748	3,956	3,798	3,007	0	3,165	5,064	40,673
34	12,229	5,218	4,892	4,076	3,913	3,098	0	3,261	5,218	41,905
35	12,589	5,371	5,036	4,196	4,028	3,189	0	3,357	5,371	43,138
36	12,948	5,525	5,179	4,316	4,144	3,280	0	3,453	5,525	44,370
37	13,308	5,678	5,323	4,436	4,259	3,371	0	3,549	5,678	45,603
38	13,668	5,832	5,467	4,556	4,374	3,463	0	3,645	5,832	46,835
39	14,028	5,985	5,611	4,676	4,489	3,554	0	3,741	5,985	48,068
40	14,387	6,139	5,755	4,796	4,604	3,645	0	3,837	6,139	49,300

3. Cropland BMP Implementation: Phosphorus Load Reduction by HUC 12 Sub Watersheds

Big Blue Targeted Area – HUC 10270205

Sub Watershed 201 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Load Reduction
1	120	96	90	75	72	57	30	60	120	720
2	240	192	180	150	144	114	60	120	240	1,441
3	360	288	270	225	216	171	90	180	360	2,161
4	480	384	360	300	288	228	120	240	480	2,881
5	600	480	450	375	360	285	150	300	600	3,601
6	720	576	540	450	432	342	180	360	720	4,322
7	840	672	630	525	504	399	210	420	840	5,042
8	960	768	720	600	576	456	240	480	960	5,762
9	1,080	864	810	675	648	513	270	540	1,080	6,482
10	1,200	960	900	750	720	570	300	600	1,200	7,203
11	1,320	1,056	990	825	792	627	330	660	1,320	7,923
12	1,441	1,152	1,080	900	864	684	360	720	1,441	8,643
13	1,561	1,248	1,170	975	936	741	390	780	1,561	9,364
14	1,681	1,345	1,260	1,050	1,008	798	420	840	1,681	10,084
15	1,801	1,441	1,351	1,125	1,080	855	450	900	1,801	10,804
16	1,921	1,537	1,441	1,200	1,152	912	480	960	1,921	11,524
17	2,041	1,633	1,531	1,275	1,224	969	510	1,020	2,041	12,245
18	2,161	1,729	1,621	1,351	1,296	1,026	540	1,080	2,161	12,965

19	2,281	1,825	1,711	1,426	1,369	1,083	570	1,140	2,281	13,685
20	2,401	1,921	1,801	1,501	1,441	1,140	600	1,200	2,401	14,405
21	2,521	2,017	1,891	1,576	1,513	1,197	630	1,260	2,521	15,126
22	2,641	2,113	1,981	1,651	1,585	1,254	660	1,320	2,641	15,846
23	2,761	2,209	2,071	1,726	1,657	1,311	690	1,381	2,761	16,566
24	2,881	2,305	2,161	1,801	1,729	1,369	720	1,441	2,881	17,286
25	3,001	2,401	2,251	1,876	1,801	1,426	750	1,501	3,001	18,007
26	3,121	2,497	2,341	1,951	1,873	1,483	780	1,561	3,121	18,727
27	3,241	2,593	2,431	2,026	1,945	1,540	810	1,621	3,241	19,447
28	3,361	2,689	2,521	2,101	2,017	1,597	840	1,681	3,361	20,168
29	3,481	2,785	2,611	2,176	2,089	1,654	870	1,741	3,481	20,888
30	3,601	2,881	2,701	2,251	2,161	1,711	900	1,801	3,601	21,608
31	3,721	2,977	2,791	2,326	2,233	1,768	930	1,861	3,721	22,328
32	3,841	3,073	2,881	2,401	2,305	1,825	960	1,921	3,841	23,049
33	3,961	3,169	2,971	2,476	2,377	1,882	990	1,981	3,961	23,769
34	4,082	3,265	3,061	2,551	2,449	1,939	1,020	2,041	4,082	24,489
35	4,202	3,361	3,151	2,626	2,521	1,996	1,050	2,101	4,202	25,209
36	4,322	3,457	3,241	2,701	2,593	2,053	1,080	2,161	4,322	25,930
37	4,442	3,553	3,331	2,776	2,665	2,110	1,110	2,221	4,442	26,650
38	4,562	3,649	3,421	2,851	2,737	2,167	1,140	2,281	4,562	27,370
39	4,682	3,745	3,511	2,926	2,809	2,224	1,170	2,341	4,682	28,091
40	4,802	3,841	3,601	3,001	2,881	2,281	1,200	2,401	4,802	28,811
Sub Watershed 204 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	135	108	101	84	81	64	34	67	135	807
2	269	215	202	168	161	128	67	135	269	1,615
3	404	323	303	252	242	192	101	202	404	2,422
4	538	431	404	336	323	256	135	269	538	3,229
5	673	538	505	420	404	320	168	336	673	4,037
6	807	646	605	505	484	383	202	404	807	4,844
7	942	754	706	589	565	447	235	471	942	5,651
8	1,076	861	807	673	646	511	269	538	1,076	6,459
9	1,211	969	908	757	727	575	303	605	1,211	7,266
10	1,346	1,076	1,009	841	807	639	336	673	1,346	8,073
11	1,480	1,184	1,110	925	888	703	370	740	1,480	8,881
12	1,615	1,292	1,211	1,009	969	767	404	807	1,615	9,688
13	1,749	1,399	1,312	1,093	1,050	831	437	875	1,749	10,495
14	1,884	1,507	1,413	1,177	1,130	895	471	942	1,884	11,303
15	2,018	1,615	1,514	1,261	1,211	959	505	1,009	2,018	12,110
16	2,153	1,722	1,615	1,346	1,292	1,023	538	1,076	2,153	12,917
17	2,287	1,830	1,716	1,430	1,372	1,087	572	1,144	2,287	13,725
18	2,422	1,938	1,816	1,514	1,453	1,150	605	1,211	2,422	14,532
19	2,557	2,045	1,917	1,598	1,534	1,214	639	1,278	2,557	15,339
20	2,691	2,153	2,018	1,682	1,615	1,278	673	1,346	2,691	16,146
21	2,826	2,261	2,119	1,766	1,695	1,342	706	1,413	2,826	16,954
22	2,960	2,368	2,220	1,850	1,776	1,406	740	1,480	2,960	17,761
23	3,095	2,476	2,321	1,934	1,857	1,470	774	1,547	3,095	18,568
24	3,229	2,583	2,422	2,018	1,938	1,534	807	1,615	3,229	19,376
25	3,364	2,691	2,523	2,102	2,018	1,598	841	1,682	3,364	20,183
26	3,498	2,799	2,624	2,187	2,099	1,662	875	1,749	3,498	20,990
27	3,633	2,906	2,725	2,271	2,180	1,726	908	1,816	3,633	21,798
28	3,768	3,014	2,826	2,355	2,261	1,790	942	1,884	3,768	22,605
29	3,902	3,122	2,927	2,439	2,341	1,853	976	1,951	3,902	23,412
30	4,037	3,229	3,027	2,523	2,422	1,917	1,009	2,018	4,037	24,220
31	4,171	3,337	3,128	2,607	2,503	1,981	1,043	2,086	4,171	25,027
32	4,306	3,445	3,229	2,691	2,583	2,045	1,076	2,153	4,306	25,834
33	4,440	3,552	3,330	2,775	2,664	2,109	1,110	2,220	4,440	26,642
34	4,575	3,660	3,431	2,859	2,745	2,173	1,144	2,287	4,575	27,449
35	4,709	3,768	3,532	2,943	2,826	2,237	1,177	2,355	4,709	28,256

36	4,844	3,875	3,633	3,027	2,906	2,301	1,211	2,422	4,844	29,064
37	4,978	3,983	3,734	3,112	2,987	2,365	1,245	2,489	4,978	29,871
38	5,113	4,090	3,835	3,196	3,068	2,429	1,278	2,557	5,113	30,678
39	5,248	4,198	3,936	3,280	3,149	2,493	1,312	2,624	5,248	31,486
40	5,382	4,306	4,037	3,364	3,229	2,557	1,346	2,691	5,382	32,293
Sub Watershed 301 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	212	170	159	133	127	101	53	106	212	1,273
2	424	339	318	265	255	202	106	212	424	2,546
3	636	509	477	398	382	302	159	318	636	3,819
4	849	679	636	530	509	403	212	424	849	5,091
5	1,061	849	796	663	636	504	265	530	1,061	6,364
6	1,273	1,018	955	796	764	605	318	636	1,273	7,637
7	1,485	1,188	1,114	928	891	705	371	743	1,485	8,910
8	1,697	1,358	1,273	1,061	1,018	806	424	849	1,697	10,183
9	1,909	1,527	1,432	1,193	1,146	907	477	955	1,909	11,456
10	2,121	1,697	1,591	1,326	1,273	1,008	530	1,061	2,121	12,729
11	2,334	1,867	1,750	1,458	1,400	1,108	583	1,167	2,334	14,001
12	2,546	2,037	1,909	1,591	1,527	1,209	636	1,273	2,546	15,274
13	2,758	2,206	2,068	1,724	1,655	1,310	689	1,379	2,758	16,547
14	2,970	2,376	2,228	1,856	1,782	1,411	743	1,485	2,970	17,820
15	3,182	2,546	2,387	1,989	1,909	1,512	796	1,591	3,182	19,093
16	3,394	2,715	2,546	2,121	2,037	1,612	849	1,697	3,394	20,366
17	3,606	2,885	2,705	2,254	2,164	1,713	902	1,803	3,606	21,639
18	3,819	3,055	2,864	2,387	2,291	1,814	955	1,909	3,819	22,911
19	4,031	3,225	3,023	2,519	2,418	1,915	1,008	2,015	4,031	24,184
20	4,243	3,394	3,182	2,652	2,546	2,015	1,061	2,121	4,243	25,457
21	4,455	3,564	3,341	2,784	2,673	2,116	1,114	2,228	4,455	26,730
22	4,667	3,734	3,500	2,917	2,800	2,217	1,167	2,334	4,667	28,003
23	4,879	3,903	3,659	3,050	2,928	2,318	1,220	2,440	4,879	29,276
24	5,091	4,073	3,819	3,182	3,055	2,418	1,273	2,546	5,091	30,549
25	5,304	4,243	3,978	3,315	3,182	2,519	1,326	2,652	5,304	31,821
26	5,516	4,413	4,137	3,447	3,309	2,620	1,379	2,758	5,516	33,094
27	5,728	4,582	4,296	3,580	3,437	2,721	1,432	2,864	5,728	34,367
28	5,940	4,752	4,455	3,713	3,564	2,822	1,485	2,970	5,940	35,640
29	6,152	4,922	4,614	3,845	3,691	2,922	1,538	3,076	6,152	36,913
30	6,364	5,091	4,773	3,978	3,819	3,023	1,591	3,182	6,364	38,186
31	6,576	5,261	4,932	4,110	3,946	3,124	1,644	3,288	6,576	39,459
32	6,789	5,431	5,091	4,243	4,073	3,225	1,697	3,394	6,789	40,731
33	7,001	5,601	5,251	4,375	4,200	3,325	1,750	3,500	7,001	42,004
34	7,213	5,770	5,410	4,508	4,328	3,426	1,803	3,606	7,213	43,277
35	7,425	5,940	5,569	4,641	4,455	3,527	1,856	3,713	7,425	44,550
36	7,637	6,110	5,728	4,773	4,582	3,628	1,909	3,819	7,637	45,823
37	7,849	6,279	5,887	4,906	4,710	3,728	1,962	3,925	7,849	47,096
38	8,061	6,449	6,046	5,038	4,837	3,829	2,015	4,031	8,061	48,369
39	8,274	6,619	6,205	5,171	4,964	3,930	2,068	4,137	8,274	49,642
40	8,486	6,789	6,364	5,304	5,091	4,031	2,121	4,243	8,486	50,914
Sub Watershed 302 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	205	164	153	128	123	97	51	102	205	1,228
2	409	327	307	256	246	194	102	205	409	2,456
3	614	491	460	384	368	292	153	307	614	3,684
4	819	655	614	512	491	389	205	409	819	4,912
5	1,023	819	767	640	614	486	256	512	1,023	6,140

6	1,228	982	921	767	737	583	307	614	1,228	7,367
7	1,433	1,146	1,074	895	860	680	358	716	1,433	8,595
8	1,637	1,310	1,228	1,023	982	778	409	819	1,637	9,823
9	1,842	1,473	1,381	1,151	1,105	875	460	921	1,842	11,051
10	2,047	1,637	1,535	1,279	1,228	972	512	1,023	2,047	12,279
11	2,251	1,801	1,688	1,407	1,351	1,069	563	1,126	2,251	13,507
12	2,456	1,965	1,842	1,535	1,473	1,167	614	1,228	2,456	14,735
13	2,660	2,128	1,995	1,663	1,596	1,264	665	1,330	2,660	15,963
14	2,865	2,292	2,149	1,791	1,719	1,361	716	1,433	2,865	17,191
15	3,070	2,456	2,302	1,919	1,842	1,458	767	1,535	3,070	18,419
16	3,274	2,620	2,456	2,047	1,965	1,555	819	1,637	3,274	19,647
17	3,479	2,783	2,609	2,174	2,087	1,653	870	1,740	3,479	20,875
18	3,684	2,947	2,763	2,302	2,210	1,750	921	1,842	3,684	22,102
19	3,888	3,111	2,916	2,430	2,333	1,847	972	1,944	3,888	23,330
20	4,093	3,274	3,070	2,558	2,456	1,944	1,023	2,047	4,093	24,558
21	4,298	3,438	3,223	2,686	2,579	2,041	1,074	2,149	4,298	25,786
22	4,502	3,602	3,377	2,814	2,701	2,139	1,126	2,251	4,502	27,014
23	4,707	3,766	3,530	2,942	2,824	2,236	1,177	2,354	4,707	28,242
24	4,912	3,929	3,684	3,070	2,947	2,333	1,228	2,456	4,912	29,470
25	5,116	4,093	3,837	3,198	3,070	2,430	1,279	2,558	5,116	30,698
26	5,321	4,257	3,991	3,326	3,193	2,527	1,330	2,660	5,321	31,926
27	5,526	4,420	4,144	3,454	3,315	2,625	1,381	2,763	5,526	33,154
28	5,730	4,584	4,298	3,581	3,438	2,722	1,433	2,865	5,730	34,382
29	5,935	4,748	4,451	3,709	3,561	2,819	1,484	2,967	5,935	35,610
30	6,140	4,912	4,605	3,837	3,684	2,916	1,535	3,070	6,140	36,837
31	6,344	5,075	4,758	3,965	3,807	3,014	1,586	3,172	6,344	38,065
32	6,549	5,239	4,912	4,093	3,929	3,111	1,637	3,274	6,549	39,293
33	6,754	5,403	5,065	4,221	4,052	3,208	1,688	3,377	6,754	40,521
34	6,958	5,567	5,219	4,349	4,175	3,305	1,740	3,479	6,958	41,749
35	7,163	5,730	5,372	4,477	4,298	3,402	1,791	3,581	7,163	42,977
36	7,367	5,894	5,526	4,605	4,420	3,500	1,842	3,684	7,367	44,205
37	7,572	6,058	5,679	4,733	4,543	3,597	1,893	3,786	7,572	45,433
38	7,777	6,221	5,833	4,860	4,666	3,694	1,944	3,888	7,777	46,661
39	7,981	6,385	5,986	4,988	4,789	3,791	1,995	3,991	7,981	47,889
40	8,186	6,549	6,140	5,116	4,912	3,888	2,047	4,093	8,186	49,117
Sub Watershed 306 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	82	66	61	51	49	39	20	41	82	491
2	164	131	123	102	98	78	41	82	164	983
3	246	197	184	154	147	117	61	123	246	1,474
4	328	262	246	205	197	156	82	164	328	1,965
5	409	328	307	256	246	194	102	205	409	2,456
6	491	393	368	307	295	233	123	246	491	2,948
7	573	459	430	358	344	272	143	287	573	3,439
8	655	524	491	409	393	311	164	328	655	3,930
9	737	590	553	461	442	350	184	368	737	4,421
10	819	655	614	512	491	389	205	409	819	4,913
11	901	721	675	563	540	428	225	450	901	5,404
12	983	786	737	614	590	467	246	491	983	5,895
13	1,064	852	798	665	639	506	266	532	1,064	6,387
14	1,146	917	860	716	688	544	287	573	1,146	6,878
15	1,228	983	921	768	737	583	307	614	1,228	7,369
16	1,310	1,048	983	819	786	622	328	655	1,310	7,860
17	1,392	1,114	1,044	870	835	661	348	696	1,392	8,352
18	1,474	1,179	1,105	921	884	700	368	737	1,474	8,843
19	1,556	1,245	1,167	972	933	739	389	778	1,556	9,334
20	1,638	1,310	1,228	1,023	983	778	409	819	1,638	9,825
21	1,719	1,376	1,290	1,075	1,032	817	430	860	1,719	10,317
22	1,801	1,441	1,351	1,126	1,081	856	450	901	1,801	10,808

23	1,883	1,507	1,412	1,177	1,130	895	471	942	1,883	11,299
24	1,965	1,572	1,474	1,228	1,179	933	491	983	1,965	11,791
25	2,047	1,638	1,535	1,279	1,228	972	512	1,023	2,047	12,282
26	2,129	1,703	1,597	1,331	1,277	1,011	532	1,064	2,129	12,773
27	2,211	1,769	1,658	1,382	1,326	1,050	553	1,105	2,211	13,264
28	2,293	1,834	1,719	1,433	1,376	1,089	573	1,146	2,293	13,756
29	2,374	1,900	1,781	1,484	1,425	1,128	594	1,187	2,374	14,247
30	2,456	1,965	1,842	1,535	1,474	1,167	614	1,228	2,456	14,738
31	2,538	2,031	1,904	1,586	1,523	1,206	635	1,269	2,538	15,229
32	2,620	2,096	1,965	1,638	1,572	1,245	655	1,310	2,620	15,721
33	2,702	2,162	2,026	1,689	1,621	1,283	675	1,351	2,702	16,212
34	2,784	2,227	2,088	1,740	1,670	1,322	696	1,392	2,784	16,703
35	2,866	2,293	2,149	1,791	1,719	1,361	716	1,433	2,866	17,195
36	2,948	2,358	2,211	1,842	1,769	1,400	737	1,474	2,948	17,686
37	3,030	2,424	2,272	1,893	1,818	1,439	757	1,515	3,030	18,177
38	3,111	2,489	2,334	1,945	1,867	1,478	778	1,556	3,111	18,668
39	3,193	2,555	2,395	1,996	1,916	1,517	798	1,597	3,193	19,160
40	3,275	2,620	2,456	2,047	1,965	1,556	819	1,638	3,275	19,651
Sub Watershed 401 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	140	112	105	87	84	66	35	70	140	839
2	280	224	210	175	168	133	70	140	280	1,678
3	420	336	315	262	252	199	105	210	420	2,518
4	559	448	420	350	336	266	140	280	559	3,357
5	699	559	525	437	420	332	175	350	699	4,196
6	839	671	629	525	504	399	210	420	839	5,035
7	979	783	734	612	587	465	245	490	979	5,875
8	1,119	895	839	699	671	532	280	559	1,119	6,714
9	1,259	1,007	944	787	755	598	315	629	1,259	7,553
10	1,399	1,119	1,049	874	839	664	350	699	1,399	8,392
11	1,539	1,231	1,154	962	923	731	385	769	1,539	9,231
12	1,678	1,343	1,259	1,049	1,007	797	420	839	1,678	10,071
13	1,818	1,455	1,364	1,136	1,091	864	455	909	1,818	10,910
14	1,958	1,567	1,469	1,224	1,175	930	490	979	1,958	11,749
15	2,098	1,678	1,574	1,311	1,259	997	525	1,049	2,098	12,588
16	2,238	1,790	1,678	1,399	1,343	1,063	559	1,119	2,238	13,428
17	2,378	1,902	1,783	1,486	1,427	1,129	594	1,189	2,378	14,267
18	2,518	2,014	1,888	1,574	1,511	1,196	629	1,259	2,518	15,106
19	2,658	2,126	1,993	1,661	1,595	1,262	664	1,329	2,658	15,945
20	2,797	2,238	2,098	1,748	1,678	1,329	699	1,399	2,797	16,785
21	2,937	2,350	2,203	1,836	1,762	1,395	734	1,469	2,937	17,624
22	3,077	2,462	2,308	1,923	1,846	1,462	769	1,539	3,077	18,463
23	3,217	2,574	2,413	2,011	1,930	1,528	804	1,609	3,217	19,302
24	3,357	2,686	2,518	2,098	2,014	1,595	839	1,678	3,357	20,141
25	3,497	2,797	2,623	2,185	2,098	1,661	874	1,748	3,497	20,981
26	3,637	2,909	2,727	2,273	2,182	1,727	909	1,818	3,637	21,820
27	3,777	3,021	2,832	2,360	2,266	1,794	944	1,888	3,777	22,659
28	3,916	3,133	2,937	2,448	2,350	1,860	979	1,958	3,916	23,498
29	4,056	3,245	3,042	2,535	2,434	1,927	1,014	2,028	4,056	24,338
30	4,196	3,357	3,147	2,623	2,518	1,993	1,049	2,098	4,196	25,177
31	4,336	3,469	3,252	2,710	2,602	2,060	1,084	2,168	4,336	26,016
32	4,476	3,581	3,357	2,797	2,686	2,126	1,119	2,238	4,476	26,855
33	4,616	3,693	3,462	2,885	2,769	2,192	1,154	2,308	4,616	27,694
34	4,756	3,804	3,567	2,972	2,853	2,259	1,189	2,378	4,756	28,534
35	4,895	3,916	3,672	3,060	2,937	2,325	1,224	2,448	4,895	29,373
36	5,035	4,028	3,777	3,147	3,021	2,392	1,259	2,518	5,035	30,212
37	5,175	4,140	3,881	3,235	3,105	2,458	1,294	2,588	5,175	31,051
38	5,315	4,252	3,986	3,322	3,189	2,525	1,329	2,658	5,315	31,891
39	5,455	4,364	4,091	3,409	3,273	2,591	1,364	2,727	5,455	32,730

40	5,595	4,476	4,196	3,497	3,357	2,658	1,399	2,797	5,595	33,569
Sub Watershed 402 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	68	54	51	42	41	32	17	34	68	407
2	136	108	102	85	81	64	34	68	136	814
3	203	163	153	127	122	97	51	102	203	1,220
4	271	217	203	169	163	129	68	136	271	1,627
5	339	271	254	212	203	161	85	169	339	2,034
6	407	325	305	254	244	193	102	203	407	2,441
7	475	380	356	297	285	225	119	237	475	2,848
8	542	434	407	339	325	258	136	271	542	3,254
9	610	488	458	381	366	290	153	305	610	3,661
10	678	542	508	424	407	322	169	339	678	4,068
11	746	597	559	466	447	354	186	373	746	4,475
12	814	651	610	508	488	386	203	407	814	4,881
13	881	705	661	551	529	419	220	441	881	5,288
14	949	759	712	593	570	451	237	475	949	5,695
15	1,017	814	763	636	610	483	254	508	1,017	6,102
16	1,085	868	814	678	651	515	271	542	1,085	6,509
17	1,153	922	864	720	692	547	288	576	1,153	6,915
18	1,220	976	915	763	732	580	305	610	1,220	7,322
19	1,288	1,031	966	805	773	612	322	644	1,288	7,729
20	1,356	1,085	1,017	847	814	644	339	678	1,356	8,136
21	1,424	1,139	1,068	890	854	676	356	712	1,424	8,543
22	1,492	1,193	1,119	932	895	708	373	746	1,492	8,949
23	1,559	1,247	1,170	975	936	741	390	780	1,559	9,356
24	1,627	1,302	1,220	1,017	976	773	407	814	1,627	9,763
25	1,695	1,356	1,271	1,059	1,017	805	424	847	1,695	10,170
26	1,763	1,410	1,322	1,102	1,058	837	441	881	1,763	10,576
27	1,831	1,464	1,373	1,144	1,098	870	458	915	1,831	10,983
28	1,898	1,519	1,424	1,186	1,139	902	475	949	1,898	11,390
29	1,966	1,573	1,475	1,229	1,180	934	492	983	1,966	11,797
30	2,034	1,627	1,525	1,271	1,220	966	508	1,017	2,034	12,204
31	2,102	1,681	1,576	1,314	1,261	998	525	1,051	2,102	12,610
32	2,170	1,736	1,627	1,356	1,302	1,031	542	1,085	2,170	13,017
33	2,237	1,790	1,678	1,398	1,342	1,063	559	1,119	2,237	13,424
34	2,305	1,844	1,729	1,441	1,383	1,095	576	1,153	2,305	13,831
35	2,373	1,898	1,780	1,483	1,424	1,127	593	1,186	2,373	14,238
36	2,441	1,953	1,831	1,525	1,464	1,159	610	1,220	2,441	14,644
37	2,509	2,007	1,881	1,568	1,505	1,192	627	1,254	2,509	15,051
38	2,576	2,061	1,932	1,610	1,546	1,224	644	1,288	2,576	15,458
39	2,644	2,115	1,983	1,653	1,586	1,256	661	1,322	2,644	15,865
40	2,712	2,170	2,034	1,695	1,627	1,288	678	1,356	2,712	16,271
Sub Watershed 403 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	82	66	62	51	49	39	21	41	82	494
2	165	132	124	103	99	78	41	82	165	989
3	247	198	185	154	148	117	62	124	247	1,483
4	330	264	247	206	198	157	82	165	330	1,977
5	412	330	309	257	247	196	103	206	412	2,471
6	494	395	371	309	297	235	124	247	494	2,966
7	577	461	433	360	346	274	144	288	577	3,460
8	659	527	494	412	395	313	165	330	659	3,954
9	741	593	556	463	445	352	185	371	741	4,449

10	824	659	618	515	494	391	206	412	824	4,943
11	906	725	680	566	544	430	227	453	906	5,437
12	989	791	741	618	593	470	247	494	989	5,932
13	1,071	857	803	669	643	509	268	535	1,071	6,426
14	1,153	923	865	721	692	548	288	577	1,153	6,920
15	1,236	989	927	772	741	587	309	618	1,236	7,414
16	1,318	1,055	989	824	791	626	330	659	1,318	7,909
17	1,401	1,120	1,050	875	840	665	350	700	1,401	8,403
18	1,483	1,186	1,112	927	890	704	371	741	1,483	8,897
19	1,565	1,252	1,174	978	939	744	391	783	1,565	9,392
20	1,648	1,318	1,236	1,030	989	783	412	824	1,648	9,886
21	1,730	1,384	1,298	1,081	1,038	822	433	865	1,730	10,380
22	1,812	1,450	1,359	1,133	1,087	861	453	906	1,812	10,875
23	1,895	1,516	1,421	1,184	1,137	900	474	947	1,895	11,369
24	1,977	1,582	1,483	1,236	1,186	939	494	989	1,977	11,863
25	2,060	1,648	1,545	1,287	1,236	978	515	1,030	2,060	12,357
26	2,142	1,714	1,606	1,339	1,285	1,017	535	1,071	2,142	12,852
27	2,224	1,779	1,668	1,390	1,335	1,057	556	1,112	2,224	13,346
28	2,307	1,845	1,730	1,442	1,384	1,096	577	1,153	2,307	13,840
29	2,389	1,911	1,792	1,493	1,433	1,135	597	1,195	2,389	14,335
30	2,471	1,977	1,854	1,545	1,483	1,174	618	1,236	2,471	14,829
31	2,554	2,043	1,915	1,596	1,532	1,213	638	1,277	2,554	15,323
32	2,636	2,109	1,977	1,648	1,582	1,252	659	1,318	2,636	15,818
33	2,719	2,175	2,039	1,699	1,631	1,291	680	1,359	2,719	16,312
34	2,801	2,241	2,101	1,751	1,681	1,330	700	1,401	2,801	16,806
35	2,883	2,307	2,163	1,802	1,730	1,370	721	1,442	2,883	17,300
36	2,966	2,373	2,224	1,854	1,779	1,409	741	1,483	2,966	17,795
37	3,048	2,439	2,286	1,905	1,829	1,448	762	1,524	3,048	18,289
38	3,131	2,504	2,348	1,957	1,878	1,487	783	1,565	3,131	18,783
39	3,213	2,570	2,410	2,008	1,928	1,526	803	1,606	3,213	19,278
40	3,295	2,636	2,471	2,060	1,977	1,565	824	1,648	3,295	19,772

Sub Watershed 501 Annual Phosphorous Reduction, Cropland BMPs (pounds)

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Load Reduction
1	178	142	134	111	107	85	45	89	178	1,068
2	356	285	267	223	214	169	89	178	356	2,137
3	534	427	401	334	321	254	134	267	534	3,205
4	712	570	534	445	427	338	178	356	712	4,273
5	890	712	668	556	534	423	223	445	890	5,342
6	1,068	855	801	668	641	507	267	534	1,068	6,410
7	1,246	997	935	779	748	592	312	623	1,246	7,478
8	1,424	1,140	1,068	890	855	677	356	712	1,424	8,547
9	1,603	1,282	1,202	1,002	962	761	401	801	1,603	9,615
10	1,781	1,424	1,335	1,113	1,068	846	445	890	1,781	10,683
11	1,959	1,567	1,469	1,224	1,175	930	490	979	1,959	11,752
12	2,137	1,709	1,603	1,335	1,282	1,015	534	1,068	2,137	12,820
13	2,315	1,852	1,736	1,447	1,389	1,099	579	1,157	2,315	13,888
14	2,493	1,994	1,870	1,558	1,496	1,184	623	1,246	2,493	14,957
15	2,671	2,137	2,003	1,669	1,603	1,269	668	1,335	2,671	16,025
16	2,849	2,279	2,137	1,781	1,709	1,353	712	1,424	2,849	17,093
17	3,027	2,422	2,270	1,892	1,816	1,438	757	1,513	3,027	18,162
18	3,205	2,564	2,404	2,003	1,923	1,522	801	1,603	3,205	19,230
19	3,383	2,706	2,537	2,114	2,030	1,607	846	1,692	3,383	20,298
20	3,561	2,849	2,671	2,226	2,137	1,692	890	1,781	3,561	21,367
21	3,739	2,991	2,804	2,337	2,244	1,776	935	1,870	3,739	22,435

22	3,917	3,134	2,938	2,448	2,350	1,861	979	1,959	3,917	23,503
23	4,095	3,276	3,071	2,560	2,457	1,945	1,024	2,048	4,095	24,572
24	4,273	3,419	3,205	2,671	2,564	2,030	1,068	2,137	4,273	25,640
25	4,451	3,561	3,339	2,782	2,671	2,114	1,113	2,226	4,451	26,708
26	4,629	3,704	3,472	2,893	2,778	2,199	1,157	2,315	4,629	27,777
27	4,808	3,846	3,606	3,005	2,885	2,284	1,202	2,404	4,808	28,845
28	4,986	3,988	3,739	3,116	2,991	2,368	1,246	2,493	4,986	29,913
29	5,164	4,131	3,873	3,227	3,098	2,453	1,291	2,582	5,164	30,982
30	5,342	4,273	4,006	3,339	3,205	2,537	1,335	2,671	5,342	32,050
31	5,520	4,416	4,140	3,450	3,312	2,622	1,380	2,760	5,520	33,118
32	5,698	4,558	4,273	3,561	3,419	2,706	1,424	2,849	5,698	34,187
33	5,876	4,701	4,407	3,672	3,526	2,791	1,469	2,938	5,876	35,255
34	6,054	4,843	4,540	3,784	3,632	2,876	1,513	3,027	6,054	36,323
35	6,232	4,986	4,674	3,895	3,739	2,960	1,558	3,116	6,232	37,392
36	6,410	5,128	4,808	4,006	3,846	3,045	1,603	3,205	6,410	38,460
37	6,588	5,270	4,941	4,118	3,953	3,129	1,647	3,294	6,588	39,528
38	6,766	5,413	5,075	4,229	4,060	3,214	1,692	3,383	6,766	40,597
39	6,944	5,555	5,208	4,340	4,167	3,298	1,736	3,472	6,944	41,665
40	7,122	5,698	5,342	4,451	4,273	3,383	1,781	3,561	7,122	42,733

Little Blue Targeted Area – HUC 10270207

Sub Watershed 505 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Load Reduction
1	54	43	41	34	33	26	14	27	54	326
2	109	87	82	68	65	52	27	54	109	652
3	163	130	122	102	98	77	41	82	163	978
4	217	174	163	136	130	103	54	109	217	1,304
5	272	217	204	170	163	129	68	136	272	1,630
6	326	261	245	204	196	155	82	163	326	1,956
7	380	304	285	238	228	181	95	190	380	2,282
8	435	348	326	272	261	206	109	217	435	2,608
9	489	391	367	306	293	232	122	245	489	2,934
10	543	435	408	340	326	258	136	272	543	3,260
11	598	478	448	374	359	284	149	299	598	3,586
12	652	522	489	408	391	310	163	326	652	3,912
13	706	565	530	441	424	336	177	353	706	4,238
14	761	609	571	475	456	361	190	380	761	4,564
15	815	652	611	509	489	387	204	408	815	4,890
16	869	696	652	543	522	413	217	435	869	5,216
17	924	739	693	577	554	439	231	462	924	5,542
18	978	782	734	611	587	465	245	489	978	5,868
19	1,032	826	774	645	619	490	258	516	1,032	6,194
20	1,087	869	815	679	652	516	272	543	1,087	6,521
21	1,141	913	856	713	685	542	285	571	1,141	6,847
22	1,195	956	897	747	717	568	299	598	1,195	7,173
23	1,250	1,000	937	781	750	594	312	625	1,250	7,499
24	1,304	1,043	978	815	782	619	326	652	1,304	7,825
25	1,358	1,087	1,019	849	815	645	340	679	1,358	8,151
26	1,413	1,130	1,060	883	848	671	353	706	1,413	8,477
27	1,467	1,174	1,100	917	880	697	367	734	1,467	8,803
28	1,521	1,217	1,141	951	913	723	380	761	1,521	9,129
29	1,576	1,261	1,182	985	945	748	394	788	1,576	9,455
30	1,630	1,304	1,223	1,019	978	774	408	815	1,630	9,781
31	1,684	1,348	1,263	1,053	1,011	800	421	842	1,684	10,107
32	1,739	1,391	1,304	1,087	1,043	826	435	869	1,739	10,433
33	1,793	1,435	1,345	1,121	1,076	852	448	897	1,793	10,759
34	1,847	1,478	1,386	1,155	1,108	878	462	924	1,847	11,085
35	1,902	1,521	1,426	1,189	1,141	903	475	951	1,902	11,411
36	1,956	1,565	1,467	1,223	1,174	929	489	978	1,956	11,737

37	2,010	1,608	1,508	1,257	1,206	955	503	1,005	2,010	12,063
38	2,065	1,652	1,549	1,291	1,239	981	516	1,032	2,065	12,389
39	2,119	1,695	1,589	1,324	1,271	1,007	530	1,060	2,119	12,715
40	2,174	1,739	1,630	1,358	1,304	1,032	543	1,087	2,174	13,041
Sub Watershed 601 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	60	48	45	37	36	28	15	30	60	358
2	119	96	90	75	72	57	30	60	119	716
3	179	143	134	112	107	85	45	90	179	1,074
4	239	191	179	149	143	113	60	119	239	1,433
5	298	239	224	187	179	142	75	149	298	1,791
6	358	287	269	224	215	170	90	179	358	2,149
7	418	334	313	261	251	198	104	209	418	2,507
8	478	382	358	298	287	227	119	239	478	2,865
9	537	430	403	336	322	255	134	269	537	3,223
10	597	478	448	373	358	284	149	298	597	3,581
11	657	525	492	410	394	312	164	328	657	3,939
12	716	573	537	448	430	340	179	358	716	4,298
13	776	621	582	485	466	369	194	388	776	4,656
14	836	669	627	522	501	397	209	418	836	5,014
15	895	716	671	560	537	425	224	448	895	5,372
16	955	764	716	597	573	454	239	478	955	5,730
17	1,015	812	761	634	609	482	254	507	1,015	6,088
18	1,074	860	806	671	645	510	269	537	1,074	6,446
19	1,134	907	851	709	680	539	284	567	1,134	6,804
20	1,194	955	895	746	716	567	298	597	1,194	7,163
21	1,253	1,003	940	783	752	595	313	627	1,253	7,521
22	1,313	1,051	985	821	788	624	328	657	1,313	7,879
23	1,373	1,098	1,030	858	824	652	343	686	1,373	8,237
24	1,433	1,146	1,074	895	860	680	358	716	1,433	8,595
25	1,492	1,194	1,119	933	895	709	373	746	1,492	8,953
26	1,552	1,242	1,164	970	931	737	388	776	1,552	9,311
27	1,612	1,289	1,209	1,007	967	765	403	806	1,612	9,669
28	1,671	1,337	1,253	1,045	1,003	794	418	836	1,671	10,028
29	1,731	1,385	1,298	1,082	1,039	822	433	865	1,731	10,386
30	1,791	1,433	1,343	1,119	1,074	851	448	895	1,791	10,744
31	1,850	1,480	1,388	1,156	1,110	879	463	925	1,850	11,102
32	1,910	1,528	1,433	1,194	1,146	907	478	955	1,910	11,460
33	1,970	1,576	1,477	1,231	1,182	936	492	985	1,970	11,818
34	2,029	1,624	1,522	1,268	1,218	964	507	1,015	2,029	12,176
35	2,089	1,671	1,567	1,306	1,253	992	522	1,045	2,089	12,534
36	2,149	1,719	1,612	1,343	1,289	1,021	537	1,074	2,149	12,893
37	2,208	1,767	1,656	1,380	1,325	1,049	552	1,104	2,208	13,251
38	2,268	1,815	1,701	1,418	1,361	1,077	567	1,134	2,268	13,609
39	2,328	1,862	1,746	1,455	1,397	1,106	582	1,164	2,328	13,967
40	2,388	1,910	1,791	1,492	1,433	1,134	597	1,194	2,388	14,325
Sub Watershed 602 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	41	33	31	26	25	19	10	20	41	245
2	82	65	61	51	49	39	20	41	82	491
3	123	98	92	77	74	58	31	61	123	736
4	164	131	123	102	98	78	41	82	164	982
5	205	164	153	128	123	97	51	102	205	1,227
6	245	196	184	153	147	117	61	123	245	1,473
7	286	229	215	179	172	136	72	143	286	1,718

8	327	262	245	205	196	155	82	164	327	1,964
9	368	295	276	230	221	175	92	184	368	2,209
10	409	327	307	256	245	194	102	205	409	2,455
11	450	360	338	281	270	214	113	225	450	2,700
12	491	393	368	307	295	233	123	245	491	2,946
13	532	425	399	332	319	253	133	266	532	3,191
14	573	458	430	358	344	272	143	286	573	3,436
15	614	491	460	384	368	291	153	307	614	3,682
16	655	524	491	409	393	311	164	327	655	3,927
17	695	556	522	435	417	330	174	348	695	4,173
18	736	589	552	460	442	350	184	368	736	4,418
19	777	622	583	486	466	369	194	389	777	4,664
20	818	655	614	511	491	389	205	409	818	4,909
21	859	687	644	537	515	408	215	430	859	5,155
22	900	720	675	563	540	428	225	450	900	5,400
23	941	753	706	588	565	447	235	470	941	5,646
24	982	785	736	614	589	466	245	491	982	5,891
25	1,023	818	767	639	614	486	256	511	1,023	6,137
26	1,064	851	798	665	638	505	266	532	1,064	6,382
27	1,105	884	828	690	663	525	276	552	1,105	6,627
28	1,145	916	859	716	687	544	286	573	1,145	6,873
29	1,186	949	890	742	712	564	297	593	1,186	7,118
30	1,227	982	920	767	736	583	307	614	1,227	7,364
31	1,268	1,015	951	793	761	602	317	634	1,268	7,609
32	1,309	1,047	982	818	785	622	327	655	1,309	7,855
33	1,350	1,080	1,013	844	810	641	338	675	1,350	8,100
34	1,391	1,113	1,043	869	835	661	348	695	1,391	8,346
35	1,432	1,145	1,074	895	859	680	358	716	1,432	8,591
36	1,473	1,178	1,105	920	884	700	368	736	1,473	8,837
37	1,514	1,211	1,135	946	908	719	378	757	1,514	9,082
38	1,555	1,244	1,166	972	933	738	389	777	1,555	9,328
39	1,596	1,276	1,197	997	957	758	399	798	1,596	9,573
40	1,636	1,309	1,227	1,023	982	777	409	818	1,636	9,819

Sub Watershed 603 Annual Phosphorous Reduction, Cropland BMPs (pounds)

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Load Reduction
1	75	60	56	47	45	36	19	37	75	450
2	150	120	112	94	90	71	37	75	150	899
3	225	180	169	141	135	107	56	112	225	1,349
4	300	240	225	187	180	142	75	150	300	1,799
5	375	300	281	234	225	178	94	187	375	2,249
6	450	360	337	281	270	214	112	225	450	2,698
7	525	420	393	328	315	249	131	262	525	3,148
8	600	480	450	375	360	285	150	300	600	3,598
9	675	540	506	422	405	320	169	337	675	4,047
10	750	600	562	468	450	356	187	375	750	4,497
11	824	660	618	515	495	392	206	412	824	4,947
12	899	720	675	562	540	427	225	450	899	5,396
13	974	779	731	609	585	463	244	487	974	5,846
14	1,049	839	787	656	630	498	262	525	1,049	6,296
15	1,124	899	843	703	675	534	281	562	1,124	6,746
16	1,199	959	899	750	720	570	300	600	1,199	7,195
17	1,274	1,019	956	796	764	605	319	637	1,274	7,645
18	1,349	1,079	1,012	843	809	641	337	675	1,349	8,095
19	1,424	1,139	1,068	890	854	676	356	712	1,424	8,544
20	1,499	1,199	1,124	937	899	712	375	750	1,499	8,994
21	1,574	1,259	1,180	984	944	748	393	787	1,574	9,444
22	1,649	1,319	1,237	1,031	989	783	412	824	1,649	9,894

23	1,724	1,379	1,293	1,077	1,034	819	431	862	1,724	10,343
24	1,799	1,439	1,349	1,124	1,079	854	450	899	1,799	10,793
25	1,874	1,499	1,405	1,171	1,124	890	468	937	1,874	11,243
26	1,949	1,559	1,462	1,218	1,169	926	487	974	1,949	11,692
27	2,024	1,619	1,518	1,265	1,214	961	506	1,012	2,024	12,142
28	2,099	1,679	1,574	1,312	1,259	997	525	1,049	2,099	12,592
29	2,174	1,739	1,630	1,358	1,304	1,032	543	1,087	2,174	13,041
30	2,249	1,799	1,686	1,405	1,349	1,068	562	1,124	2,249	13,491
31	2,323	1,859	1,743	1,452	1,394	1,104	581	1,162	2,323	13,941
32	2,398	1,919	1,799	1,499	1,439	1,139	600	1,199	2,398	14,391
33	2,473	1,979	1,855	1,546	1,484	1,175	618	1,237	2,473	14,840
34	2,548	2,039	1,911	1,593	1,529	1,210	637	1,274	2,548	15,290
35	2,623	2,099	1,967	1,640	1,574	1,246	656	1,312	2,623	15,740
36	2,698	2,159	2,024	1,686	1,619	1,282	675	1,349	2,698	16,189
37	2,773	2,219	2,080	1,733	1,664	1,317	693	1,387	2,773	16,639
38	2,848	2,279	2,136	1,780	1,709	1,353	712	1,424	2,848	17,089
39	2,923	2,338	2,192	1,827	1,754	1,388	731	1,462	2,923	17,539
40	2,998	2,398	2,249	1,874	1,799	1,424	750	1,499	2,998	17,988
Sub Watershed 606 Annual Phosphorous Reduction, Cropland BMPs (pounds)										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Load Reduction**
1	99	79	74	62	59	47	25	49	99	592
2	197	158	148	123	118	94	49	99	197	1,183
3	296	237	222	185	177	141	74	148	296	1,775
4	394	316	296	247	237	187	99	197	394	2,366
5	493	394	370	308	296	234	123	247	493	2,958
6	592	473	444	370	355	281	148	296	592	3,550
7	690	552	518	431	414	328	173	345	690	4,141
8	789	631	592	493	473	375	197	394	789	4,733
9	887	710	666	555	532	422	222	444	887	5,325
10	986	789	740	616	592	468	247	493	986	5,916
11	1,085	868	813	678	651	515	271	542	1,085	6,508
12	1,183	947	887	740	710	562	296	592	1,183	7,099
13	1,282	1,025	961	801	769	609	320	641	1,282	7,691
14	1,380	1,104	1,035	863	828	656	345	690	1,380	8,283
15	1,479	1,183	1,109	924	887	703	370	740	1,479	8,874
16	1,578	1,262	1,183	986	947	749	394	789	1,578	9,466
17	1,676	1,341	1,257	1,048	1,006	796	419	838	1,676	10,058
18	1,775	1,420	1,331	1,109	1,065	843	444	887	1,775	10,649
19	1,873	1,499	1,405	1,171	1,124	890	468	937	1,873	11,241
20	1,972	1,578	1,479	1,233	1,183	937	493	986	1,972	11,832
21	2,071	1,657	1,553	1,294	1,242	984	518	1,035	2,071	12,424
22	2,169	1,735	1,627	1,356	1,302	1,030	542	1,085	2,169	13,016
23	2,268	1,814	1,701	1,417	1,361	1,077	567	1,134	2,268	13,607
24	2,366	1,893	1,775	1,479	1,420	1,124	592	1,183	2,366	14,199
25	2,465	1,972	1,849	1,541	1,479	1,171	616	1,233	2,465	14,791
26	2,564	2,051	1,923	1,602	1,538	1,218	641	1,282	2,564	15,382
27	2,662	2,130	1,997	1,664	1,597	1,265	666	1,331	2,662	15,974
28	2,761	2,209	2,071	1,726	1,657	1,311	690	1,380	2,761	16,565
29	2,860	2,288	2,145	1,787	1,716	1,358	715	1,430	2,860	17,157
30	2,958	2,366	2,219	1,849	1,775	1,405	740	1,479	2,958	17,749
31	3,057	2,445	2,293	1,910	1,834	1,452	764	1,528	3,057	18,340
32	3,155	2,524	2,366	1,972	1,893	1,499	789	1,578	3,155	18,932
33	3,254	2,603	2,440	2,034	1,952	1,546	813	1,627	3,254	19,524
34	3,353	2,682	2,514	2,095	2,012	1,592	838	1,676	3,353	20,115
35	3,451	2,761	2,588	2,157	2,071	1,639	863	1,726	3,451	20,707
36	3,550	2,840	2,662	2,219	2,130	1,686	887	1,775	3,550	21,298
37	3,648	2,919	2,736	2,280	2,189	1,733	912	1,824	3,648	21,890
38	3,747	2,998	2,810	2,342	2,248	1,780	937	1,873	3,747	22,482
39	3,846	3,076	2,884	2,403	2,307	1,827	961	1,923	3,846	23,073

40	3,944	3,155	2,958	2,465	2,366	1,873	986	1,972	3,944	23,665

4. Cropland BMP Implementation: Costs before cost share by HUC 12 Sub Watersheds

Big Blue Targeted Area – HUC 10270205

Sub Watershed 201 Annual Cost* Before Cost-Share, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$9,165	$15,100	$4,742	$6,724	$11,797	$3,539	$637	$5,898	$4,719	$62,322
2	$9,440	$15,553	$4,885	$6,926	$12,151	$3,645	$656	$6,075	$4,860	$64,191
3	$9,723	$16,020	$5,031	$7,134	$12,515	$3,755	$676	$6,258	$5,006	$66,117
4	$10,015	$16,500	$5,182	$7,348	$12,891	$3,867	$696	$6,445	$5,156	$68,101
5	$10,315	$16,995	$5,338	$7,568	$13,277	$3,983	$717	$6,639	$5,311	$70,144
6	$10,625	$17,505	$5,498	$7,795	$13,676	$4,103	$738	$6,838	$5,470	$72,248
7	$10,943	$18,030	$5,663	$8,029	$14,086	$4,226	$761	$7,043	$5,634	$74,415
8	$11,272	$18,571	$5,832	$8,270	$14,509	$4,353	$783	$7,254	$5,803	$76,648
9	$11,610	$19,128	$6,007	$8,518	$14,944	$4,483	$807	$7,472	$5,978	$78,947
10	$11,958	$19,702	$6,188	$8,774	$15,392	$4,618	$831	$7,696	$6,157	$81,316
11	$12,317	$20,293	$6,373	$9,037	$15,854	$4,756	$856	$7,927	$6,342	$83,755
12	$12,686	$20,902	$6,565	$9,308	$16,330	$4,899	$882	$8,165	$6,532	$86,268
13	$13,067	$21,529	$6,761	$9,587	$16,820	$5,046	$908	$8,410	$6,728	$88,856
14	$13,459	$22,175	$6,964	$9,875	$17,324	$5,197	$936	$8,662	$6,930	$91,522
15	$13,863	$22,840	$7,173	$10,171	$17,844	$5,353	$964	$8,922	$7,138	$94,267
16	$14,279	$23,525	$7,388	$10,476	$18,379	$5,514	$992	$9,190	$7,352	$97,095
17	$14,707	$24,231	$7,610	$10,790	$18,931	$5,679	$1,022	$9,465	$7,572	$100,008
18	$15,148	$24,958	$7,838	$11,114	$19,498	$5,850	$1,053	$9,749	$7,799	$103,008
19	$15,603	$25,707	$8,074	$11,448	$20,083	$6,025	$1,085	$10,042	$8,033	$106,099
20	$16,071	$26,478	$8,316	$11,791	$20,686	$6,206	$1,117	$10,343	$8,274	$109,281
21	$16,553	$27,272	$8,565	$12,145	$21,306	$6,392	$1,151	$10,653	$8,523	$112,560
22	$17,050	$28,090	$8,822	$12,509	$21,946	$6,584	$1,185	$10,973	$8,778	$115,937
23	$17,561	$28,933	$9,087	$12,884	$22,604	$6,781	$1,221	$11,302	$9,042	$119,415
24	$18,088	$29,801	$9,359	$13,271	$23,282	$6,985	$1,257	$11,641	$9,313	$122,997
25	$18,631	$30,695	$9,640	$13,669	$23,981	$7,194	$1,295	$11,990	$9,592	$126,687
26	$19,189	$31,616	$9,929	$14,079	$24,700	$7,410	$1,334	$12,350	$9,880	$130,488
27	$19,765	$32,565	$10,227	$14,501	$25,441	$7,632	$1,374	$12,721	$10,176	$134,402
28	$20,358	$33,541	$10,534	$14,936	$26,204	$7,861	$1,415	$13,102	$10,482	$138,435
29	$20,969	$34,548	$10,850	$15,385	$26,990	$8,097	$1,457	$13,495	$10,796	$142,588
30	$21,598	$35,584	$11,176	$15,846	$27,800	$8,340	$1,501	$13,900	$11,120	$146,865
31	$22,246	$36,652	$11,511	$16,321	$28,634	$8,590	$1,546	$14,317	$11,454	$151,271
32	$22,913	$37,751	$11,856	$16,811	$29,493	$8,848	$1,593	$14,747	$11,797	$155,809
33	$23,601	$38,884	$12,212	$17,315	$30,378	$9,113	$1,640	$15,189	$12,151	$160,484
34	$24,309	$40,050	$12,578	$17,835	$31,289	$9,387	$1,690	$15,645	$12,516	$165,298
35	$25,038	$41,252	$12,956	$18,370	$32,228	$9,668	$1,740	$16,114	$12,891	$170,257
36	$25,789	$42,489	$13,344	$18,921	$33,195	$9,958	$1,793	$16,597	$13,278	$175,365
37	$26,563	$43,764	$13,745	$19,489	$34,191	$10,257	$1,846	$17,095	$13,676	$180,626
38	$27,360	$45,077	$14,157	$20,073	$35,216	$10,565	$1,902	$17,608	$14,087	$186,044
39	$28,180	$46,429	$14,582	$20,676	$36,273	$10,882	$1,959	$18,136	$14,509	$191,626
40	$29,026	$47,822	$15,019	$21,296	$37,361	$11,208	$2,017	$18,681	$14,944	$197,375
**3% Inflation*		**3% Inflation*								$4,699,136

Sub Watershed 204 Annual Cost* Before Cost-Share, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$8,458	$13,934	$4,376	$6,205	$10,886	$3,266	$588	$5,443	$4,355	$57,511
2	$8,711	$14,352	$4,508	$6,391	$11,213	$3,364	$605	$5,606	$4,485	$59,236
3	$8,973	$14,783	$4,643	$6,583	$11,549	$3,465	$624	$5,775	$4,620	$61,013
4	$9,242	$15,226	$4,782	$6,781	$11,896	$3,569	$642	$5,948	$4,758	$62,844

5	$9,519	$15,683	$4,926	$6,984	$12,253	$3,676	$662	$6,126	$4,901	$64,729
6	$9,805	$16,154	$5,073	$7,193	$12,620	$3,786	$681	$6,310	$5,048	$66,671
7	$10,099	$16,638	$5,225	$7,409	$12,999	$3,900	$702	$6,499	$5,200	$68,671
8	$10,402	$17,138	$5,382	$7,632	$13,389	$4,017	$723	$6,694	$5,355	$70,731
9	$10,714	$17,652	$5,544	$7,861	$13,790	$4,137	$745	$6,895	$5,516	$72,853
10	$11,035	$18,181	$5,710	$8,096	$14,204	$4,261	$767	$7,102	$5,682	$75,039
11	$11,366	$18,727	$5,881	$8,339	$14,630	$4,389	$790	$7,315	$5,852	$77,290
12	$11,707	$19,288	$6,058	$8,589	$15,069	$4,521	$814	$7,535	$6,028	$79,609
13	$12,058	$19,867	$6,240	$8,847	$15,521	$4,656	$838	$7,761	$6,208	$81,997
14	$12,420	$20,463	$6,427	$9,112	$15,987	$4,796	$863	$7,993	$6,395	$84,457
15	$12,793	$21,077	$6,620	$9,386	$16,466	$4,940	$889	$8,233	$6,587	$86,991
16	$13,177	$21,709	$6,818	$9,667	$16,960	$5,088	$916	$8,480	$6,784	$89,600
17	$13,572	$22,361	$7,023	$9,957	$17,469	$5,241	$943	$8,735	$6,988	$92,288
18	$13,979	$23,031	$7,233	$10,256	$17,993	$5,398	$972	$8,997	$7,197	$95,057
19	$14,398	$23,722	$7,450	$10,564	$18,533	$5,560	$1,001	$9,267	$7,413	$97,909
20	$14,830	$24,434	$7,674	$10,881	$19,089	$5,727	$1,031	$9,545	$7,636	$100,846
21	$15,275	$25,167	$7,904	$11,207	$19,662	$5,899	$1,062	$9,831	$7,865	$103,871
22	$15,733	$25,922	$8,141	$11,543	$20,252	$6,075	$1,094	$10,126	$8,101	$106,987
23	$16,205	$26,700	$8,385	$11,890	$20,859	$6,258	$1,126	$10,430	$8,344	$110,197
24	$16,692	$27,501	$8,637	$12,246	$21,485	$6,445	$1,160	$10,742	$8,594	$113,503
25	$17,192	$28,326	$8,896	$12,614	$22,130	$6,639	$1,195	$11,065	$8,852	$116,908
26	$17,708	$29,176	$9,163	$12,992	$22,793	$6,838	$1,231	$11,397	$9,117	$120,415
27	$18,239	$30,051	$9,438	$13,382	$23,477	$7,043	$1,268	$11,739	$9,391	$124,028
28	$18,787	$30,952	$9,721	$13,783	$24,182	$7,254	$1,306	$12,091	$9,673	$127,748
29	$19,350	$31,881	$10,013	$14,197	$24,907	$7,472	$1,345	$12,453	$9,963	$131,581
30	$19,931	$32,837	$10,313	$14,623	$25,654	$7,696	$1,385	$12,827	$10,262	$135,528
31	$20,529	$33,822	$10,622	$15,062	$26,424	$7,927	$1,427	$13,212	$10,570	$139,594
32	$21,144	$34,837	$10,941	$15,513	$27,216	$8,165	$1,470	$13,608	$10,887	$143,782
33	$21,779	$35,882	$11,269	$15,979	$28,033	$8,410	$1,514	$14,016	$11,213	$148,096
34	$22,432	$36,959	$11,607	$16,458	$28,874	$8,662	$1,559	$14,437	$11,550	$152,538
35	$23,105	$38,067	$11,956	$16,952	$29,740	$8,922	$1,606	$14,870	$11,896	$157,115
36	$23,798	$39,209	$12,314	$17,460	$30,632	$9,190	$1,654	$15,316	$12,253	$161,828
37	$24,512	$40,386	$12,684	$17,984	$31,551	$9,465	$1,704	$15,776	$12,621	$166,683
38	$25,248	$41,597	$13,064	$18,524	$32,498	$9,749	$1,755	$16,249	$12,999	$171,683
39	$26,005	$42,845	$13,456	$19,080	$33,473	$10,042	$1,808	$16,736	$13,389	$176,834
40	$26,785	$44,131	$13,860	$19,652	$34,477	$10,343	$1,862	$17,239	$13,791	$182,139
**3% Inflation*		**3% Inflation*								$4,336,400

Sub Watershed 301 Annual Cost* Before Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$14,357	$23,654	$7,429	$10,533	$18,479	$5,544	$998	$9,240	$7,392	$97,625
2	$14,787	$24,363	$7,652	$10,849	$19,034	$5,710	$1,028	$9,517	$7,614	$100,553
3	$15,231	$25,094	$7,881	$11,175	$19,605	$5,881	$1,059	$9,802	$7,842	$103,570
4	$15,688	$25,847	$8,118	$11,510	$20,193	$6,058	$1,090	$10,096	$8,077	$106,677
5	$16,159	$26,622	$8,361	$11,855	$20,799	$6,240	$1,123	$10,399	$8,319	$109,877
6	$16,643	$27,421	$8,612	$12,211	$21,423	$6,427	$1,157	$10,711	$8,569	$113,174
7	$17,143	$28,244	$8,870	$12,577	$22,065	$6,620	$1,192	$11,033	$8,826	$116,569
8	$17,657	$29,091	$9,136	$12,955	$22,727	$6,818	$1,227	$11,364	$9,091	$120,066
9	$18,187	$29,964	$9,410	$13,343	$23,409	$7,023	$1,264	$11,705	$9,364	$123,668
10	$18,732	$30,863	$9,693	$13,743	$24,111	$7,233	$1,302	$12,056	$9,645	$127,378
11	$19,294	$31,788	$9,984	$14,156	$24,835	$7,450	$1,341	$12,417	$9,934	$131,199
12	$19,873	$32,742	$10,283	$14,580	$25,580	$7,674	$1,381	$12,790	$10,232	$135,135
13	$20,469	$33,724	$10,592	$15,018	$26,347	$7,904	$1,423	$13,174	$10,539	$139,189
14	$21,083	$34,736	$10,909	$15,468	$27,138	$8,141	$1,465	$13,569	$10,855	$143,365
15	$21,716	$35,778	$11,237	$15,932	$27,952	$8,386	$1,509	$13,976	$11,181	$147,666
16	$22,367	$36,852	$11,574	$16,410	$28,790	$8,637	$1,555	$14,395	$11,516	$152,096
17	$23,038	$37,957	$11,921	$16,903	$29,654	$8,896	$1,601	$14,827	$11,862	$156,659
18	$23,729	$39,096	$12,279	$17,410	$30,544	$9,163	$1,649	$15,272	$12,217	$161,359
19	$24,441	$40,269	$12,647	$17,932	$31,460	$9,438	$1,699	$15,730	$12,584	$166,200
20	$25,174	$41,477	$13,026	$18,470	$32,404	$9,721	$1,750	$16,202	$12,961	$171,185
21	$25,930	$42,721	$13,417	$19,024	$33,376	$10,013	$1,802	$16,688	$13,350	$176,321

22	$26,708	$44,003	$13,820	$19,595	$34,377	$10,313	$1,856	$17,189	$13,751	$181,611
23	$27,509	$45,323	$14,234	$20,183	$35,408	$10,623	$1,912	$17,704	$14,163	$187,059
24	$28,334	$46,682	$14,661	$20,788	$36,471	$10,941	$1,969	$18,235	$14,588	$192,671
25	$29,184	$48,083	$15,101	$21,412	$37,565	$11,269	$2,028	$18,782	$15,026	$198,451
26	$30,060	$49,525	$15,554	$22,054	$38,692	$11,608	$2,089	$19,346	$15,477	$204,404
27	$30,961	$51,011	$16,021	$22,716	$39,852	$11,956	$2,152	$19,926	$15,941	$210,537
28	$31,890	$52,541	$16,501	$23,397	$41,048	$12,314	$2,217	$20,524	$16,419	$216,853
29	$32,847	$54,118	$16,996	$24,099	$42,279	$12,684	$2,283	$21,140	$16,912	$223,358
30	$33,832	$55,741	$17,506	$24,822	$43,548	$13,064	$2,352	$21,774	$17,419	$230,059
31	$34,847	$57,413	$18,031	$25,567	$44,854	$13,456	$2,422	$22,427	$17,942	$236,961
32	$35,893	$59,136	$18,572	$26,334	$46,200	$13,860	$2,495	$23,100	$18,480	$244,070
33	$36,970	$60,910	$19,130	$27,124	$47,586	$14,276	$2,570	$23,793	$19,034	$251,392
34	$38,079	$62,737	$19,703	$27,938	$49,013	$14,704	$2,647	$24,507	$19,605	$258,933
35	$39,221	$64,619	$20,295	$28,776	$50,484	$15,145	$2,726	$25,242	$20,194	$266,701
36	$40,398	$66,558	$20,903	$29,639	$51,998	$15,600	$2,808	$25,999	$20,799	$274,702
37	$41,609	$68,555	$21,530	$30,528	$53,558	$16,068	$2,892	$26,779	$21,423	$282,944
38	$42,858	$70,611	$22,176	$31,444	$55,165	$16,550	$2,979	$27,583	$22,066	$291,432
39	$44,144	$72,730	$22,842	$32,387	$56,820	$17,046	$3,068	$28,410	$22,728	$300,175
40	$45,468	$74,912	$23,527	$33,359	$58,525	$17,557	$3,160	$29,262	$23,410	$309,180
*3% Inflation		*3% Inflation								$7,361,025

Sub Watershed 302 Annual Cost* Before Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$13,850	$22,818	$7,166	$10,161	$17,827	$5,348	$963	$8,913	$7,131	$94,178
2	$14,265	$23,503	$7,381	$10,466	$18,362	$5,509	$992	$9,181	$7,345	$97,003
3	$14,693	$24,208	$7,603	$10,780	$18,913	$5,674	$1,021	$9,456	$7,565	$99,913
4	$15,134	$24,934	$7,831	$11,104	$19,480	$5,844	$1,052	$9,740	$7,792	$102,910
5	$15,588	$25,682	$8,066	$11,437	$20,064	$6,019	$1,083	$10,032	$8,026	$105,998
6	$16,056	$26,453	$8,308	$11,780	$20,666	$6,200	$1,116	$10,333	$8,266	$109,178
7	$16,537	$27,246	$8,557	$12,133	$21,286	$6,386	$1,149	$10,643	$8,514	$112,453
8	$17,033	$28,064	$8,814	$12,497	$21,925	$6,577	$1,184	$10,962	$8,770	$115,827
9	$17,544	$28,906	$9,078	$12,872	$22,583	$6,775	$1,219	$11,291	$9,033	$119,301
10	$18,071	$29,773	$9,351	$13,258	$23,260	$6,978	$1,256	$11,630	$9,304	$122,880
11	$18,613	$30,666	$9,631	$13,656	$23,958	$7,187	$1,294	$11,979	$9,583	$126,567
12	$19,171	$31,586	$9,920	$14,066	$24,677	$7,403	$1,333	$12,338	$9,871	$130,364
13	$19,746	$32,534	$10,218	$14,488	$25,417	$7,625	$1,373	$12,708	$10,167	$134,275
14	$20,339	$33,510	$10,524	$14,922	$26,179	$7,854	$1,414	$13,090	$10,472	$138,303
15	$20,949	$34,515	$10,840	$15,370	$26,965	$8,089	$1,456	$13,482	$10,786	$142,452
16	$21,577	$35,550	$11,165	$15,831	$27,774	$8,332	$1,500	$13,887	$11,109	$146,726
17	$22,225	$36,617	$11,500	$16,306	$28,607	$8,582	$1,545	$14,303	$11,443	$151,127
18	$22,891	$37,715	$11,845	$16,795	$29,465	$8,840	$1,591	$14,733	$11,786	$155,661
19	$23,578	$38,847	$12,200	$17,299	$30,349	$9,105	$1,639	$15,175	$12,140	$160,331
20	$24,286	$40,012	$12,566	$17,818	$31,260	$9,378	$1,688	$15,630	$12,504	$165,141
21	$25,014	$41,213	$12,943	$18,352	$32,197	$9,659	$1,739	$16,099	$12,879	$170,095
22	$25,765	$42,449	$13,332	$18,903	$33,163	$9,949	$1,791	$16,582	$13,265	$175,198
23	$26,537	$43,722	$13,732	$19,470	$34,158	$10,247	$1,845	$17,079	$13,663	$180,454
24	$27,334	$45,034	$14,144	$20,054	$35,183	$10,555	$1,900	$17,591	$14,073	$185,868
25	$28,154	$46,385	$14,568	$20,656	$36,238	$10,872	$1,957	$18,119	$14,495	$191,444
26	$28,998	$47,777	$15,005	$21,276	$37,326	$11,198	$2,016	$18,663	$14,930	$197,187
27	$29,868	$49,210	$15,455	$21,914	$38,445	$11,534	$2,076	$19,223	$15,378	$203,103
28	$30,764	$50,686	$15,919	$22,571	$39,599	$11,880	$2,138	$19,799	$15,839	$209,196
29	$31,687	$52,207	$16,396	$23,248	$40,787	$12,236	$2,202	$20,393	$16,315	$215,472
30	$32,638	$53,773	$16,888	$23,946	$42,010	$12,603	$2,269	$21,005	$16,804	$221,936
31	$33,617	$55,386	$17,395	$24,664	$43,271	$12,981	$2,337	$21,635	$17,308	$228,594
32	$34,625	$57,048	$17,917	$25,404	$44,569	$13,371	$2,407	$22,284	$17,827	$235,452
33	$35,664	$58,759	$18,454	$26,166	$45,906	$13,772	$2,479	$22,953	$18,362	$242,515
34	$36,734	$60,522	$19,008	$26,951	$47,283	$14,185	$2,553	$23,641	$18,913	$249,791
35	$37,836	$62,338	$19,578	$27,760	$48,701	$14,610	$2,630	$24,351	$19,481	$257,284
36	$38,971	$64,208	$20,165	$28,593	$50,162	$15,049	$2,709	$25,081	$20,065	$265,003
37	$40,140	$66,134	$20,770	$29,450	$51,667	$15,500	$2,790	$25,834	$20,667	$272,953
38	$41,344	$68,118	$21,393	$30,334	$53,217	$15,965	$2,874	$26,609	$21,287	$281,141

39	$42,585	$70,162	$22,035	$31,244	$54,814	$16,444	$2,960	$27,407	$21,926	$289,576
40	$43,862	$72,266	$22,696	$32,181	$56,458	$16,937	$3,049	$28,229	$22,583	$298,263
*3% Inflation		*3% Inflation								$7,101,110

Sub Watershed 306 Annual Cost* Before Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$6,855	$11,294	$3,547	$5,029	$8,823	$2,647	$476	$4,412	$3,529	$46,612
2	$7,060	$11,632	$3,653	$5,180	$9,088	$2,726	$491	$4,544	$3,635	$48,010
3	$7,272	$11,981	$3,763	$5,335	$9,360	$2,808	$505	$4,680	$3,744	$49,450
4	$7,490	$12,341	$3,876	$5,496	$9,641	$2,892	$521	$4,821	$3,857	$50,934
5	$7,715	$12,711	$3,992	$5,660	$9,931	$2,979	$536	$4,965	$3,972	$52,462
6	$7,946	$13,092	$4,112	$5,830	$10,228	$3,069	$552	$5,114	$4,091	$54,036
7	$8,185	$13,485	$4,235	$6,005	$10,535	$3,161	$569	$5,268	$4,214	$55,657
8	$8,430	$13,890	$4,362	$6,185	$10,851	$3,255	$586	$5,426	$4,341	$57,326
9	$8,683	$14,306	$4,493	$6,371	$11,177	$3,353	$604	$5,588	$4,471	$59,046
10	$8,944	$14,736	$4,628	$6,562	$11,512	$3,454	$622	$5,756	$4,605	$60,818
11	$9,212	$15,178	$4,767	$6,759	$11,858	$3,557	$640	$5,929	$4,743	$62,642
12	$9,488	$15,633	$4,910	$6,962	$12,213	$3,664	$660	$6,107	$4,885	$64,521
13	$9,773	$16,102	$5,057	$7,170	$12,580	$3,774	$679	$6,290	$5,032	$66,457
14	$10,066	$16,585	$5,209	$7,386	$12,957	$3,887	$700	$6,479	$5,183	$68,451
15	$10,368	$17,083	$5,365	$7,607	$13,346	$4,004	$721	$6,673	$5,338	$70,504
16	$10,679	$17,595	$5,526	$7,835	$13,746	$4,124	$742	$6,873	$5,498	$72,619
17	$11,000	$18,123	$5,692	$8,070	$14,159	$4,248	$765	$7,079	$5,663	$74,798
18	$11,330	$18,667	$5,862	$8,312	$14,583	$4,375	$787	$7,292	$5,833	$77,042
19	$11,670	$19,227	$6,038	$8,562	$15,021	$4,506	$811	$7,510	$6,008	$79,353
20	$12,020	$19,803	$6,220	$8,819	$15,471	$4,641	$835	$7,736	$6,189	$81,734
21	$12,380	$20,397	$6,406	$9,083	$15,936	$4,781	$861	$7,968	$6,374	$84,186
22	$12,752	$21,009	$6,598	$9,356	$16,414	$4,924	$886	$8,207	$6,565	$86,711
23	$13,134	$21,640	$6,796	$9,636	$16,906	$5,072	$913	$8,453	$6,762	$89,313
24	$13,528	$22,289	$7,000	$9,926	$17,413	$5,224	$940	$8,707	$6,965	$91,992
25	$13,934	$22,958	$7,210	$10,223	$17,936	$5,381	$969	$8,968	$7,174	$94,752
26	$14,352	$23,646	$7,426	$10,530	$18,474	$5,542	$998	$9,237	$7,389	$97,595
27	$14,783	$24,356	$7,649	$10,846	$19,028	$5,708	$1,028	$9,514	$7,611	$100,522
28	$15,226	$25,086	$7,879	$11,171	$19,599	$5,880	$1,058	$9,799	$7,839	$103,538
29	$15,683	$25,839	$8,115	$11,506	$20,187	$6,056	$1,090	$10,093	$8,075	$106,644
30	$16,154	$26,614	$8,358	$11,852	$20,792	$6,238	$1,123	$10,396	$8,317	$109,843
31	$16,638	$27,413	$8,609	$12,207	$21,416	$6,425	$1,156	$10,708	$8,566	$113,139
32	$17,137	$28,235	$8,868	$12,573	$22,059	$6,618	$1,191	$11,029	$8,823	$116,533
33	$17,651	$29,082	$9,134	$12,951	$22,720	$6,816	$1,227	$11,360	$9,088	$120,029
34	$18,181	$29,954	$9,408	$13,339	$23,402	$7,021	$1,264	$11,701	$9,361	$123,630
35	$18,726	$30,853	$9,690	$13,739	$24,104	$7,231	$1,302	$12,052	$9,642	$127,339
36	$19,288	$31,779	$9,980	$14,151	$24,827	$7,448	$1,341	$12,414	$9,931	$131,159
37	$19,867	$32,732	$10,280	$14,576	$25,572	$7,672	$1,381	$12,786	$10,229	$135,094
38	$20,463	$33,714	$10,588	$15,013	$26,339	$7,902	$1,422	$13,170	$10,536	$139,146
39	$21,077	$34,725	$10,906	$15,464	$27,129	$8,139	$1,465	$13,565	$10,852	$143,321
40	$21,709	$35,767	$11,233	$15,928	$27,943	$8,383	$1,509	$13,972	$11,177	$147,620
*3% Inflation		*3% Inflation								$3,514,580

Sub Watershed 401 Annual Cost* Before Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$10,738	$17,691	$5,556	$7,878	$13,821	$4,146	$746	$6,911	$5,529	$73,016
2	$11,060	$18,222	$5,723	$8,114	$14,236	$4,271	$769	$7,118	$5,694	$75,207
3	$11,392	$18,769	$5,895	$8,358	$14,663	$4,399	$792	$7,331	$5,865	$77,463
4	$11,733	$19,332	$6,071	$8,609	$15,103	$4,531	$816	$7,551	$6,041	$79,787
5	$12,085	$19,912	$6,253	$8,867	$15,556	$4,667	$840	$7,778	$6,222	$82,180
6	$12,448	$20,509	$6,441	$9,133	$16,023	$4,807	$865	$8,011	$6,409	$84,646
7	$12,821	$21,124	$6,634	$9,407	$16,503	$4,951	$891	$8,252	$6,601	$87,185
8	$13,206	$21,758	$6,833	$9,689	$16,998	$5,100	$918	$8,499	$6,799	$89,801

9	$13,602	$22,411	$7,038	$9,980	$17,508	$5,253	$945	$8,754	$7,003	$92,495
10	$14,010	$23,083	$7,250	$10,279	$18,034	$5,410	$974	$9,017	$7,213	$95,270
11	$14,431	$23,775	$7,467	$10,588	$18,575	$5,572	$1,003	$9,287	$7,430	$98,128
12	$14,864	$24,489	$7,691	$10,905	$19,132	$5,740	$1,033	$9,566	$7,653	$101,072
13	$15,309	$25,223	$7,922	$11,232	$19,706	$5,912	$1,064	$9,853	$7,882	$104,104
14	$15,769	$25,980	$8,159	$11,569	$20,297	$6,089	$1,096	$10,148	$8,119	$107,227
15	$16,242	$26,760	$8,404	$11,916	$20,906	$6,272	$1,129	$10,453	$8,362	$110,444
16	$16,729	$27,562	$8,656	$12,274	$21,533	$6,460	$1,163	$10,767	$8,613	$113,757
17	$17,231	$28,389	$8,916	$12,642	$22,179	$6,654	$1,198	$11,090	$8,872	$117,170
18	$17,748	$29,241	$9,183	$13,021	$22,844	$6,853	$1,234	$11,422	$9,138	$120,685
19	$18,280	$30,118	$9,459	$13,412	$23,530	$7,059	$1,271	$11,765	$9,412	$124,305
20	$18,829	$31,022	$9,743	$13,814	$24,236	$7,271	$1,309	$12,118	$9,694	$128,034
21	$19,394	$31,952	$10,035	$14,229	$24,963	$7,489	$1,348	$12,481	$9,985	$131,876
22	$19,975	$32,911	$10,336	$14,656	$25,712	$7,713	$1,388	$12,856	$10,285	$135,832
23	$20,575	$33,898	$10,646	$15,095	$26,483	$7,945	$1,430	$13,241	$10,593	$139,907
24	$21,192	$34,915	$10,966	$15,548	$27,277	$8,183	$1,473	$13,639	$10,911	$144,104
25	$21,828	$35,963	$11,294	$16,015	$28,096	$8,429	$1,517	$14,048	$11,238	$148,427
26	$22,482	$37,041	$11,633	$16,495	$28,939	$8,682	$1,563	$14,469	$11,575	$152,880
27	$23,157	$38,153	$11,982	$16,990	$29,807	$8,942	$1,610	$14,903	$11,923	$157,466
28	$23,852	$39,297	$12,342	$17,500	$30,701	$9,210	$1,658	$15,350	$12,280	$162,190
29	$24,567	$40,476	$12,712	$18,025	$31,622	$9,487	$1,708	$15,811	$12,649	$167,056
30	$25,304	$41,690	$13,093	$18,565	$32,571	$9,771	$1,759	$16,285	$13,028	$172,068
31	$26,063	$42,941	$13,486	$19,122	$33,548	$10,064	$1,812	$16,774	$13,419	$177,230
32	$26,845	$44,229	$13,891	$19,696	$34,554	$10,366	$1,866	$17,277	$13,822	$182,547
33	$27,651	$45,556	$14,308	$20,287	$35,591	$10,677	$1,922	$17,795	$14,236	$188,023
34	$28,480	$46,923	$14,737	$20,895	$36,659	$10,998	$1,980	$18,329	$14,663	$193,664
35	$29,334	$48,331	$15,179	$21,522	$37,758	$11,328	$2,039	$18,879	$15,103	$199,474
36	$30,214	$49,781	$15,634	$22,168	$38,891	$11,667	$2,100	$19,446	$15,556	$205,458
37	$31,121	$51,274	$16,103	$22,833	$40,058	$12,017	$2,163	$20,029	$16,023	$211,622
38	$32,055	$52,812	$16,586	$23,518	$41,260	$12,378	$2,228	$20,630	$16,504	$217,970
39	$33,016	$54,397	$17,084	$24,223	$42,497	$12,749	$2,295	$21,249	$16,999	$224,509
40	$34,007	$56,029	$17,596	$24,950	$43,772	$13,132	$2,364	$21,886	$17,509	$231,245
*3% Inflation		*3% Inflation								$5,505,520

Sub Watershed 402 Annual Cost* Before Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$5,205	$8,575	$2,693	$3,819	$6,699	$2,010	$362	$3,350	$2,680	$35,392
2	$5,361	$8,832	$2,774	$3,933	$6,900	$2,070	$373	$3,450	$2,760	$36,454
3	$5,522	$9,097	$2,857	$4,051	$7,107	$2,132	$384	$3,554	$2,843	$37,548
4	$5,687	$9,370	$2,943	$4,173	$7,321	$2,196	$395	$3,660	$2,928	$38,674
5	$5,858	$9,651	$3,031	$4,298	$7,540	$2,262	$407	$3,770	$3,016	$39,834
6	$6,034	$9,941	$3,122	$4,427	$7,766	$2,330	$419	$3,883	$3,107	$41,029
7	$6,215	$10,239	$3,216	$4,560	$7,999	$2,400	$432	$4,000	$3,200	$42,260
8	$6,401	$10,546	$3,312	$4,696	$8,239	$2,472	$445	$4,120	$3,296	$43,528
9	$6,593	$10,863	$3,412	$4,837	$8,487	$2,546	$458	$4,243	$3,395	$44,834
10	$6,791	$11,189	$3,514	$4,982	$8,741	$2,622	$472	$4,371	$3,496	$46,179
11	$6,995	$11,524	$3,619	$5,132	$9,003	$2,701	$486	$4,502	$3,601	$47,564
12	$7,205	$11,870	$3,728	$5,286	$9,274	$2,782	$501	$4,637	$3,709	$48,991
13	$7,421	$12,226	$3,840	$5,444	$9,552	$2,866	$516	$4,776	$3,821	$50,461
14	$7,643	$12,593	$3,955	$5,608	$9,838	$2,951	$531	$4,919	$3,935	$51,975
15	$7,873	$12,971	$4,074	$5,776	$10,133	$3,040	$547	$5,067	$4,053	$53,534
16	$8,109	$13,360	$4,196	$5,949	$10,437	$3,131	$564	$5,219	$4,175	$55,140
17	$8,352	$13,761	$4,322	$6,128	$10,751	$3,225	$581	$5,375	$4,300	$56,794
18	$8,603	$14,173	$4,451	$6,312	$11,073	$3,322	$598	$5,537	$4,429	$58,498
19	$8,861	$14,599	$4,585	$6,501	$11,405	$3,422	$616	$5,703	$4,562	$60,253
20	$9,127	$15,037	$4,722	$6,696	$11,747	$3,524	$634	$5,874	$4,699	$62,060
21	$9,400	$15,488	$4,864	$6,897	$12,100	$3,630	$653	$6,050	$4,840	$63,922
22	$9,682	$15,952	$5,010	$7,104	$12,463	$3,739	$673	$6,231	$4,985	$65,840
23	$9,973	$16,431	$5,160	$7,317	$12,837	$3,851	$693	$6,418	$5,135	$67,815
24	$10,272	$16,924	$5,315	$7,536	$13,222	$3,967	$714	$6,611	$5,289	$69,849
25	$10,580	$17,432	$5,475	$7,763	$13,618	$4,086	$735	$6,809	$5,447	$71,945

26	$10,898	$17,955	$5,639	$7,995	$14,027	$4,208	$757	$7,014	$5,611	$74,103
27	$11,225	$18,493	$5,808	$8,235	$14,448	$4,334	$780	$7,224	$5,779	$76,326
28	$11,561	$19,048	$5,982	$8,482	$14,881	$4,464	$804	$7,441	$5,952	$78,616
29	$11,908	$19,619	$6,162	$8,737	$15,328	$4,598	$828	$7,664	$6,131	$80,975
30	$12,265	$20,208	$6,347	$8,999	$15,788	$4,736	$853	$7,894	$6,315	$83,404
31	$12,633	$20,814	$6,537	$9,269	$16,261	$4,878	$878	$8,131	$6,504	$85,906
32	$13,012	$21,439	$6,733	$9,547	$16,749	$5,025	$904	$8,374	$6,700	$88,483
33	$13,403	$22,082	$6,935	$9,833	$17,251	$5,175	$932	$8,626	$6,901	$91,138
34	$13,805	$22,744	$7,143	$10,128	$17,769	$5,331	$960	$8,884	$7,108	$93,872
35	$14,219	$23,427	$7,357	$10,432	$18,302	$5,491	$988	$9,151	$7,321	$96,688
36	$14,645	$24,129	$7,578	$10,745	$18,851	$5,655	$1,018	$9,426	$7,540	$99,589
37	$15,085	$24,853	$7,805	$11,067	$19,417	$5,825	$1,048	$9,708	$7,767	$102,576
38	$15,537	$25,599	$8,040	$11,400	$19,999	$6,000	$1,080	$10,000	$8,000	$105,654
39	$16,003	$26,367	$8,281	$11,742	$20,599	$6,180	$1,112	$10,300	$8,240	$108,823
40	$16,484	$27,158	$8,529	$12,094	$21,217	$6,365	$1,146	$10,609	$8,487	$112,088
*3% Inflation										$2,668,611

Sub Watershed 403 Annual Cost* Before Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$6,324	$10,420	$3,273	$4,640	$8,141	$2,442	$440	$4,070	$3,256	$43,006
2	$6,514	$10,733	$3,371	$4,779	$8,385	$2,515	$453	$4,192	$3,354	$44,296
3	$6,710	$11,055	$3,472	$4,923	$8,636	$2,591	$466	$4,318	$3,455	$45,625
4	$6,911	$11,386	$3,576	$5,070	$8,895	$2,669	$480	$4,448	$3,558	$46,994
5	$7,118	$11,728	$3,683	$5,223	$9,162	$2,749	$495	$4,581	$3,665	$48,404
6	$7,332	$12,080	$3,794	$5,379	$9,437	$2,831	$510	$4,719	$3,775	$49,856
7	$7,552	$12,442	$3,908	$5,541	$9,720	$2,916	$525	$4,860	$3,888	$51,352
8	$7,778	$12,815	$4,025	$5,707	$10,012	$3,004	$541	$5,006	$4,005	$52,892
9	$8,012	$13,200	$4,146	$5,878	$10,312	$3,094	$557	$5,156	$4,125	$54,479
10	$8,252	$13,596	$4,270	$6,054	$10,622	$3,187	$574	$5,311	$4,249	$56,113
11	$8,500	$14,004	$4,398	$6,236	$10,940	$3,282	$591	$5,470	$4,376	$57,797
12	$8,755	$14,424	$4,530	$6,423	$11,269	$3,381	$609	$5,634	$4,507	$59,531
13	$9,017	$14,856	$4,666	$6,616	$11,607	$3,482	$627	$5,803	$4,643	$61,316
14	$9,288	$15,302	$4,806	$6,814	$11,955	$3,586	$646	$5,977	$4,782	$63,156
15	$9,566	$15,761	$4,950	$7,019	$12,313	$3,694	$665	$6,157	$4,925	$65,051
16	$9,853	$16,234	$5,098	$7,229	$12,683	$3,805	$685	$6,341	$5,073	$67,002
17	$10,149	$16,721	$5,251	$7,446	$13,063	$3,919	$705	$6,532	$5,225	$69,012
18	$10,453	$17,223	$5,409	$7,669	$13,455	$4,037	$727	$6,728	$5,382	$71,083
19	$10,767	$17,739	$5,571	$7,900	$13,859	$4,158	$748	$6,929	$5,544	$73,215
20	$11,090	$18,272	$5,738	$8,137	$14,275	$4,282	$771	$7,137	$5,710	$75,411
21	$11,423	$18,820	$5,911	$8,381	$14,703	$4,411	$794	$7,351	$5,881	$77,674
22	$11,765	$19,384	$6,088	$8,632	$15,144	$4,543	$818	$7,572	$6,058	$80,004
23	$12,118	$19,966	$6,271	$8,891	$15,598	$4,679	$842	$7,799	$6,239	$82,404
24	$12,482	$20,565	$6,459	$9,158	$16,066	$4,820	$868	$8,033	$6,426	$84,876
25	$12,856	$21,182	$6,652	$9,432	$16,548	$4,964	$894	$8,274	$6,619	$87,423
26	$13,242	$21,817	$6,852	$9,715	$17,045	$5,113	$920	$8,522	$6,818	$90,045
27	$13,639	$22,472	$7,058	$10,007	$17,556	$5,267	$948	$8,778	$7,022	$92,747
28	$14,048	$23,146	$7,269	$10,307	$18,083	$5,425	$976	$9,041	$7,233	$95,529
29	$14,470	$23,840	$7,487	$10,616	$18,625	$5,588	$1,006	$9,313	$7,450	$98,395
30	$14,904	$24,555	$7,712	$10,935	$19,184	$5,755	$1,036	$9,592	$7,674	$101,347
31	$15,351	$25,292	$7,943	$11,263	$19,759	$5,928	$1,067	$9,880	$7,904	$104,387
32	$15,812	$26,051	$8,182	$11,601	$20,352	$6,106	$1,099	$10,176	$8,141	$107,519
33	$16,286	$26,832	$8,427	$11,949	$20,963	$6,289	$1,132	$10,481	$8,385	$110,744
34	$16,775	$27,637	$8,680	$12,307	$21,592	$6,477	$1,166	$10,796	$8,637	$114,067
35	$17,278	$28,466	$8,940	$12,676	$22,239	$6,672	$1,201	$11,120	$8,896	$117,489
36	$17,796	$29,320	$9,208	$13,057	$22,907	$6,872	$1,237	$11,453	$9,163	$121,013
37	$18,330	$30,200	$9,485	$13,448	$23,594	$7,078	$1,274	$11,797	$9,438	$124,644
38	$18,880	$31,106	$9,769	$13,852	$24,302	$7,290	$1,312	$12,151	$9,721	$128,383
39	$19,446	$32,039	$10,062	$14,267	$25,031	$7,509	$1,352	$12,515	$10,012	$132,234
40	$20,030	$33,000	$10,364	$14,696	$25,782	$7,734	$1,392	$12,891	$10,313	$136,202
*3% Inflation										$3,242,715

Sub Watershed 501 Annual Cost* Before Cost-Share, Cropland BMPs										
Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$12,576	$20,719	$6,507	$9,227	$16,187	$4,856	$874	$8,093	$6,475	$85,514
2	$12,953	$21,341	$6,702	$9,503	$16,672	$5,002	$900	$8,336	$6,669	$88,079
3	$13,341	$21,981	$6,903	$9,788	$17,173	$5,152	$927	$8,586	$6,869	$90,721
4	$13,742	$22,640	$7,111	$10,082	$17,688	$5,306	$955	$8,844	$7,075	$93,443
5	$14,154	$23,320	$7,324	$10,385	$18,218	$5,466	$984	$9,109	$7,287	$96,246
6	$14,579	$24,019	$7,544	$10,696	$18,765	$5,630	$1,013	$9,383	$7,506	$99,134
7	$15,016	$24,740	$7,770	$11,017	$19,328	$5,798	$1,044	$9,664	$7,731	$102,108
8	$15,466	$25,482	$8,003	$11,347	$19,908	$5,972	$1,075	$9,954	$7,963	$105,171
9	$15,930	$26,246	$8,243	$11,688	$20,505	$6,152	$1,107	$10,253	$8,202	$108,326
10	$16,408	$27,034	$8,490	$12,039	$21,120	$6,336	$1,140	$10,560	$8,448	$111,576
11	$16,901	$27,845	$8,745	$12,400	$21,754	$6,526	$1,175	$10,877	$8,702	$114,923
12	$17,408	$28,680	$9,007	$12,772	$22,406	$6,722	$1,210	$11,203	$8,963	$118,371
13	$17,930	$29,541	$9,278	$13,155	$23,079	$6,924	$1,246	$11,539	$9,231	$121,922
14	$18,468	$30,427	$9,556	$13,549	$23,771	$7,131	$1,284	$11,885	$9,508	$125,580
15	$19,022	$31,340	$9,843	$13,956	$24,484	$7,345	$1,322	$12,242	$9,794	$129,347
16	$19,592	$32,280	$10,138	$14,375	$25,219	$7,566	$1,362	$12,609	$10,087	$133,227
17	$20,180	$33,248	$10,442	$14,806	$25,975	$7,793	$1,403	$12,988	$10,390	$137,224
18	$20,786	$34,246	$10,755	$15,250	$26,754	$8,026	$1,445	$13,377	$10,702	$141,341
19	$21,409	$35,273	$11,078	$15,708	$27,557	$8,267	$1,488	$13,779	$11,023	$145,581
20	$22,051	$36,331	$11,410	$16,179	$28,384	$8,515	$1,533	$14,192	$11,354	$149,949
21	$22,713	$37,421	$11,753	$16,664	$29,235	$8,771	$1,579	$14,618	$11,694	$154,447
22	$23,394	$38,544	$12,105	$17,164	$30,112	$9,034	$1,626	$15,056	$12,045	$159,081
23	$24,096	$39,700	$12,468	$17,679	$31,016	$9,305	$1,675	$15,508	$12,406	$163,853
24	$24,819	$40,891	$12,842	$18,209	$31,946	$9,584	$1,725	$15,973	$12,778	$168,769
25	$25,564	$42,118	$13,228	$18,756	$32,905	$9,871	$1,777	$16,452	$13,162	$173,832
26	$26,330	$43,381	$13,624	$19,318	$33,892	$10,168	$1,830	$16,946	$13,557	$179,047
27	$27,120	$44,683	$14,033	$19,898	$34,908	$10,473	$1,885	$17,454	$13,963	$184,418
28	$27,934	$46,023	$14,454	$20,495	$35,956	$10,787	$1,942	$17,978	$14,382	$189,951
29	$28,772	$47,404	$14,888	$21,110	$37,034	$11,110	$2,000	$18,517	$14,814	$195,649
30	$29,635	$48,826	$15,334	$21,743	$38,145	$11,444	$2,060	$19,073	$15,258	$201,518
31	$30,524	$50,291	$15,794	$22,395	$39,290	$11,787	$2,122	$19,645	$15,716	$207,564
32	$31,440	$51,800	$16,268	$23,067	$40,468	$12,141	$2,185	$20,234	$16,187	$213,791
33	$32,383	$53,354	$16,756	$23,759	$41,683	$12,505	$2,251	$20,841	$16,673	$220,205
34	$33,355	$54,954	$17,259	$24,472	$42,933	$12,880	$2,318	$21,467	$17,173	$226,811
35	$34,355	$56,603	$17,777	$25,206	$44,221	$13,266	$2,388	$22,111	$17,688	$233,615
36	$35,386	$58,301	$18,310	$25,962	$45,548	$13,664	$2,460	$22,774	$18,219	$240,624
37	$36,448	$60,050	$18,859	$26,741	$46,914	$14,074	$2,533	$23,457	$18,766	$247,842
38	$37,541	$61,852	$19,425	$27,543	$48,321	$14,496	$2,609	$24,161	$19,329	$255,278
39	$38,667	$63,707	$20,008	$28,370	$49,771	$14,931	$2,688	$24,886	$19,908	$262,936
40	$39,827	$65,618	$20,608	$29,221	$51,264	$15,379	$2,768	$25,632	$20,506	$270,824
*3% Inflation										$6,447,836

Little Blue Targeted Area - HUC 10270207

Sub Watershed 505 Annual Cost* Before Cost-Share, Cropland BMPs										
Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$6,031	$9,936	$3,121	$4,425	$7,763	$2,329	$419	$3,881	$3,105	$41,009
2	$6,212	$10,234	$3,214	$4,557	$7,995	$2,399	$432	$3,998	$3,198	$42,239
3	$6,398	$10,541	$3,311	$4,694	$8,235	$2,471	$445	$4,118	$3,294	$43,506
4	$6,590	$10,857	$3,410	$4,835	$8,482	$2,545	$458	$4,241	$3,393	$44,811
5	$6,788	$11,183	$3,512	$4,980	$8,737	$2,621	$472	$4,368	$3,495	$46,155
6	$6,991	$11,519	$3,618	$5,129	$8,999	$2,700	$486	$4,499	$3,600	$47,540

7	$7,201	$11,864	$3,726	$5,283	$9,269	$2,781	$501	$4,634	$3,708	$48,966
8	$7,417	$12,220	$3,838	$5,442	$9,547	$2,864	$516	$4,773	$3,819	$50,435
9	$7,639	$12,587	$3,953	$5,605	$9,833	$2,950	$531	$4,917	$3,933	$51,948
10	$7,869	$12,964	$4,072	$5,773	$10,128	$3,038	$547	$5,064	$4,051	$53,507
11	$8,105	$13,353	$4,194	$5,946	$10,432	$3,130	$563	$5,216	$4,173	$55,112
12	$8,348	$13,754	$4,320	$6,125	$10,745	$3,224	$580	$5,373	$4,298	$56,765
13	$8,598	$14,166	$4,449	$6,308	$11,067	$3,320	$598	$5,534	$4,427	$58,468
14	$8,856	$14,591	$4,583	$6,498	$11,399	$3,420	$616	$5,700	$4,560	$60,222
15	$9,122	$15,029	$4,720	$6,693	$11,741	$3,522	$634	$5,871	$4,697	$62,029
16	$9,396	$15,480	$4,862	$6,893	$12,094	$3,628	$653	$6,047	$4,837	$63,890
17	$9,677	$15,944	$5,008	$7,100	$12,457	$3,737	$673	$6,228	$4,983	$65,807
18	$9,968	$16,423	$5,158	$7,313	$12,830	$3,849	$693	$6,415	$5,132	$67,781
19	$10,267	$16,915	$5,312	$7,533	$13,215	$3,965	$714	$6,608	$5,286	$69,814
20	$10,575	$17,423	$5,472	$7,759	$13,612	$4,083	$735	$6,806	$5,445	$71,909
21	$10,892	$17,946	$5,636	$7,991	$14,020	$4,206	$757	$7,010	$5,608	$74,066
22	$11,219	$18,484	$5,805	$8,231	$14,441	$4,332	$780	$7,220	$5,776	$76,288
23	$11,555	$19,038	$5,979	$8,478	$14,874	$4,462	$803	$7,437	$5,950	$78,577
24	$11,902	$19,610	$6,159	$8,732	$15,320	$4,596	$827	$7,660	$6,128	$80,934
25	$12,259	$20,198	$6,343	$8,994	$15,780	$4,734	$852	$7,890	$6,312	$83,362
26	$12,627	$20,804	$6,534	$9,264	$16,253	$4,876	$878	$8,126	$6,501	$85,863
27	$13,006	$21,428	$6,730	$9,542	$16,741	$5,022	$904	$8,370	$6,696	$88,439
28	$13,396	$22,071	$6,932	$9,828	$17,243	$5,173	$931	$8,621	$6,897	$91,092
29	$13,798	$22,733	$7,140	$10,123	$17,760	$5,328	$959	$8,880	$7,104	$93,825
30	$14,212	$23,415	$7,354	$10,427	$18,293	$5,488	$988	$9,146	$7,317	$96,639
31	$14,638	$24,117	$7,574	$10,740	$18,842	$5,652	$1,017	$9,421	$7,537	$99,538
32	$15,077	$24,841	$7,802	$11,062	$19,407	$5,822	$1,048	$9,703	$7,763	$102,525
33	$15,530	$25,586	$8,036	$11,394	$19,989	$5,997	$1,079	$9,995	$7,996	$105,600
34	$15,995	$26,354	$8,277	$11,736	$20,589	$6,177	$1,112	$10,294	$8,236	$108,768
35	$16,475	$27,144	$8,525	$12,088	$21,206	$6,362	$1,145	$10,603	$8,483	$112,031
36	$16,970	$27,959	$8,781	$12,450	$21,843	$6,553	$1,180	$10,921	$8,737	$115,392
37	$17,479	$28,797	$9,044	$12,824	$22,498	$6,749	$1,215	$11,249	$8,999	$118,854
38	$18,003	$29,661	$9,315	$13,209	$23,173	$6,952	$1,251	$11,586	$9,269	$122,420
39	$18,543	$30,551	$9,595	$13,605	$23,868	$7,160	$1,289	$11,934	$9,547	$126,092
40	$19,099	$31,468	$9,883	$14,013	$24,584	$7,375	$1,328	$12,292	$9,834	$129,875
**3% Inflation*										$3,092,093

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

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$6,476	$10,670	$3,351	$4,752	$8,336	$2,501	$450	$4,168	$3,335	$44,040
2	$6,671	$10,991	$3,452	$4,894	$8,586	$2,576	$464	$4,293	$3,435	$45,361
3	$6,871	$11,320	$3,555	$5,041	$8,844	$2,653	$478	$4,422	$3,538	$46,722
4	$7,077	$11,660	$3,662	$5,192	$9,109	$2,733	$492	$4,555	$3,644	$48,123
5	$7,289	$12,010	$3,772	$5,348	$9,383	$2,815	$507	$4,691	$3,753	$49,567
6	$7,508	$12,370	$3,885	$5,508	$9,664	$2,899	$522	$4,832	$3,866	$51,054
7	$7,733	$12,741	$4,001	$5,674	$9,954	$2,986	$538	$4,977	$3,982	$52,586
8	$7,965	$13,123	$4,122	$5,844	$10,253	$3,076	$554	$5,126	$4,101	$54,163
9	$8,204	$13,517	$4,245	$6,019	$10,560	$3,168	$570	$5,280	$4,224	$55,788
10	$8,450	$13,922	$4,373	$6,200	$10,877	$3,263	$587	$5,438	$4,351	$57,462
11	$8,704	$14,340	$4,504	$6,386	$11,203	$3,361	$605	$5,602	$4,481	$59,186
12	$8,965	$14,770	$4,639	$6,577	$11,539	$3,462	$623	$5,770	$4,616	$60,961
13	$9,234	$15,213	$4,778	$6,775	$11,885	$3,566	$642	$5,943	$4,754	$62,790
14	$9,511	$15,670	$4,921	$6,978	$12,242	$3,673	$661	$6,121	$4,897	$64,674
15	$9,796	$16,140	$5,069	$7,187	$12,609	$3,783	$681	$6,305	$5,044	$66,614
16	$10,090	$16,624	$5,221	$7,403	$12,988	$3,896	$701	$6,494	$5,195	$68,612
17	$10,393	$17,123	$5,378	$7,625	$13,377	$4,013	$722	$6,689	$5,351	$70,671
18	$10,705	$17,637	$5,539	$7,854	$13,779	$4,134	$744	$6,889	$5,511	$72,791
19	$11,026	$18,166	$5,705	$8,089	$14,192	$4,258	$766	$7,096	$5,677	$74,974
20	$11,356	$18,711	$5,876	$8,332	$14,618	$4,385	$789	$7,309	$5,847	$77,224
21	$11,697	$19,272	$6,053	$8,582	$15,056	$4,517	$813	$7,528	$6,022	$79,540
22	$12,048	$19,850	$6,234	$8,839	$15,508	$4,652	$837	$7,754	$6,203	$81,927
23	$12,410	$20,446	$6,421	$9,105	$15,973	$4,792	$863	$7,987	$6,389	$84,384

24	$12,782	$21,059	$6,614	$9,378	$16,452	$4,936	$888	$8,226	$6,581	$86,916
25	$13,165	$21,691	$6,812	$9,659	$16,946	$5,084	$915	$8,473	$6,778	$89,523
26	$13,560	$22,341	$7,017	$9,949	$17,454	$5,236	$943	$8,727	$6,982	$92,209
27	$13,967	$23,012	$7,227	$10,247	$17,978	$5,393	$971	$8,989	$7,191	$94,975
28	$14,386	$23,702	$7,444	$10,555	$18,517	$5,555	$1,000	$9,259	$7,407	$97,825
29	$14,818	$24,413	$7,667	$10,871	$19,073	$5,722	$1,030	$9,536	$7,629	$100,759
30	$15,262	$25,145	$7,897	$11,198	$19,645	$5,893	$1,061	$9,822	$7,858	$103,782
31	$15,720	$25,900	$8,134	$11,534	$20,234	$6,070	$1,093	$10,117	$8,094	$106,896
32	$16,192	$26,677	$8,378	$11,880	$20,841	$6,252	$1,125	$10,421	$8,337	$110,102
33	$16,677	$27,477	$8,630	$12,236	$21,467	$6,440	$1,159	$10,733	$8,587	$113,406
34	$17,178	$28,301	$8,888	$12,603	$22,111	$6,633	$1,194	$11,055	$8,844	$116,808
35	$17,693	$29,151	$9,155	$12,981	$22,774	$6,832	$1,230	$11,387	$9,110	$120,312
36	$18,224	$30,025	$9,430	$13,371	$23,457	$7,037	$1,267	$11,729	$9,383	$123,921
37	$18,771	$30,926	$9,713	$13,772	$24,161	$7,248	$1,305	$12,080	$9,664	$127,639
38	$19,334	$31,854	$10,004	$14,185	$24,886	$7,466	$1,344	$12,443	$9,954	$131,468
39	$19,914	$32,809	$10,304	$14,610	$25,632	$7,690	$1,384	$12,816	$10,253	$135,412
40	$20,511	$33,793	$10,613	$15,049	$26,401	$7,920	$1,426	$13,201	$10,560	$139,475
**3% Inflation*										$3,320,639

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

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$4,439	$7,314	$2,297	$3,257	$5,714	$1,714	$309	$2,857	$2,286	$30,185
2	$4,572	$7,533	$2,366	$3,355	$5,885	$1,766	$318	$2,943	$2,354	$31,091
3	$4,709	$7,759	$2,437	$3,455	$6,062	$1,819	$327	$3,031	$2,425	$32,023
4	$4,851	$7,992	$2,510	$3,559	$6,244	$1,873	$337	$3,122	$2,497	$32,984
5	$4,996	$8,232	$2,585	$3,666	$6,431	$1,929	$347	$3,215	$2,572	$33,974
6	$5,146	$8,478	$2,663	$3,776	$6,624	$1,987	$358	$3,312	$2,650	$34,993
7	$5,300	$8,733	$2,743	$3,889	$6,823	$2,047	$368	$3,411	$2,729	$36,043
8	$5,459	$8,995	$2,825	$4,005	$7,027	$2,108	$379	$3,514	$2,811	$37,124
9	$5,623	$9,265	$2,910	$4,126	$7,238	$2,171	$391	$3,619	$2,895	$38,238
10	$5,792	$9,543	$2,997	$4,249	$7,455	$2,237	$403	$3,728	$2,982	$39,385
11	$5,966	$9,829	$3,087	$4,377	$7,679	$2,304	$415	$3,839	$3,072	$40,566
12	$6,145	$10,124	$3,179	$4,508	$7,909	$2,373	$427	$3,955	$3,164	$41,783
13	$6,329	$10,427	$3,275	$4,643	$8,146	$2,444	$440	$4,073	$3,259	$43,037
14	$6,519	$10,740	$3,373	$4,783	$8,391	$2,517	$453	$4,195	$3,356	$44,328
15	$6,714	$11,062	$3,474	$4,926	$8,643	$2,593	$467	$4,321	$3,457	$45,658
16	$6,916	$11,394	$3,579	$5,074	$8,902	$2,671	$481	$4,451	$3,561	$47,028
17	$7,123	$11,736	$3,686	$5,226	$9,169	$2,751	$495	$4,584	$3,668	$48,438
18	$7,337	$12,088	$3,796	$5,383	$9,444	$2,833	$510	$4,722	$3,778	$49,891
19	$7,557	$12,451	$3,910	$5,545	$9,727	$2,918	$525	$4,864	$3,891	$51,388
20	$7,784	$12,824	$4,028	$5,711	$10,019	$3,006	$541	$5,010	$4,008	$52,930
21	$8,017	$13,209	$4,149	$5,882	$10,320	$3,096	$557	$5,160	$4,128	$54,518
22	$8,258	$13,605	$4,273	$6,059	$10,629	$3,189	$574	$5,315	$4,252	$56,153
23	$8,506	$14,014	$4,401	$6,240	$10,948	$3,284	$591	$5,474	$4,379	$57,838
24	$8,761	$14,434	$4,533	$6,428	$11,277	$3,383	$609	$5,638	$4,511	$59,573
25	$9,024	$14,867	$4,669	$6,620	$11,615	$3,484	$627	$5,807	$4,646	$61,360
26	$9,294	$15,313	$4,809	$6,819	$11,963	$3,589	$646	$5,982	$4,785	$63,201
27	$9,573	$15,772	$4,954	$7,024	$12,322	$3,697	$665	$6,161	$4,929	$65,097
28	$9,860	$16,246	$5,102	$7,234	$12,692	$3,808	$685	$6,346	$5,077	$67,050
29	$10,156	$16,733	$5,255	$7,451	$13,073	$3,922	$706	$6,536	$5,229	$69,061
30	$10,461	$17,235	$5,413	$7,675	$13,465	$4,039	$727	$6,732	$5,386	$71,133
31	$10,775	$17,752	$5,575	$7,905	$13,869	$4,161	$749	$6,934	$5,548	$73,267
32	$11,098	$18,285	$5,743	$8,142	$14,285	$4,285	$771	$7,142	$5,714	$75,465
33	$11,431	$18,833	$5,915	$8,387	$14,713	$4,414	$795	$7,357	$5,885	$77,729
34	$11,774	$19,398	$6,092	$8,638	$15,155	$4,546	$818	$7,577	$6,062	$80,061
35	$12,127	$19,980	$6,275	$8,897	$15,609	$4,683	$843	$7,805	$6,244	$82,463
36	$12,491	$20,579	$6,463	$9,164	$16,078	$4,823	$868	$8,039	$6,431	$84,937
37	$12,865	$21,197	$6,657	$9,439	$16,560	$4,968	$894	$8,280	$6,624	$87,485
38	$13,251	$21,833	$6,857	$9,722	$17,057	$5,117	$921	$8,528	$6,823	$90,110
39	$13,649	$22,488	$7,063	$10,014	$17,569	$5,271	$949	$8,784	$7,027	$92,813
40	$14,058	$23,162	$7,274	$10,314	$18,096	$5,429	$977	$9,048	$7,238	$95,597

*3% Inflation										$2,276,000

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

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$5,709	$9,406	$2,954	$4,188	$7,348	$2,204	$397	$3,674	$2,939	$38,819
2	$5,880	$9,688	$3,043	$4,314	$7,569	$2,271	$409	$3,784	$3,027	$39,984
3	$6,056	$9,978	$3,134	$4,444	$7,796	$2,339	$421	$3,898	$3,118	$41,184
4	$6,238	$10,278	$3,228	$4,577	$8,029	$2,409	$434	$4,015	$3,212	$42,419
5	$6,425	$10,586	$3,325	$4,714	$8,270	$2,481	$447	$4,135	$3,308	$43,692
6	$6,618	$10,904	$3,424	$4,856	$8,518	$2,556	$460	$4,259	$3,407	$45,002
7	$6,817	$11,231	$3,527	$5,001	$8,774	$2,632	$474	$4,387	$3,510	$46,352
8	$7,021	$11,568	$3,633	$5,151	$9,037	$2,711	$488	$4,519	$3,615	$47,743
9	$7,232	$11,915	$3,742	$5,306	$9,308	$2,793	$503	$4,654	$3,723	$49,175
10	$7,449	$12,272	$3,854	$5,465	$9,588	$2,876	$518	$4,794	$3,835	$50,651
11	$7,672	$12,640	$3,970	$5,629	$9,875	$2,963	$533	$4,938	$3,950	$52,170
12	$7,902	$13,020	$4,089	$5,798	$10,172	$3,051	$549	$5,086	$4,069	$53,735
13	$8,139	$13,410	$4,212	$5,972	$10,477	$3,143	$566	$5,238	$4,191	$55,347
14	$8,384	$13,812	$4,338	$6,151	$10,791	$3,237	$583	$5,395	$4,316	$57,008
15	$8,635	$14,227	$4,468	$6,335	$11,115	$3,334	$600	$5,557	$4,446	$58,718
16	$8,894	$14,654	$4,602	$6,525	$11,448	$3,434	$618	$5,724	$4,579	$60,479
17	$9,161	$15,093	$4,740	$6,721	$11,792	$3,537	$637	$5,896	$4,717	$62,294
18	$9,436	$15,546	$4,882	$6,923	$12,145	$3,644	$656	$6,073	$4,858	$64,163
19	$9,719	$16,012	$5,029	$7,131	$12,510	$3,753	$676	$6,255	$5,004	$66,087
20	$10,010	$16,493	$5,180	$7,344	$12,885	$3,865	$696	$6,442	$5,154	$68,070
21	$10,311	$16,988	$5,335	$7,565	$13,272	$3,981	$717	$6,636	$5,309	$70,112
22	$10,620	$17,497	$5,495	$7,792	$13,670	$4,101	$738	$6,835	$5,468	$72,216
23	$10,939	$18,022	$5,660	$8,025	$14,080	$4,224	$760	$7,040	$5,632	$74,382
24	$11,267	$18,563	$5,830	$8,266	$14,502	$4,351	$783	$7,251	$5,801	$76,613
25	$11,605	$19,120	$6,005	$8,514	$14,937	$4,481	$807	$7,469	$5,975	$78,912
26	$11,953	$19,693	$6,185	$8,770	$15,385	$4,616	$831	$7,693	$6,154	$81,279
27	$12,311	$20,284	$6,370	$9,033	$15,847	$4,754	$856	$7,923	$6,339	$83,718
28	$12,681	$20,893	$6,562	$9,304	$16,322	$4,897	$881	$8,161	$6,529	$86,229
29	$13,061	$21,519	$6,758	$9,583	$16,812	$5,044	$908	$8,406	$6,725	$88,816
30	$13,453	$22,165	$6,961	$9,870	$17,316	$5,195	$935	$8,658	$6,927	$91,480
31	$13,857	$22,830	$7,170	$10,166	$17,836	$5,351	$963	$8,918	$7,134	$94,225
32	$14,272	$23,515	$7,385	$10,471	$18,371	$5,511	$992	$9,185	$7,348	$97,052
33	$14,701	$24,220	$7,607	$10,786	$18,922	$5,677	$1,022	$9,461	$7,569	$99,963
34	$15,142	$24,947	$7,835	$11,109	$19,490	$5,847	$1,052	$9,745	$7,796	$102,962
35	$15,596	$25,695	$8,070	$11,442	$20,074	$6,022	$1,084	$10,037	$8,030	$106,051
36	$16,064	$26,466	$8,312	$11,786	$20,677	$6,203	$1,117	$10,338	$8,271	$109,232
37	$16,546	$27,260	$8,561	$12,139	$21,297	$6,389	$1,150	$10,648	$8,519	$112,509
38	$17,042	$28,078	$8,818	$12,503	$21,936	$6,581	$1,185	$10,968	$8,774	$115,885
39	$17,553	$28,920	$9,083	$12,879	$22,594	$6,778	$1,220	$11,297	$9,038	$119,361
40	$18,080	$29,788	$9,355	$13,265	$23,272	$6,982	$1,257	$11,636	$9,309	$122,942
*3% Inflation										$2,927,032

Sub Watershed 606 Annual Cost* Before Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$8,705	$14,342	$4,504	$6,387	$11,205	$3,362	$605	$5,603	$4,482	$59,195
2	$8,966	$14,773	$4,640	$6,578	$11,541	$3,462	$623	$5,771	$4,616	$60,971
3	$9,235	$15,216	$4,779	$6,776	$11,887	$3,566	$642	$5,944	$4,755	$62,800
4	$9,512	$15,672	$4,922	$6,979	$12,244	$3,673	$661	$6,122	$4,898	$64,684
5	$9,798	$16,142	$5,070	$7,188	$12,611	$3,783	$681	$6,306	$5,045	$66,624
6	$10,092	$16,627	$5,222	$7,404	$12,990	$3,897	$701	$6,495	$5,196	$68,623
7	$10,394	$17,126	$5,379	$7,626	$13,379	$4,014	$722	$6,690	$5,352	$70,682
8	$10,706	$17,639	$5,540	$7,855	$13,781	$4,134	$744	$6,890	$5,512	$72,802
9	$11,027	$18,169	$5,706	$8,091	$14,194	$4,258	$766	$7,097	$5,678	$74,986
10	$11,358	$18,714	$5,877	$8,333	$14,620	$4,386	$789	$7,310	$5,848	$77,236

11	$11,699	$19,275	$6,054	$8,583	$15,059	$4,518	$813	$7,529	$6,023	$79,553
12	$12,050	$19,853	$6,235	$8,841	$15,510	$4,653	$838	$7,755	$6,204	$81,940
13	$12,411	$20,449	$6,422	$9,106	$15,976	$4,793	$863	$7,988	$6,390	$84,398
14	$12,784	$21,062	$6,615	$9,379	$16,455	$4,936	$889	$8,227	$6,582	$86,930
15	$13,167	$21,694	$6,813	$9,661	$16,949	$5,085	$915	$8,474	$6,779	$89,538
16	$13,562	$22,345	$7,018	$9,951	$17,457	$5,237	$943	$8,729	$6,983	$92,224
17	$13,969	$23,015	$7,228	$10,249	$17,981	$5,394	$971	$8,990	$7,192	$94,990
18	$14,388	$23,706	$7,445	$10,556	$18,520	$5,556	$1,000	$9,260	$7,408	$97,840
19	$14,820	$24,417	$7,668	$10,873	$19,076	$5,723	$1,030	$9,538	$7,630	$100,775
20	$15,265	$25,149	$7,899	$11,199	$19,648	$5,894	$1,061	$9,824	$7,859	$103,799
21	$15,722	$25,904	$8,135	$11,535	$20,237	$6,071	$1,093	$10,119	$8,095	$106,913
22	$16,194	$26,681	$8,380	$11,881	$20,845	$6,253	$1,126	$10,422	$8,338	$110,120
23	$16,680	$27,482	$8,631	$12,238	$21,470	$6,441	$1,159	$10,735	$8,588	$113,424
24	$17,180	$28,306	$8,890	$12,605	$22,114	$6,634	$1,194	$11,057	$8,846	$116,826
25	$17,696	$29,155	$9,157	$12,983	$22,777	$6,833	$1,230	$11,389	$9,111	$120,331
26	$18,227	$30,030	$9,431	$13,373	$23,461	$7,038	$1,267	$11,730	$9,384	$123,941
27	$18,773	$30,931	$9,714	$13,774	$24,165	$7,249	$1,305	$12,082	$9,666	$127,659
28	$19,337	$31,859	$10,006	$14,187	$24,890	$7,467	$1,344	$12,445	$9,956	$131,489
29	$19,917	$32,814	$10,306	$14,613	$25,636	$7,691	$1,384	$12,818	$10,254	$135,434
30	$20,514	$33,799	$10,615	$15,051	$26,405	$7,922	$1,426	$13,203	$10,562	$139,497
31	$21,130	$34,813	$10,933	$15,503	$27,197	$8,159	$1,469	$13,599	$10,879	$143,682
32	$21,764	$35,857	$11,261	$15,968	$28,013	$8,404	$1,513	$14,007	$11,205	$147,992
33	$22,417	$36,933	$11,599	$16,447	$28,854	$8,656	$1,558	$14,427	$11,542	$152,432
34	$23,089	$38,041	$11,947	$16,940	$29,719	$8,916	$1,605	$14,860	$11,888	$157,005
35	$23,782	$39,182	$12,306	$17,448	$30,611	$9,183	$1,653	$15,305	$12,244	$161,715
36	$24,495	$40,358	$12,675	$17,972	$31,529	$9,459	$1,703	$15,765	$12,612	$166,566
37	$25,230	$41,568	$13,055	$18,511	$32,475	$9,743	$1,754	$16,238	$12,990	$171,563
38	$25,987	$42,815	$13,447	$19,066	$33,449	$10,035	$1,806	$16,725	$13,380	$176,710
39	$26,766	$44,100	$13,850	$19,638	$34,453	$10,336	$1,860	$17,226	$13,781	$182,011
40	$27,569	$45,423	$14,266	$20,227	$35,487	$10,646	$1,916	$17,743	$14,195	$187,472
**3% Inflation*										$4,463,370

5. Cropland BMP Implementation: Costs after cost share by HUC 12 Sub Watersheds

Big Blue Targeted Area – HUC 10270205

Sub Watershed 201 Annual Cost* After Cost-Share, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$5,591	$7,550	$474	$3,362	$5,898	$1,770	$637	$2,949	$1,888	$30,119
2	$5,758	$7,777	$488	$3,463	$6,075	$1,823	$656	$3,038	$1,944	$31,022
3	$5,931	$8,010	$503	$3,567	$6,258	$1,877	$676	$3,129	$2,002	$31,953
4	$6,109	$8,250	$518	$3,674	$6,445	$1,934	$696	$3,223	$2,063	$32,912
5	$6,292	$8,498	$534	$3,784	$6,639	$1,992	$717	$3,319	$2,124	$33,899
6	$6,481	$8,753	$550	$3,898	$6,838	$2,051	$738	$3,419	$2,188	$34,916
7	$6,676	$9,015	$566	$4,015	$7,043	$2,113	$761	$3,522	$2,254	$35,963
8	$6,876	$9,286	$583	$4,135	$7,254	$2,176	$783	$3,627	$2,321	$37,042
9	$7,082	$9,564	$601	$4,259	$7,472	$2,242	$807	$3,736	$2,391	$38,153
10	$7,295	$9,851	$619	$4,387	$7,696	$2,309	$831	$3,848	$2,463	$39,298
11	$7,513	$10,147	$637	$4,518	$7,927	$2,378	$856	$3,964	$2,537	$40,477
12	$7,739	$10,451	$656	$4,654	$8,165	$2,449	$882	$4,082	$2,613	$41,691
13	$7,971	$10,764	$676	$4,794	$8,410	$2,523	$908	$4,205	$2,691	$42,942
14	$8,210	$11,087	$696	$4,937	$8,662	$2,599	$936	$4,331	$2,772	$44,230
15	$8,456	$11,420	$717	$5,085	$8,922	$2,677	$964	$4,461	$2,855	$45,557
16	$8,710	$11,763	$739	$5,238	$9,190	$2,757	$992	$4,595	$2,941	$46,924
17	$8,971	$12,116	$761	$5,395	$9,465	$2,840	$1,022	$4,733	$3,029	$48,332
18	$9,240	$12,479	$784	$5,557	$9,749	$2,925	$1,053	$4,875	$3,120	$49,782
19	$9,518	$12,853	$807	$5,724	$10,042	$3,013	$1,085	$5,021	$3,213	$51,275
20	$9,803	$13,239	$832	$5,895	$10,343	$3,103	$1,117	$5,171	$3,310	$52,813
21	$10,097	$13,636	$857	$6,072	$10,653	$3,196	$1,151	$5,327	$3,409	$54,398

22	$10,400	$14,045	$882	$6,255	$10,973	$3,292	$1,185	$5,486	$3,511	$56,030
23	$10,712	$14,467	$909	$6,442	$11,302	$3,391	$1,221	$5,651	$3,617	$57,711
24	$11,034	$14,901	$936	$6,635	$11,641	$3,492	$1,257	$5,821	$3,725	$59,442
25	$11,365	$15,348	$964	$6,834	$11,990	$3,597	$1,295	$5,995	$3,837	$61,225
26	$11,706	$15,808	$993	$7,040	$12,350	$3,705	$1,334	$6,175	$3,952	$63,062
27	$12,057	$16,282	$1,023	$7,251	$12,721	$3,816	$1,374	$6,360	$4,071	$64,954
28	$12,418	$16,771	$1,053	$7,468	$13,102	$3,931	$1,415	$6,551	$4,193	$66,902
29	$12,791	$17,274	$1,085	$7,692	$13,495	$4,049	$1,457	$6,748	$4,318	$68,909
30	$13,175	$17,792	$1,118	$7,923	$13,900	$4,170	$1,501	$6,950	$4,448	$70,977
31	$13,570	$18,326	$1,151	$8,161	$14,317	$4,295	$1,546	$7,159	$4,581	$73,106
32	$13,977	$18,876	$1,186	$8,406	$14,747	$4,424	$1,593	$7,373	$4,719	$75,299
33	$14,396	$19,442	$1,221	$8,658	$15,189	$4,557	$1,640	$7,594	$4,860	$77,558
34	$14,828	$20,025	$1,258	$8,917	$15,645	$4,693	$1,690	$7,822	$5,006	$79,885
35	$15,273	$20,626	$1,296	$9,185	$16,114	$4,834	$1,740	$8,057	$5,156	$82,281
36	$15,731	$21,245	$1,334	$9,461	$16,597	$4,979	$1,793	$8,299	$5,311	$84,750
37	$16,203	$21,882	$1,374	$9,744	$17,095	$5,129	$1,846	$8,548	$5,471	$87,292
38	$16,689	$22,538	$1,416	$10,037	$17,608	$5,282	$1,902	$8,804	$5,635	$89,911
39	$17,190	$23,215	$1,458	$10,338	$18,136	$5,441	$1,959	$9,068	$5,804	$92,609
40	$17,706	$23,911	$1,502	$10,648	$18,681	$5,604	$2,017	$9,340	$5,978	$95,387
*3% Inflation										$2,270,989

Sub Watershed 204 Annual Cost* After Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$5,159	$6,967	$438	$3,103	$5,443	$1,633	$588	$2,722	$1,742	$27,794
2	$5,314	$7,176	$451	$3,196	$5,606	$1,682	$605	$2,803	$1,794	$28,628
3	$5,473	$7,392	$464	$3,292	$5,775	$1,732	$624	$2,887	$1,848	$29,486
4	$5,637	$7,613	$478	$3,390	$5,948	$1,784	$642	$2,974	$1,903	$30,371
5	$5,807	$7,842	$493	$3,492	$6,126	$1,838	$662	$3,063	$1,960	$31,282
6	$5,981	$8,077	$507	$3,597	$6,310	$1,893	$681	$3,155	$2,019	$32,221
7	$6,160	$8,319	$523	$3,705	$6,499	$1,950	$702	$3,250	$2,080	$33,187
8	$6,345	$8,569	$538	$3,816	$6,694	$2,008	$723	$3,347	$2,142	$34,183
9	$6,535	$8,826	$554	$3,930	$6,895	$2,069	$745	$3,448	$2,206	$35,208
10	$6,731	$9,091	$571	$4,048	$7,102	$2,131	$767	$3,551	$2,273	$36,265
11	$6,933	$9,363	$588	$4,170	$7,315	$2,195	$790	$3,658	$2,341	$37,353
12	$7,141	$9,644	$606	$4,295	$7,535	$2,260	$814	$3,767	$2,411	$38,473
13	$7,356	$9,934	$624	$4,424	$7,761	$2,328	$838	$3,880	$2,483	$39,627
14	$7,576	$10,232	$643	$4,556	$7,993	$2,398	$863	$3,997	$2,558	$40,816
15	$7,804	$10,539	$662	$4,693	$8,233	$2,470	$889	$4,117	$2,635	$42,041
16	$8,038	$10,855	$682	$4,834	$8,480	$2,544	$916	$4,240	$2,714	$43,302
17	$8,279	$11,180	$702	$4,979	$8,735	$2,620	$943	$4,367	$2,795	$44,601
18	$8,527	$11,516	$723	$5,128	$8,997	$2,699	$972	$4,498	$2,879	$45,939
19	$8,783	$11,861	$745	$5,282	$9,267	$2,780	$1,001	$4,633	$2,965	$47,317
20	$9,046	$12,217	$767	$5,440	$9,545	$2,863	$1,031	$4,772	$3,054	$48,737
21	$9,318	$12,584	$790	$5,604	$9,831	$2,949	$1,062	$4,915	$3,146	$50,199
22	$9,597	$12,961	$814	$5,772	$10,126	$3,038	$1,094	$5,063	$3,240	$51,705
23	$9,885	$13,350	$839	$5,945	$10,430	$3,129	$1,126	$5,215	$3,337	$53,256
24	$10,182	$13,750	$864	$6,123	$10,742	$3,223	$1,160	$5,371	$3,438	$54,853
25	$10,487	$14,163	$890	$6,307	$11,065	$3,319	$1,195	$5,532	$3,541	$56,499
26	$10,802	$14,588	$916	$6,496	$11,397	$3,419	$1,231	$5,698	$3,647	$58,194
27	$11,126	$15,025	$944	$6,691	$11,739	$3,522	$1,268	$5,869	$3,756	$59,940
28	$11,460	$15,476	$972	$6,892	$12,091	$3,627	$1,306	$6,045	$3,869	$61,738
29	$11,804	$15,940	$1,001	$7,098	$12,453	$3,736	$1,345	$6,227	$3,985	$63,590
30	$12,158	$16,419	$1,031	$7,311	$12,827	$3,848	$1,385	$6,414	$4,105	$65,498
31	$12,522	$16,911	$1,062	$7,531	$13,212	$3,964	$1,427	$6,606	$4,228	$67,463
32	$12,898	$17,419	$1,094	$7,757	$13,608	$4,082	$1,470	$6,804	$4,355	$69,487
33	$13,285	$17,941	$1,127	$7,989	$14,016	$4,205	$1,514	$7,008	$4,485	$71,571
34	$13,684	$18,479	$1,161	$8,229	$14,437	$4,331	$1,559	$7,218	$4,620	$73,718
35	$14,094	$19,034	$1,196	$8,476	$14,870	$4,461	$1,606	$7,435	$4,758	$75,930
36	$14,517	$19,605	$1,231	$8,730	$15,316	$4,595	$1,654	$7,658	$4,901	$78,208
37	$14,952	$20,193	$1,268	$8,992	$15,776	$4,733	$1,704	$7,888	$5,048	$80,554
38	$15,401	$20,799	$1,306	$9,262	$16,249	$4,875	$1,755	$8,124	$5,200	$82,971

39	$15,863	$21,423	$1,346	$9,540	$16,736	$5,021	$1,808	$8,368	$5,356	$85,460
40	$16,339	$22,065	$1,386	$9,826	$17,239	$5,172	$1,862	$8,619	$5,516	$88,024
*3% Inflation										$2,095,686

Sub Watershed 301 Annual Cost* After Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$8,758	$11,827	$743	$5,267	$9,240	$2,772	$998	$4,620	$2,957	$47,180
2	$9,020	$12,182	$765	$5,425	$9,517	$2,855	$1,028	$4,758	$3,045	$48,595
3	$9,291	$12,547	$788	$5,587	$9,802	$2,941	$1,059	$4,901	$3,137	$50,053
4	$9,570	$12,923	$812	$5,755	$10,096	$3,029	$1,090	$5,048	$3,231	$51,555
5	$9,857	$13,311	$836	$5,928	$10,399	$3,120	$1,123	$5,200	$3,328	$53,101
6	$10,152	$13,711	$861	$6,105	$10,711	$3,213	$1,157	$5,356	$3,428	$54,694
7	$10,457	$14,122	$887	$6,289	$11,033	$3,310	$1,192	$5,516	$3,530	$56,335
8	$10,771	$14,545	$914	$6,477	$11,364	$3,409	$1,227	$5,682	$3,636	$58,025
9	$11,094	$14,982	$941	$6,672	$11,705	$3,511	$1,264	$5,852	$3,745	$59,766
10	$11,427	$15,431	$969	$6,872	$12,056	$3,617	$1,302	$6,028	$3,858	$61,559
11	$11,769	$15,894	$998	$7,078	$12,417	$3,725	$1,341	$6,209	$3,974	$63,406
12	$12,122	$16,371	$1,028	$7,290	$12,790	$3,837	$1,381	$6,395	$4,093	$65,308
13	$12,486	$16,862	$1,059	$7,509	$13,174	$3,952	$1,423	$6,587	$4,216	$67,267
14	$12,861	$17,368	$1,091	$7,734	$13,569	$4,071	$1,465	$6,784	$4,342	$69,285
15	$13,247	$17,889	$1,124	$7,966	$13,976	$4,193	$1,509	$6,988	$4,472	$71,364
16	$13,644	$18,426	$1,157	$8,205	$14,395	$4,319	$1,555	$7,198	$4,606	$73,505
17	$14,053	$18,979	$1,192	$8,451	$14,827	$4,448	$1,601	$7,413	$4,745	$75,710
18	$14,475	$19,548	$1,228	$8,705	$15,272	$4,582	$1,649	$7,636	$4,887	$77,981
19	$14,909	$20,134	$1,265	$8,966	$15,730	$4,719	$1,699	$7,865	$5,034	$80,321
20	$15,356	$20,738	$1,303	$9,235	$16,202	$4,861	$1,750	$8,101	$5,185	$82,730
21	$15,817	$21,361	$1,342	$9,512	$16,688	$5,006	$1,802	$8,344	$5,340	$85,212
22	$16,292	$22,001	$1,382	$9,797	$17,189	$5,157	$1,856	$8,594	$5,500	$87,768
23	$16,780	$22,661	$1,423	$10,091	$17,704	$5,311	$1,912	$8,852	$5,665	$90,401
24	$17,284	$23,341	$1,466	$10,394	$18,235	$5,471	$1,969	$9,118	$5,835	$93,114
25	$17,802	$24,041	$1,510	$10,706	$18,782	$5,635	$2,028	$9,391	$6,010	$95,907
26	$18,336	$24,763	$1,555	$11,027	$19,346	$5,804	$2,089	$9,673	$6,191	$98,784
27	$18,886	$25,506	$1,602	$11,358	$19,926	$5,978	$2,152	$9,963	$6,376	$101,748
28	$19,453	$26,271	$1,650	$11,699	$20,524	$6,157	$2,217	$10,262	$6,568	$104,800
29	$20,037	$27,059	$1,700	$12,050	$21,140	$6,342	$2,283	$10,570	$6,765	$107,944
30	$20,638	$27,871	$1,751	$12,411	$21,774	$6,532	$2,352	$10,887	$6,968	$111,182
31	$21,257	$28,707	$1,803	$12,783	$22,427	$6,728	$2,422	$11,214	$7,177	$114,518
32	$21,895	$29,568	$1,857	$13,167	$23,100	$6,930	$2,495	$11,550	$7,392	$117,953
33	$22,551	$30,455	$1,913	$13,562	$23,793	$7,138	$2,570	$11,896	$7,614	$121,492
34	$23,228	$31,369	$1,970	$13,969	$24,507	$7,352	$2,647	$12,253	$7,842	$125,137
35	$23,925	$32,310	$2,029	$14,388	$25,242	$7,573	$2,726	$12,621	$8,077	$128,891
36	$24,643	$33,279	$2,090	$14,820	$25,999	$7,800	$2,808	$13,000	$8,320	$132,758
37	$25,382	$34,277	$2,153	$15,264	$26,779	$8,034	$2,892	$13,390	$8,569	$136,740
38	$26,143	$35,306	$2,218	$15,722	$27,583	$8,275	$2,979	$13,791	$8,826	$140,843
39	$26,928	$36,365	$2,284	$16,194	$28,410	$8,523	$3,068	$14,205	$9,091	$145,068
40	$27,735	$37,456	$2,353	$16,680	$29,262	$8,779	$3,160	$14,631	$9,364	$149,420
*3% Inflation										$3,557,421

Sub Watershed 302 Annual Cost* After Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$8,448	$11,409	$717	$5,081	$8,913	$2,674	$963	$4,457	$2,852	$45,514
2	$8,702	$11,751	$738	$5,233	$9,181	$2,754	$992	$4,590	$2,938	$46,879
3	$8,963	$12,104	$760	$5,390	$9,456	$2,837	$1,021	$4,728	$3,026	$48,286
4	$9,232	$12,467	$783	$5,552	$9,740	$2,922	$1,052	$4,870	$3,117	$49,734
5	$9,509	$12,841	$807	$5,718	$10,032	$3,010	$1,083	$5,016	$3,210	$51,226
6	$9,794	$13,226	$831	$5,890	$10,333	$3,100	$1,116	$5,167	$3,307	$52,763
7	$10,088	$13,623	$856	$6,067	$10,643	$3,193	$1,149	$5,322	$3,406	$54,346
8	$10,390	$14,032	$881	$6,249	$10,962	$3,289	$1,184	$5,481	$3,508	$55,976
9	$10,702	$14,453	$908	$6,436	$11,291	$3,387	$1,219	$5,646	$3,613	$57,656

10	$11,023	$14,886	$935	$6,629	$11,630	$3,489	$1,256	$5,815	$3,722	$59,385
11	$11,354	$15,333	$963	$6,828	$11,979	$3,594	$1,294	$5,989	$3,833	$61,167
12	$11,694	$15,793	$992	$7,033	$12,338	$3,701	$1,333	$6,169	$3,948	$63,002
13	$12,045	$16,267	$1,022	$7,244	$12,708	$3,813	$1,373	$6,354	$4,067	$64,892
14	$12,407	$16,755	$1,052	$7,461	$13,090	$3,927	$1,414	$6,545	$4,189	$66,839
15	$12,779	$17,257	$1,084	$7,685	$13,482	$4,045	$1,456	$6,741	$4,314	$68,844
16	$13,162	$17,775	$1,117	$7,916	$13,887	$4,166	$1,500	$6,943	$4,444	$70,909
17	$13,557	$18,308	$1,150	$8,153	$14,303	$4,291	$1,545	$7,152	$4,577	$73,037
18	$13,964	$18,858	$1,184	$8,398	$14,733	$4,420	$1,591	$7,366	$4,714	$75,228
19	$14,383	$19,423	$1,220	$8,649	$15,175	$4,552	$1,639	$7,587	$4,856	$77,484
20	$14,814	$20,006	$1,257	$8,909	$15,630	$4,689	$1,688	$7,815	$5,002	$79,809
21	$15,259	$20,606	$1,294	$9,176	$16,099	$4,830	$1,739	$8,049	$5,152	$82,203
22	$15,716	$21,224	$1,333	$9,452	$16,582	$4,974	$1,791	$8,291	$5,306	$84,669
23	$16,188	$21,861	$1,373	$9,735	$17,079	$5,124	$1,845	$8,540	$5,465	$87,209
24	$16,673	$22,517	$1,414	$10,027	$17,591	$5,277	$1,900	$8,796	$5,629	$89,826
25	$17,174	$23,193	$1,457	$10,328	$18,119	$5,436	$1,957	$9,060	$5,798	$92,520
26	$17,689	$23,888	$1,500	$10,638	$18,663	$5,599	$2,016	$9,331	$5,972	$95,296
27	$18,220	$24,605	$1,546	$10,957	$19,223	$5,767	$2,076	$9,611	$6,151	$98,155
28	$18,766	$25,343	$1,592	$11,286	$19,799	$5,940	$2,138	$9,900	$6,336	$101,100
29	$19,329	$26,103	$1,640	$11,624	$20,393	$6,118	$2,202	$10,197	$6,526	$104,133
30	$19,909	$26,887	$1,689	$11,973	$21,005	$6,302	$2,269	$10,503	$6,722	$107,257
31	$20,506	$27,693	$1,739	$12,332	$21,635	$6,491	$2,337	$10,818	$6,923	$110,474
32	$21,121	$28,524	$1,792	$12,702	$22,284	$6,685	$2,407	$11,142	$7,131	$113,789
33	$21,755	$29,380	$1,845	$13,083	$22,953	$6,886	$2,479	$11,476	$7,345	$117,202
34	$22,408	$30,261	$1,901	$13,476	$23,641	$7,092	$2,553	$11,821	$7,565	$120,718
35	$23,080	$31,169	$1,958	$13,880	$24,351	$7,305	$2,630	$12,175	$7,792	$124,340
36	$23,772	$32,104	$2,017	$14,296	$25,081	$7,524	$2,709	$12,541	$8,026	$128,070
37	$24,486	$33,067	$2,077	$14,725	$25,834	$7,750	$2,790	$12,917	$8,267	$131,912
38	$25,220	$34,059	$2,139	$15,167	$26,609	$7,983	$2,874	$13,304	$8,515	$135,869
39	$25,977	$35,081	$2,204	$15,622	$27,407	$8,222	$2,960	$13,703	$8,770	$139,946
40	$26,756	$36,133	$2,270	$16,091	$28,229	$8,469	$3,049	$14,115	$9,033	$144,144
**3% Inflation*										$3,431,810

Sub Watershed 306 Annual Cost* After Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$4,181	$5,647	$355	$2,515	$4,412	$1,323	$476	$2,206	$1,412	$22,526
2	$4,307	$5,816	$365	$2,590	$4,544	$1,363	$491	$2,272	$1,454	$23,202
3	$4,436	$5,991	$376	$2,668	$4,680	$1,404	$505	$2,340	$1,498	$23,898
4	$4,569	$6,170	$388	$2,748	$4,821	$1,446	$521	$2,410	$1,543	$24,615
5	$4,706	$6,356	$399	$2,830	$4,965	$1,490	$536	$2,483	$1,589	$25,354
6	$4,847	$6,546	$411	$2,915	$5,114	$1,534	$552	$2,557	$1,637	$26,114
7	$4,993	$6,743	$424	$3,003	$5,268	$1,580	$569	$2,634	$1,686	$26,898
8	$5,143	$6,945	$436	$3,093	$5,426	$1,628	$586	$2,713	$1,736	$27,705
9	$5,297	$7,153	$449	$3,185	$5,588	$1,677	$604	$2,794	$1,788	$28,536
10	$5,456	$7,368	$463	$3,281	$5,756	$1,727	$622	$2,878	$1,842	$29,392
11	$5,619	$7,589	$477	$3,379	$5,929	$1,779	$640	$2,964	$1,897	$30,274
12	$5,788	$7,816	$491	$3,481	$6,107	$1,832	$660	$3,053	$1,954	$31,182
13	$5,962	$8,051	$506	$3,585	$6,290	$1,887	$679	$3,145	$2,013	$32,117
14	$6,140	$8,293	$521	$3,693	$6,479	$1,944	$700	$3,239	$2,073	$33,081
15	$6,325	$8,541	$536	$3,804	$6,673	$2,002	$721	$3,336	$2,135	$34,073
16	$6,514	$8,798	$553	$3,918	$6,873	$2,062	$742	$3,437	$2,199	$35,095
17	$6,710	$9,061	$569	$4,035	$7,079	$2,124	$765	$3,540	$2,265	$36,148
18	$6,911	$9,333	$586	$4,156	$7,292	$2,187	$787	$3,646	$2,333	$37,233
19	$7,118	$9,613	$604	$4,281	$7,510	$2,253	$811	$3,755	$2,403	$38,350
20	$7,332	$9,902	$622	$4,409	$7,736	$2,321	$835	$3,868	$2,475	$39,500
21	$7,552	$10,199	$641	$4,542	$7,968	$2,390	$861	$3,984	$2,550	$40,685
22	$7,779	$10,505	$660	$4,678	$8,207	$2,462	$886	$4,103	$2,626	$41,906
23	$8,012	$10,820	$680	$4,818	$8,453	$2,536	$913	$4,227	$2,705	$43,163
24	$8,252	$11,144	$700	$4,963	$8,707	$2,612	$940	$4,353	$2,786	$44,458
25	$8,500	$11,479	$721	$5,112	$8,968	$2,690	$969	$4,484	$2,870	$45,792
26	$8,755	$11,823	$743	$5,265	$9,237	$2,771	$998	$4,618	$2,956	$47,165

27	$9,017	$12,178	$765	$5,423	$9,514	$2,854	$1,028	$4,757	$3,044	$48,580
28	$9,288	$12,543	$788	$5,586	$9,799	$2,940	$1,058	$4,900	$3,136	$50,038
29	$9,567	$12,919	$812	$5,753	$10,093	$3,028	$1,090	$5,047	$3,230	$51,539
30	$9,854	$13,307	$836	$5,926	$10,396	$3,119	$1,123	$5,198	$3,327	$53,085
31	$10,149	$13,706	$861	$6,104	$10,708	$3,212	$1,156	$5,354	$3,427	$54,677
32	$10,454	$14,117	$887	$6,287	$11,029	$3,309	$1,191	$5,515	$3,529	$56,318
33	$10,767	$14,541	$913	$6,475	$11,360	$3,408	$1,227	$5,680	$3,635	$58,007
34	$11,090	$14,977	$941	$6,670	$11,701	$3,510	$1,264	$5,850	$3,744	$59,748
35	$11,423	$15,427	$969	$6,870	$12,052	$3,616	$1,302	$6,026	$3,857	$61,540
36	$11,766	$15,889	$998	$7,076	$12,414	$3,724	$1,341	$6,207	$3,972	$63,386
37	$12,119	$16,366	$1,028	$7,288	$12,786	$3,836	$1,381	$6,393	$4,091	$65,288
38	$12,482	$16,857	$1,059	$7,507	$13,170	$3,951	$1,422	$6,585	$4,214	$67,246
39	$12,857	$17,363	$1,091	$7,732	$13,565	$4,069	$1,465	$6,782	$4,341	$69,264
40	$13,242	$17,884	$1,123	$7,964	$13,972	$4,191	$1,509	$6,986	$4,471	$71,342
*3% Inflation										$1,698,519

Sub Watershed 401 Annual Cost* After Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$6,550	$8,846	$556	$3,939	$6,911	$2,073	$746	$3,455	$2,211	$35,287
2	$6,747	$9,111	$572	$4,057	$7,118	$2,135	$769	$3,559	$2,278	$36,346
3	$6,949	$9,384	$589	$4,179	$7,331	$2,199	$792	$3,666	$2,346	$37,436
4	$7,157	$9,666	$607	$4,304	$7,551	$2,265	$816	$3,776	$2,416	$38,559
5	$7,372	$9,956	$625	$4,433	$7,778	$2,333	$840	$3,889	$2,489	$39,716
6	$7,593	$10,254	$644	$4,566	$8,011	$2,403	$865	$4,006	$2,564	$40,907
7	$7,821	$10,562	$663	$4,703	$8,252	$2,475	$891	$4,126	$2,641	$42,135
8	$8,056	$10,879	$683	$4,845	$8,499	$2,550	$918	$4,250	$2,720	$43,399
9	$8,297	$11,205	$704	$4,990	$8,754	$2,626	$945	$4,377	$2,801	$44,701
10	$8,546	$11,542	$725	$5,140	$9,017	$2,705	$974	$4,508	$2,885	$46,042
11	$8,803	$11,888	$747	$5,294	$9,287	$2,786	$1,003	$4,644	$2,972	$47,423
12	$9,067	$12,244	$769	$5,453	$9,566	$2,870	$1,033	$4,783	$3,061	$48,846
13	$9,339	$12,612	$792	$5,616	$9,853	$2,956	$1,064	$4,926	$3,153	$50,311
14	$9,619	$12,990	$816	$5,785	$10,148	$3,045	$1,096	$5,074	$3,248	$51,820
15	$9,907	$13,380	$840	$5,958	$10,453	$3,136	$1,129	$5,226	$3,345	$53,375
16	$10,205	$13,781	$866	$6,137	$10,767	$3,230	$1,163	$5,383	$3,445	$54,976
17	$10,511	$14,195	$892	$6,321	$11,090	$3,327	$1,198	$5,545	$3,549	$56,626
18	$10,826	$14,620	$918	$6,511	$11,422	$3,427	$1,234	$5,711	$3,655	$58,324
19	$11,151	$15,059	$946	$6,706	$11,765	$3,529	$1,271	$5,882	$3,765	$60,074
20	$11,485	$15,511	$974	$6,907	$12,118	$3,635	$1,309	$6,059	$3,878	$61,876
21	$11,830	$15,976	$1,004	$7,114	$12,481	$3,744	$1,348	$6,241	$3,994	$63,733
22	$12,185	$16,455	$1,034	$7,328	$12,856	$3,857	$1,388	$6,428	$4,114	$65,645
23	$12,551	$16,949	$1,065	$7,548	$13,241	$3,972	$1,430	$6,621	$4,237	$67,614
24	$12,927	$17,458	$1,097	$7,774	$13,639	$4,092	$1,473	$6,819	$4,364	$69,642
25	$13,315	$17,981	$1,129	$8,007	$14,048	$4,214	$1,517	$7,024	$4,495	$71,732
26	$13,714	$18,521	$1,163	$8,248	$14,469	$4,341	$1,563	$7,235	$4,630	$73,883
27	$14,126	$19,076	$1,198	$8,495	$14,903	$4,471	$1,610	$7,452	$4,769	$76,100
28	$14,549	$19,649	$1,234	$8,750	$15,350	$4,605	$1,658	$7,675	$4,912	$78,383
29	$14,986	$20,238	$1,271	$9,012	$15,811	$4,743	$1,708	$7,906	$5,060	$80,734
30	$15,436	$20,845	$1,309	$9,283	$16,285	$4,886	$1,759	$8,143	$5,211	$83,156
31	$15,899	$21,471	$1,349	$9,561	$16,774	$5,032	$1,812	$8,387	$5,368	$85,651
32	$16,376	$22,115	$1,389	$9,848	$17,277	$5,183	$1,866	$8,639	$5,529	$88,221
33	$16,867	$22,778	$1,431	$10,143	$17,795	$5,339	$1,922	$8,898	$5,695	$90,867
34	$17,373	$23,461	$1,474	$10,448	$18,329	$5,499	$1,980	$9,165	$5,865	$93,593
35	$17,894	$24,165	$1,518	$10,761	$18,879	$5,664	$2,039	$9,440	$6,041	$96,401
36	$18,431	$24,890	$1,563	$11,084	$19,446	$5,834	$2,100	$9,723	$6,223	$99,293
37	$18,984	$25,637	$1,610	$11,416	$20,029	$6,009	$2,163	$10,014	$6,409	$102,272
38	$19,553	$26,406	$1,659	$11,759	$20,630	$6,189	$2,228	$10,315	$6,602	$105,340
39	$20,140	$27,198	$1,708	$12,112	$21,249	$6,375	$2,295	$10,624	$6,800	$108,500
40	$20,744	$28,014	$1,760	$12,475	$21,886	$6,566	$2,364	$10,943	$7,004	$111,755
*3% Inflation										$2,660,696

Sub Watershed 402 Annual Cost* After Cost-Share, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$3,175	$4,288	$269	$1,909	$3,350	$1,005	$362	$1,675	$1,072	$17,104
2	$3,270	$4,416	$277	$1,967	$3,450	$1,035	$373	$1,725	$1,104	$17,617
3	$3,368	$4,549	$286	$2,026	$3,554	$1,066	$384	$1,777	$1,137	$18,146
4	$3,469	$4,685	$294	$2,086	$3,660	$1,098	$395	$1,830	$1,171	$18,690
5	$3,573	$4,826	$303	$2,149	$3,770	$1,131	$407	$1,885	$1,206	$19,251
6	$3,681	$4,971	$312	$2,213	$3,883	$1,165	$419	$1,942	$1,243	$19,828
7	$3,791	$5,120	$322	$2,280	$4,000	$1,200	$432	$2,000	$1,280	$20,423
8	$3,905	$5,273	$331	$2,348	$4,120	$1,236	$445	$2,060	$1,318	$21,036
9	$4,022	$5,431	$341	$2,419	$4,243	$1,273	$458	$2,122	$1,358	$21,667
10	$4,143	$5,594	$351	$2,491	$4,371	$1,311	$472	$2,185	$1,399	$22,317
11	$4,267	$5,762	$362	$2,566	$4,502	$1,351	$486	$2,251	$1,441	$22,987
12	$4,395	$5,935	$373	$2,643	$4,637	$1,391	$501	$2,318	$1,484	$23,676
13	$4,527	$6,113	$384	$2,722	$4,776	$1,433	$516	$2,388	$1,528	$24,387
14	$4,662	$6,296	$395	$2,804	$4,919	$1,476	$531	$2,460	$1,574	$25,118
15	$4,802	$6,485	$407	$2,888	$5,067	$1,520	$547	$2,533	$1,621	$25,872
16	$4,946	$6,680	$420	$2,975	$5,219	$1,566	$564	$2,609	$1,670	$26,648
17	$5,095	$6,880	$432	$3,064	$5,375	$1,613	$581	$2,688	$1,720	$27,447
18	$5,248	$7,087	$445	$3,156	$5,537	$1,661	$598	$2,768	$1,772	$28,271
19	$5,405	$7,299	$458	$3,250	$5,703	$1,711	$616	$2,851	$1,825	$29,119
20	$5,567	$7,518	$472	$3,348	$5,874	$1,762	$634	$2,937	$1,880	$29,992
21	$5,734	$7,744	$486	$3,448	$6,050	$1,815	$653	$3,025	$1,936	$30,892
22	$5,906	$7,976	$501	$3,552	$6,231	$1,869	$673	$3,116	$1,994	$31,819
23	$6,083	$8,215	$516	$3,658	$6,418	$1,926	$693	$3,209	$2,054	$32,773
24	$6,266	$8,462	$532	$3,768	$6,611	$1,983	$714	$3,305	$2,115	$33,757
25	$6,454	$8,716	$547	$3,881	$6,809	$2,043	$735	$3,405	$2,179	$34,769
26	$6,648	$8,977	$564	$3,998	$7,014	$2,104	$757	$3,507	$2,244	$35,812
27	$6,847	$9,247	$581	$4,118	$7,224	$2,167	$780	$3,612	$2,312	$36,887
28	$7,052	$9,524	$598	$4,241	$7,441	$2,232	$804	$3,720	$2,381	$37,993
29	$7,264	$9,810	$616	$4,368	$7,664	$2,299	$828	$3,832	$2,452	$39,133
30	$7,482	$10,104	$635	$4,499	$7,894	$2,368	$853	$3,947	$2,526	$40,307
31	$7,706	$10,407	$654	$4,634	$8,131	$2,439	$878	$4,065	$2,602	$41,516
32	$7,937	$10,719	$673	$4,773	$8,374	$2,512	$904	$4,187	$2,680	$42,762
33	$8,176	$11,041	$694	$4,917	$8,626	$2,588	$932	$4,313	$2,760	$44,045
34	$8,421	$11,372	$714	$5,064	$8,884	$2,665	$960	$4,442	$2,843	$45,366
35	$8,674	$11,713	$736	$5,216	$9,151	$2,745	$988	$4,576	$2,928	$46,727
36	$8,934	$12,065	$758	$5,373	$9,426	$2,828	$1,018	$4,713	$3,016	$48,129
37	$9,202	$12,427	$781	$5,534	$9,708	$2,912	$1,048	$4,854	$3,107	$49,573
38	$9,478	$12,799	$804	$5,700	$10,000	$3,000	$1,080	$5,000	$3,200	$51,060
39	$9,762	$13,183	$828	$5,871	$10,300	$3,090	$1,112	$5,150	$3,296	$52,592
40	$10,055	$13,579	$853	$6,047	$10,609	$3,183	$1,146	$5,304	$3,395	$54,170
**3% Inflation*										$1,289,681

Sub Watershed 403 Annual Cost* After Cost-Share, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$3,858	$5,210	$327	$2,320	$4,070	$1,221	$440	$2,035	$1,303	$20,784
2	$3,974	$5,366	$337	$2,390	$4,192	$1,258	$453	$2,096	$1,342	$21,407
3	$4,093	$5,527	$347	$2,461	$4,318	$1,295	$466	$2,159	$1,382	$22,050
4	$4,216	$5,693	$358	$2,535	$4,448	$1,334	$480	$2,224	$1,423	$22,711
5	$4,342	$5,864	$368	$2,611	$4,581	$1,374	$495	$2,291	$1,466	$23,392
6	$4,472	$6,040	$379	$2,690	$4,719	$1,416	$510	$2,359	$1,510	$24,094
7	$4,607	$6,221	$391	$2,770	$4,860	$1,458	$525	$2,430	$1,555	$24,817
8	$4,745	$6,408	$402	$2,853	$5,006	$1,502	$541	$2,503	$1,602	$25,562
9	$4,887	$6,600	$415	$2,939	$5,156	$1,547	$557	$2,578	$1,650	$26,328
10	$5,034	$6,798	$427	$3,027	$5,311	$1,593	$574	$2,655	$1,699	$27,118
11	$5,185	$7,002	$440	$3,118	$5,470	$1,641	$591	$2,735	$1,750	$27,932
12	$5,340	$7,212	$453	$3,212	$5,634	$1,690	$609	$2,817	$1,803	$28,770

13	$5,500	$7,428	$467	$3,308	$5,803	$1,741	$627	$2,902	$1,857	$29,633
14	$5,665	$7,651	$481	$3,407	$5,977	$1,793	$646	$2,989	$1,913	$30,522
15	$5,835	$7,881	$495	$3,509	$6,157	$1,847	$665	$3,078	$1,970	$31,438
16	$6,011	$8,117	$510	$3,615	$6,341	$1,902	$685	$3,171	$2,029	$32,381
17	$6,191	$8,361	$525	$3,723	$6,532	$1,959	$705	$3,266	$2,090	$33,352
18	$6,377	$8,611	$541	$3,835	$6,728	$2,018	$727	$3,364	$2,153	$34,353
19	$6,568	$8,870	$557	$3,950	$6,929	$2,079	$748	$3,465	$2,217	$35,383
20	$6,765	$9,136	$574	$4,068	$7,137	$2,141	$771	$3,569	$2,284	$36,445
21	$6,968	$9,410	$591	$4,190	$7,351	$2,205	$794	$3,676	$2,352	$37,538
22	$7,177	$9,692	$609	$4,316	$7,572	$2,272	$818	$3,786	$2,423	$38,664
23	$7,392	$9,983	$627	$4,446	$7,799	$2,340	$842	$3,900	$2,496	$39,824
24	$7,614	$10,282	$646	$4,579	$8,033	$2,410	$868	$4,017	$2,571	$41,019
25	$7,842	$10,591	$665	$4,716	$8,274	$2,482	$894	$4,137	$2,648	$42,249
26	$8,078	$10,909	$685	$4,858	$8,522	$2,557	$920	$4,261	$2,727	$43,517
27	$8,320	$11,236	$706	$5,003	$8,778	$2,633	$948	$4,389	$2,809	$44,822
28	$8,570	$11,573	$727	$5,154	$9,041	$2,712	$976	$4,521	$2,893	$46,167
29	$8,827	$11,920	$749	$5,308	$9,313	$2,794	$1,006	$4,656	$2,980	$47,552
30	$9,091	$12,278	$771	$5,467	$9,592	$2,878	$1,036	$4,796	$3,069	$48,979
31	$9,364	$12,646	$794	$5,631	$9,880	$2,964	$1,067	$4,940	$3,162	$50,448
32	$9,645	$13,025	$818	$5,800	$10,176	$3,053	$1,099	$5,088	$3,256	$51,961
33	$9,934	$13,416	$843	$5,974	$10,481	$3,144	$1,132	$5,241	$3,354	$53,520
34	$10,232	$13,819	$868	$6,154	$10,796	$3,239	$1,166	$5,398	$3,455	$55,126
35	$10,539	$14,233	$894	$6,338	$11,120	$3,336	$1,201	$5,560	$3,558	$56,780
36	$10,856	$14,660	$921	$6,528	$11,453	$3,436	$1,237	$5,727	$3,665	$58,483
37	$11,181	$15,100	$948	$6,724	$11,797	$3,539	$1,274	$5,898	$3,775	$60,238
38	$11,517	$15,553	$977	$6,926	$12,151	$3,645	$1,312	$6,075	$3,888	$62,045
39	$11,862	$16,020	$1,006	$7,134	$12,515	$3,755	$1,352	$6,258	$4,005	$63,906
40	$12,218	$16,500	$1,036	$7,348	$12,891	$3,867	$1,392	$6,445	$4,125	$65,823
**3% Inflation*										$1,567,132

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

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$7,671	$10,360	$651	$4,613	$8,093	$2,428	$874	$4,047	$2,590	$41,327
2	$7,901	$10,670	$670	$4,752	$8,336	$2,501	$900	$4,168	$2,668	$42,567
3	$8,138	$10,990	$690	$4,894	$8,586	$2,576	$927	$4,293	$2,748	$43,844
4	$8,382	$11,320	$711	$5,041	$8,844	$2,653	$955	$4,422	$2,830	$45,159
5	$8,634	$11,660	$732	$5,192	$9,109	$2,733	$984	$4,555	$2,915	$46,514
6	$8,893	$12,010	$754	$5,348	$9,383	$2,815	$1,013	$4,691	$3,002	$47,909
7	$9,160	$12,370	$777	$5,508	$9,664	$2,899	$1,044	$4,832	$3,092	$49,346
8	$9,434	$12,741	$800	$5,674	$9,954	$2,986	$1,075	$4,977	$3,185	$50,827
9	$9,718	$13,123	$824	$5,844	$10,253	$3,076	$1,107	$5,126	$3,281	$52,352
10	$10,009	$13,517	$849	$6,019	$10,560	$3,168	$1,140	$5,280	$3,379	$53,922
11	$10,309	$13,922	$875	$6,200	$10,877	$3,263	$1,175	$5,438	$3,481	$55,540
12	$10,619	$14,340	$901	$6,386	$11,203	$3,361	$1,210	$5,602	$3,585	$57,206
13	$10,937	$14,770	$928	$6,577	$11,539	$3,462	$1,246	$5,770	$3,693	$58,922
14	$11,265	$15,213	$956	$6,775	$11,885	$3,566	$1,284	$5,943	$3,803	$60,690
15	$11,603	$15,670	$984	$6,978	$12,242	$3,673	$1,322	$6,121	$3,917	$62,511
16	$11,951	$16,140	$1,014	$7,187	$12,609	$3,783	$1,362	$6,305	$4,035	$64,386
17	$12,310	$16,624	$1,044	$7,403	$12,988	$3,896	$1,403	$6,494	$4,156	$66,317
18	$12,679	$17,123	$1,076	$7,625	$13,377	$4,013	$1,445	$6,689	$4,281	$68,307
19	$13,060	$17,637	$1,108	$7,854	$13,779	$4,134	$1,488	$6,889	$4,409	$70,356
20	$13,451	$18,166	$1,141	$8,089	$14,192	$4,258	$1,533	$7,096	$4,541	$72,467
21	$13,855	$18,711	$1,175	$8,332	$14,618	$4,385	$1,579	$7,309	$4,678	$74,641
22	$14,271	$19,272	$1,211	$8,582	$15,056	$4,517	$1,626	$7,528	$4,818	$76,880
23	$14,699	$19,850	$1,247	$8,839	$15,508	$4,652	$1,675	$7,754	$4,963	$79,187
24	$15,140	$20,446	$1,284	$9,105	$15,973	$4,792	$1,725	$7,987	$5,111	$81,562
25	$15,594	$21,059	$1,323	$9,378	$16,452	$4,936	$1,777	$8,226	$5,265	$84,009
26	$16,062	$21,691	$1,362	$9,659	$16,946	$5,084	$1,830	$8,473	$5,423	$86,529
27	$16,543	$22,341	$1,403	$9,949	$17,454	$5,236	$1,885	$8,727	$5,585	$89,125
28	$17,040	$23,012	$1,445	$10,247	$17,978	$5,393	$1,942	$8,989	$5,753	$91,799
29	$17,551	$23,702	$1,489	$10,555	$18,517	$5,555	$2,000	$9,259	$5,926	$94,553

30	$18,077	$24,413	$1,533	$10,871	$19,073	$5,722	$2,060	$9,536	$6,103	$97,389
31	$18,620	$25,145	$1,579	$11,198	$19,645	$5,893	$2,122	$9,822	$6,286	$100,311
32	$19,178	$25,900	$1,627	$11,534	$20,234	$6,070	$2,185	$10,117	$6,475	$103,320
33	$19,754	$26,677	$1,676	$11,880	$20,841	$6,252	$2,251	$10,421	$6,669	$106,420
34	$20,346	$27,477	$1,726	$12,236	$21,467	$6,440	$2,318	$10,733	$6,869	$109,613
35	$20,957	$28,301	$1,778	$12,603	$22,111	$6,633	$2,388	$11,055	$7,075	$112,901
36	$21,585	$29,150	$1,831	$12,981	$22,774	$6,832	$2,460	$11,387	$7,288	$116,288
37	$22,233	$30,025	$1,886	$13,371	$23,457	$7,037	$2,533	$11,729	$7,506	$119,777
38	$22,900	$30,926	$1,943	$13,772	$24,161	$7,248	$2,609	$12,080	$7,731	$123,370
39	$23,587	$31,854	$2,001	$14,185	$24,886	$7,466	$2,688	$12,443	$7,963	$127,071
40	$24,295	$32,809	$2,061	$14,610	$25,632	$7,690	$2,768	$12,816	$8,202	$130,883
**3% Inflation*										$3,116,097

Little Blue Targeted Area - HUC 10270207

Sub Watershed 505 Annual Cost* After Cost-Share, Cropland BMPs										
Year	**No-Till**	**Waterways**	**Buffers**	**Nutrient Management Plans**	**Terraces**	**Perm Veg**	**Subsurface Fert App**	**Water Retention Structure**	**Cover Crops**	**Total Cost**
1	$3,679	$4,968	$312	$2,212	$3,881	$1,164	$419	$1,941	$1,242	$19,819
2	$3,789	$5,117	$321	$2,279	$3,998	$1,199	$432	$1,999	$1,279	$20,413
3	$3,903	$5,271	$331	$2,347	$4,118	$1,235	$445	$2,059	$1,318	$21,025
4	$4,020	$5,429	$341	$2,417	$4,241	$1,272	$458	$2,121	$1,357	$21,656
5	$4,140	$5,592	$351	$2,490	$4,368	$1,311	$472	$2,184	$1,398	$22,306
6	$4,265	$5,759	$362	$2,565	$4,499	$1,350	$486	$2,250	$1,440	$22,975
7	$4,393	$5,932	$373	$2,642	$4,634	$1,390	$501	$2,317	$1,483	$23,664
8	$4,524	$6,110	$384	$2,721	$4,773	$1,432	$516	$2,387	$1,528	$24,374
9	$4,660	$6,293	$395	$2,802	$4,917	$1,475	$531	$2,458	$1,573	$25,105
10	$4,800	$6,482	$407	$2,887	$5,064	$1,519	$547	$2,532	$1,621	$25,859
11	$4,944	$6,677	$419	$2,973	$5,216	$1,565	$563	$2,608	$1,669	$26,634
12	$5,092	$6,877	$432	$3,062	$5,373	$1,612	$580	$2,686	$1,719	$27,433
13	$5,245	$7,083	$445	$3,154	$5,534	$1,660	$598	$2,767	$1,771	$28,256
14	$5,402	$7,296	$458	$3,249	$5,700	$1,710	$616	$2,850	$1,824	$29,104
15	$5,564	$7,515	$472	$3,346	$5,871	$1,761	$634	$2,935	$1,879	$29,977
16	$5,731	$7,740	$486	$3,447	$6,047	$1,814	$653	$3,023	$1,935	$30,877
17	$5,903	$7,972	$501	$3,550	$6,228	$1,868	$673	$3,114	$1,993	$31,803
18	$6,080	$8,211	$516	$3,657	$6,415	$1,925	$693	$3,208	$2,053	$32,757
19	$6,263	$8,458	$531	$3,766	$6,608	$1,982	$714	$3,304	$2,114	$33,740
20	$6,451	$8,711	$547	$3,879	$6,806	$2,042	$735	$3,403	$2,178	$34,752
21	$6,644	$8,973	$564	$3,996	$7,010	$2,103	$757	$3,505	$2,243	$35,794
22	$6,844	$9,242	$581	$4,116	$7,220	$2,166	$780	$3,610	$2,310	$36,868
23	$7,049	$9,519	$598	$4,239	$7,437	$2,231	$803	$3,718	$2,380	$37,974
24	$7,260	$9,805	$616	$4,366	$7,660	$2,298	$827	$3,830	$2,451	$39,114
25	$7,478	$10,099	$634	$4,497	$7,890	$2,367	$852	$3,945	$2,525	$40,287
26	$7,702	$10,402	$653	$4,632	$8,126	$2,438	$878	$4,063	$2,600	$41,496
27	$7,933	$10,714	$673	$4,771	$8,370	$2,511	$904	$4,185	$2,678	$42,740
28	$8,171	$11,035	$693	$4,914	$8,621	$2,586	$931	$4,311	$2,759	$44,023
29	$8,417	$11,366	$714	$5,062	$8,880	$2,664	$959	$4,440	$2,842	$45,343
30	$8,669	$11,707	$735	$5,213	$9,146	$2,744	$988	$4,573	$2,927	$46,704
31	$8,929	$12,059	$757	$5,370	$9,421	$2,826	$1,017	$4,710	$3,015	$48,105
32	$9,197	$12,420	$780	$5,531	$9,703	$2,911	$1,048	$4,852	$3,105	$49,548
33	$9,473	$12,793	$804	$5,697	$9,995	$2,998	$1,079	$4,997	$3,198	$51,034
34	$9,757	$13,177	$828	$5,868	$10,294	$3,088	$1,112	$5,147	$3,294	$52,565
35	$10,050	$13,572	$852	$6,044	$10,603	$3,181	$1,145	$5,302	$3,393	$54,142
36	$10,351	$13,979	$878	$6,225	$10,921	$3,276	$1,180	$5,461	$3,495	$55,767
37	$10,662	$14,399	$904	$6,412	$11,249	$3,375	$1,215	$5,624	$3,600	$57,440
38	$10,982	$14,831	$932	$6,604	$11,586	$3,476	$1,251	$5,793	$3,708	$59,163
39	$11,311	$15,276	$959	$6,802	$11,934	$3,580	$1,289	$5,967	$3,819	$60,938
40	$11,651	$15,734	$988	$7,006	$12,292	$3,688	$1,328	$6,146	$3,933	$62,766
**3% Inflation*										$1,494,341
Sub Watershed 601 Annual Cost* After Cost-Share, Cropland BMPs										

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$3,951	$5,335	$335	$2,376	$4,168	$1,250	$450	$2,084	$1,334	$21,283
2	$4,069	$5,495	$345	$2,447	$4,293	$1,288	$464	$2,147	$1,374	$21,922
3	$4,191	$5,660	$356	$2,521	$4,422	$1,327	$478	$2,211	$1,415	$22,580
4	$4,317	$5,830	$366	$2,596	$4,555	$1,366	$492	$2,277	$1,457	$23,257
5	$4,446	$6,005	$377	$2,674	$4,691	$1,407	$507	$2,346	$1,501	$23,955
6	$4,580	$6,185	$388	$2,754	$4,832	$1,450	$522	$2,416	$1,546	$24,673
7	$4,717	$6,371	$400	$2,837	$4,977	$1,493	$538	$2,488	$1,593	$25,413
8	$4,859	$6,562	$412	$2,922	$5,126	$1,538	$554	$2,563	$1,640	$26,176
9	$5,005	$6,758	$425	$3,010	$5,280	$1,584	$570	$2,640	$1,690	$26,961
10	$5,155	$6,961	$437	$3,100	$5,438	$1,632	$587	$2,719	$1,740	$27,770
11	$5,309	$7,170	$450	$3,193	$5,602	$1,680	$605	$2,801	$1,793	$28,603
12	$5,469	$7,385	$464	$3,289	$5,770	$1,731	$623	$2,885	$1,846	$29,461
13	$5,633	$7,607	$478	$3,387	$5,943	$1,783	$642	$2,971	$1,902	$30,345
14	$5,802	$7,835	$492	$3,489	$6,121	$1,836	$661	$3,061	$1,959	$31,255
15	$5,976	$8,070	$507	$3,594	$6,305	$1,891	$681	$3,152	$2,017	$32,193
16	$6,155	$8,312	$522	$3,701	$6,494	$1,948	$701	$3,247	$2,078	$33,159
17	$6,340	$8,561	$538	$3,813	$6,689	$2,007	$722	$3,344	$2,140	$34,154
18	$6,530	$8,818	$554	$3,927	$6,889	$2,067	$744	$3,445	$2,205	$35,178
19	$6,726	$9,083	$571	$4,045	$7,096	$2,129	$766	$3,548	$2,271	$36,233
20	$6,927	$9,355	$588	$4,166	$7,309	$2,193	$789	$3,654	$2,339	$37,320
21	$7,135	$9,636	$605	$4,291	$7,528	$2,258	$813	$3,764	$2,409	$38,440
22	$7,349	$9,925	$623	$4,420	$7,754	$2,326	$837	$3,877	$2,481	$39,593
23	$7,570	$10,223	$642	$4,552	$7,987	$2,396	$863	$3,993	$2,556	$40,781
24	$7,797	$10,529	$661	$4,689	$8,226	$2,468	$888	$4,113	$2,632	$42,005
25	$8,031	$10,845	$681	$4,830	$8,473	$2,542	$915	$4,236	$2,711	$43,265
26	$8,272	$11,171	$702	$4,974	$8,727	$2,618	$943	$4,364	$2,793	$44,563
27	$8,520	$11,506	$723	$5,124	$8,989	$2,697	$971	$4,494	$2,876	$45,899
28	$8,775	$11,851	$744	$5,277	$9,259	$2,778	$1,000	$4,629	$2,963	$47,276
29	$9,039	$12,207	$767	$5,436	$9,536	$2,861	$1,030	$4,768	$3,052	$48,695
30	$9,310	$12,573	$790	$5,599	$9,822	$2,947	$1,061	$4,911	$3,143	$50,156
31	$9,589	$12,950	$813	$5,767	$10,117	$3,035	$1,093	$5,059	$3,237	$51,660
32	$9,877	$13,338	$838	$5,940	$10,421	$3,126	$1,125	$5,210	$3,335	$53,210
33	$10,173	$13,739	$863	$6,118	$10,733	$3,220	$1,159	$5,367	$3,435	$54,806
34	$10,478	$14,151	$889	$6,302	$11,055	$3,317	$1,194	$5,528	$3,538	$56,451
35	$10,793	$14,575	$916	$6,491	$11,387	$3,416	$1,230	$5,693	$3,644	$58,144
36	$11,117	$15,013	$943	$6,685	$11,729	$3,519	$1,267	$5,864	$3,753	$59,888
37	$11,450	$15,463	$971	$6,886	$12,080	$3,624	$1,305	$6,040	$3,866	$61,685
38	$11,794	$15,927	$1,000	$7,092	$12,443	$3,733	$1,344	$6,221	$3,982	$63,536
39	$12,147	$16,405	$1,030	$7,305	$12,816	$3,845	$1,384	$6,408	$4,101	$65,442
40	$12,512	$16,897	$1,061	$7,524	$13,201	$3,960	$1,426	$6,600	$4,224	$67,405
**3% Inflation*										$1,604,792

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

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$2,708	$3,657	$230	$1,628	$2,857	$857	$309	$1,428	$914	$14,588
2	$2,789	$3,767	$237	$1,677	$2,943	$883	$318	$1,471	$942	$15,025
3	$2,873	$3,879	$244	$1,728	$3,031	$909	$327	$1,515	$970	$15,476
4	$2,959	$3,996	$251	$1,779	$3,122	$937	$337	$1,561	$999	$15,941
5	$3,048	$4,116	$259	$1,833	$3,215	$965	$347	$1,608	$1,029	$16,419
6	$3,139	$4,239	$266	$1,888	$3,312	$994	$358	$1,656	$1,060	$16,911
7	$3,233	$4,366	$274	$1,944	$3,411	$1,023	$368	$1,706	$1,092	$17,419
8	$3,330	$4,497	$282	$2,003	$3,514	$1,054	$379	$1,757	$1,124	$17,941
9	$3,430	$4,632	$291	$2,063	$3,619	$1,086	$391	$1,810	$1,158	$18,479
10	$3,533	$4,771	$300	$2,125	$3,728	$1,118	$403	$1,864	$1,193	$19,034
11	$3,639	$4,914	$309	$2,188	$3,839	$1,152	$415	$1,920	$1,229	$19,605
12	$3,748	$5,062	$318	$2,254	$3,955	$1,186	$427	$1,977	$1,265	$20,193
13	$3,861	$5,214	$327	$2,322	$4,073	$1,222	$440	$2,037	$1,303	$20,799
14	$3,976	$5,370	$337	$2,391	$4,195	$1,259	$453	$2,098	$1,343	$21,423

15	$4,096	$5,531	$347	$2,463	$4,321	$1,296	$467	$2,161	$1,383	$22,065
16	$4,219	$5,697	$358	$2,537	$4,451	$1,335	$481	$2,225	$1,424	$22,727
17	$4,345	$5,868	$369	$2,613	$4,584	$1,375	$495	$2,292	$1,467	$23,409
18	$4,476	$6,044	$380	$2,692	$4,722	$1,417	$510	$2,361	$1,511	$24,111
19	$4,610	$6,225	$391	$2,772	$4,864	$1,459	$525	$2,432	$1,556	$24,835
20	$4,748	$6,412	$403	$2,855	$5,010	$1,503	$541	$2,505	$1,603	$25,580
21	$4,891	$6,605	$415	$2,941	$5,160	$1,548	$557	$2,580	$1,651	$26,347
22	$5,037	$6,803	$427	$3,029	$5,315	$1,594	$574	$2,657	$1,701	$27,138
23	$5,188	$7,007	$440	$3,120	$5,474	$1,642	$591	$2,737	$1,752	$27,952
24	$5,344	$7,217	$453	$3,214	$5,638	$1,691	$609	$2,819	$1,804	$28,790
25	$5,504	$7,434	$467	$3,310	$5,807	$1,742	$627	$2,904	$1,858	$29,654
26	$5,670	$7,657	$481	$3,410	$5,982	$1,794	$646	$2,991	$1,914	$30,544
27	$5,840	$7,886	$495	$3,512	$6,161	$1,848	$665	$3,081	$1,972	$31,460
28	$6,015	$8,123	$510	$3,617	$6,346	$1,904	$685	$3,173	$2,031	$32,404
29	$6,195	$8,366	$526	$3,726	$6,536	$1,961	$706	$3,268	$2,092	$33,376
30	$6,381	$8,617	$541	$3,837	$6,732	$2,020	$727	$3,366	$2,154	$34,377
31	$6,573	$8,876	$558	$3,953	$6,934	$2,080	$749	$3,467	$2,219	$35,408
32	$6,770	$9,142	$574	$4,071	$7,142	$2,143	$771	$3,571	$2,286	$36,471
33	$6,973	$9,417	$591	$4,193	$7,357	$2,207	$795	$3,678	$2,354	$37,565
34	$7,182	$9,699	$609	$4,319	$7,577	$2,273	$818	$3,789	$2,425	$38,692
35	$7,397	$9,990	$627	$4,449	$7,805	$2,341	$843	$3,902	$2,498	$39,853
36	$7,619	$10,290	$646	$4,582	$8,039	$2,412	$868	$4,019	$2,572	$41,048
37	$7,848	$10,598	$666	$4,720	$8,280	$2,484	$894	$4,140	$2,650	$42,280
38	$8,083	$10,916	$686	$4,861	$8,528	$2,559	$921	$4,264	$2,729	$43,548
39	$8,326	$11,244	$706	$5,007	$8,784	$2,635	$949	$4,392	$2,811	$44,854
40	$8,576	$11,581	$727	$5,157	$9,048	$2,714	$977	$4,524	$2,895	$46,200
*3% Inflation										$1,099,940

Sub Watershed 603 Annual Cost* After Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$3,482	$4,703	$295	$2,094	$3,674	$1,102	$397	$1,837	$1,176	$18,761
2	$3,587	$4,844	$304	$2,157	$3,784	$1,135	$409	$1,892	$1,211	$19,323
3	$3,694	$4,989	$313	$2,222	$3,898	$1,169	$421	$1,949	$1,247	$19,903
4	$3,805	$5,139	$323	$2,288	$4,015	$1,204	$434	$2,007	$1,285	$20,500
5	$3,919	$5,293	$332	$2,357	$4,135	$1,241	$447	$2,068	$1,323	$21,115
6	$4,037	$5,452	$342	$2,428	$4,259	$1,278	$460	$2,130	$1,363	$21,749
7	$4,158	$5,615	$353	$2,501	$4,387	$1,316	$474	$2,194	$1,404	$22,401
8	$4,283	$5,784	$363	$2,576	$4,519	$1,356	$488	$2,259	$1,446	$23,073
9	$4,411	$5,957	$374	$2,653	$4,654	$1,396	$503	$2,327	$1,489	$23,765
10	$4,544	$6,136	$385	$2,732	$4,794	$1,438	$518	$2,397	$1,534	$24,478
11	$4,680	$6,320	$397	$2,814	$4,938	$1,481	$533	$2,469	$1,580	$25,213
12	$4,820	$6,510	$409	$2,899	$5,086	$1,526	$549	$2,543	$1,627	$25,969
13	$4,965	$6,705	$421	$2,986	$5,238	$1,572	$566	$2,619	$1,676	$26,748
14	$5,114	$6,906	$434	$3,075	$5,395	$1,619	$583	$2,698	$1,727	$27,551
15	$5,267	$7,113	$447	$3,168	$5,557	$1,667	$600	$2,779	$1,778	$28,377
16	$5,425	$7,327	$460	$3,263	$5,724	$1,717	$618	$2,862	$1,832	$29,228
17	$5,588	$7,547	$474	$3,361	$5,896	$1,769	$637	$2,948	$1,887	$30,105
18	$5,756	$7,773	$488	$3,461	$6,073	$1,822	$656	$3,036	$1,943	$31,008
19	$5,928	$8,006	$503	$3,565	$6,255	$1,876	$676	$3,127	$2,002	$31,939
20	$6,106	$8,246	$518	$3,672	$6,442	$1,933	$696	$3,221	$2,062	$32,897
21	$6,289	$8,494	$534	$3,782	$6,636	$1,991	$717	$3,318	$2,123	$33,884
22	$6,478	$8,749	$550	$3,896	$6,835	$2,050	$738	$3,417	$2,187	$34,900
23	$6,673	$9,011	$566	$4,013	$7,040	$2,112	$760	$3,520	$2,253	$35,947
24	$6,873	$9,281	$583	$4,133	$7,251	$2,175	$783	$3,626	$2,320	$37,026
25	$7,079	$9,560	$600	$4,257	$7,469	$2,241	$807	$3,734	$2,390	$38,136
26	$7,291	$9,847	$618	$4,385	$7,693	$2,308	$831	$3,846	$2,462	$39,280
27	$7,510	$10,142	$637	$4,516	$7,923	$2,377	$856	$3,962	$2,536	$40,459
28	$7,735	$10,446	$656	$4,652	$8,161	$2,448	$881	$4,081	$2,612	$41,673
29	$7,967	$10,760	$676	$4,791	$8,406	$2,522	$908	$4,203	$2,690	$42,923
30	$8,206	$11,082	$696	$4,935	$8,658	$2,597	$935	$4,329	$2,771	$44,210
31	$8,453	$11,415	$717	$5,083	$8,918	$2,675	$963	$4,459	$2,854	$45,537

32	$8,706	$11,757	$739	$5,236	$9,185	$2,756	$992	$4,593	$2,939	$46,903
33	$8,967	$12,110	$761	$5,393	$9,461	$2,838	$1,022	$4,731	$3,028	$48,310
34	$9,236	$12,473	$783	$5,555	$9,745	$2,923	$1,052	$4,872	$3,118	$49,759
35	$9,513	$12,848	$807	$5,721	$10,037	$3,011	$1,084	$5,019	$3,212	$51,252
36	$9,799	$13,233	$831	$5,893	$10,338	$3,101	$1,117	$5,169	$3,308	$52,790
37	$10,093	$13,630	$856	$6,070	$10,648	$3,195	$1,150	$5,324	$3,408	$54,373
38	$10,396	$14,039	$882	$6,252	$10,968	$3,290	$1,185	$5,484	$3,510	$56,005
39	$10,707	$14,460	$908	$6,439	$11,297	$3,389	$1,220	$5,648	$3,615	$57,685
40	$11,029	$14,894	$936	$6,632	$11,636	$3,491	$1,257	$5,818	$3,723	$59,415
**3% Inflation*										$1,414,570

Sub Watershed 606 Annual Cost* After Cost-Share, Cropland BMPs

Year	No-Till	Waterways	Buffers	Nutrient Management Plans	Terraces	Perm Veg	Subsurface Fert App	Water Retention Structure	Cover Crops	Total Cost
1	$5,310	$7,171	$450	$3,193	$5,603	$1,681	$605	$2,801	$1,793	$28,608
2	$5,469	$7,386	$464	$3,289	$5,771	$1,731	$623	$2,885	$1,847	$29,466
3	$5,634	$7,608	$478	$3,388	$5,944	$1,783	$642	$2,972	$1,902	$30,350
4	$5,803	$7,836	$492	$3,490	$6,122	$1,837	$661	$3,061	$1,959	$31,260
5	$5,977	$8,071	$507	$3,594	$6,306	$1,892	$681	$3,153	$2,018	$32,198
6	$6,156	$8,313	$522	$3,702	$6,495	$1,948	$701	$3,247	$2,078	$33,164
7	$6,341	$8,563	$538	$3,813	$6,690	$2,007	$722	$3,345	$2,141	$34,159
8	$6,531	$8,820	$554	$3,928	$6,890	$2,067	$744	$3,445	$2,205	$35,184
9	$6,727	$9,084	$571	$4,045	$7,097	$2,129	$766	$3,549	$2,271	$36,239
10	$6,929	$9,357	$588	$4,167	$7,310	$2,193	$789	$3,655	$2,339	$37,326
11	$7,136	$9,637	$605	$4,292	$7,529	$2,259	$813	$3,765	$2,409	$38,446
12	$7,350	$9,927	$624	$4,420	$7,755	$2,327	$838	$3,878	$2,482	$39,600
13	$7,571	$10,224	$642	$4,553	$7,988	$2,396	$863	$3,994	$2,556	$40,788
14	$7,798	$10,531	$661	$4,690	$8,227	$2,468	$889	$4,114	$2,633	$42,011
15	$8,032	$10,847	$681	$4,830	$8,474	$2,542	$915	$4,237	$2,712	$43,272
16	$8,273	$11,172	$702	$4,975	$8,729	$2,619	$943	$4,364	$2,793	$44,570
17	$8,521	$11,508	$723	$5,125	$8,990	$2,697	$971	$4,495	$2,877	$45,907
18	$8,777	$11,853	$745	$5,278	$9,260	$2,778	$1,000	$4,630	$2,963	$47,284
19	$9,040	$12,208	$767	$5,437	$9,538	$2,861	$1,030	$4,769	$3,052	$48,703
20	$9,311	$12,575	$790	$5,600	$9,824	$2,947	$1,061	$4,912	$3,144	$50,164
21	$9,591	$12,952	$814	$5,768	$10,119	$3,036	$1,093	$5,059	$3,238	$51,668
22	$9,878	$13,341	$838	$5,941	$10,422	$3,127	$1,126	$5,211	$3,335	$53,219
23	$10,175	$13,741	$863	$6,119	$10,735	$3,220	$1,159	$5,367	$3,435	$54,815
24	$10,480	$14,153	$889	$6,303	$11,057	$3,317	$1,194	$5,529	$3,538	$56,460
25	$10,794	$14,578	$916	$6,492	$11,389	$3,417	$1,230	$5,694	$3,644	$58,153
26	$11,118	$15,015	$943	$6,686	$11,730	$3,519	$1,267	$5,865	$3,754	$59,898
27	$11,452	$15,465	$971	$6,887	$12,082	$3,625	$1,305	$6,041	$3,866	$61,695
28	$11,795	$15,929	$1,001	$7,094	$12,445	$3,733	$1,344	$6,222	$3,982	$63,546
29	$12,149	$16,407	$1,031	$7,306	$12,818	$3,845	$1,384	$6,409	$4,102	$65,452
30	$12,514	$16,899	$1,061	$7,526	$13,203	$3,961	$1,426	$6,601	$4,225	$67,416
31	$12,889	$17,406	$1,093	$7,751	$13,599	$4,080	$1,469	$6,799	$4,352	$69,438
32	$13,276	$17,929	$1,126	$7,984	$14,007	$4,202	$1,513	$7,003	$4,482	$71,521
33	$13,674	$18,466	$1,160	$8,223	$14,427	$4,328	$1,558	$7,213	$4,617	$73,667
34	$14,084	$19,020	$1,195	$8,470	$14,860	$4,458	$1,605	$7,430	$4,755	$75,877
35	$14,507	$19,591	$1,231	$8,724	$15,305	$4,592	$1,653	$7,653	$4,898	$78,153
36	$14,942	$20,179	$1,267	$8,986	$15,765	$4,729	$1,703	$7,882	$5,045	$80,498
37	$15,390	$20,784	$1,306	$9,255	$16,238	$4,871	$1,754	$8,119	$5,196	$82,913
38	$15,852	$21,408	$1,345	$9,533	$16,725	$5,017	$1,806	$8,362	$5,352	$85,400
39	$16,328	$22,050	$1,385	$9,819	$17,226	$5,168	$1,860	$8,613	$5,512	$87,962
40	$16,817	$22,711	$1,427	$10,114	$17,743	$5,323	$1,916	$8,872	$5,678	$90,601
**3% Inflation*										$2,157,048