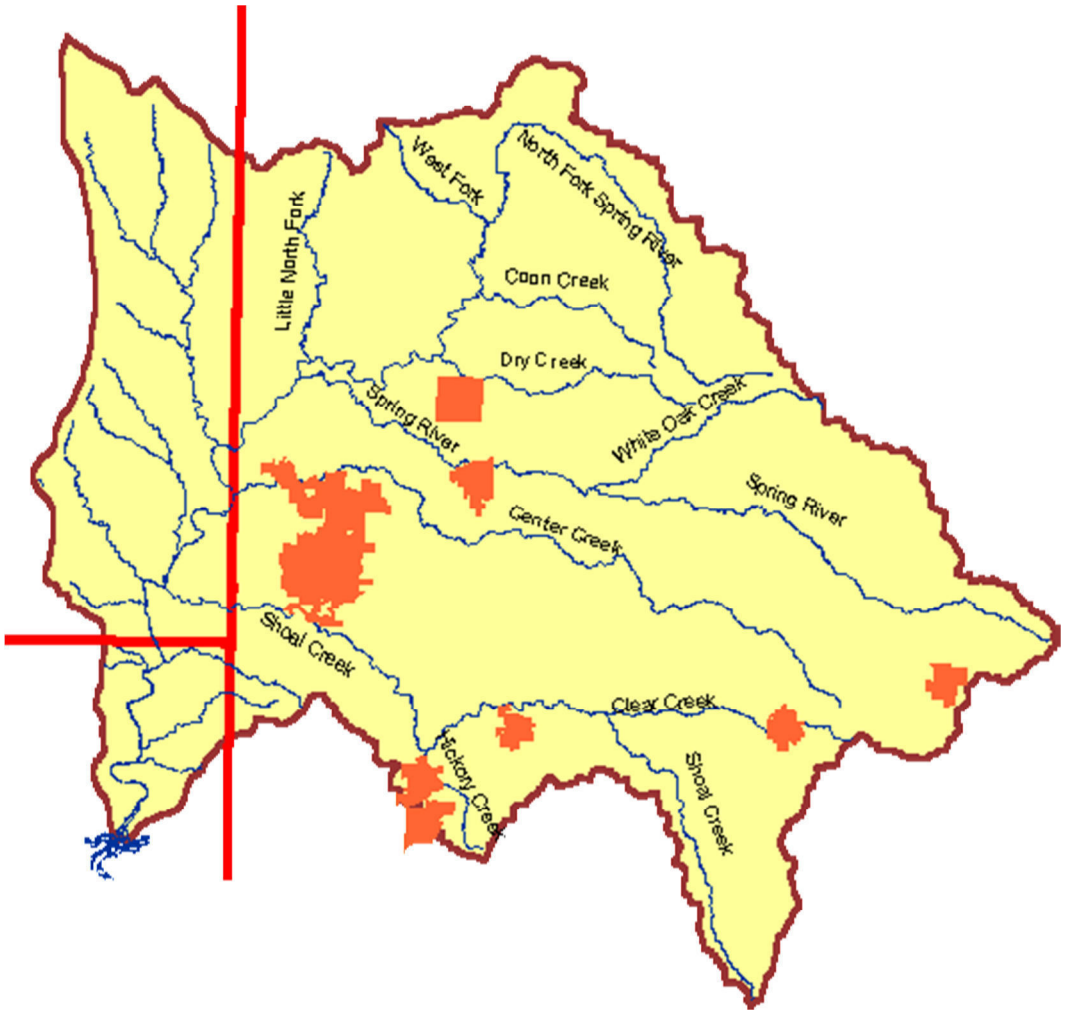
# Spring River Watershed Management Plan for HUC #: 11070207140002




**Prepared By: Spring River Watershed Partnership**

**Written for the Improvement of Water Quality Through the Spring River Watershed**

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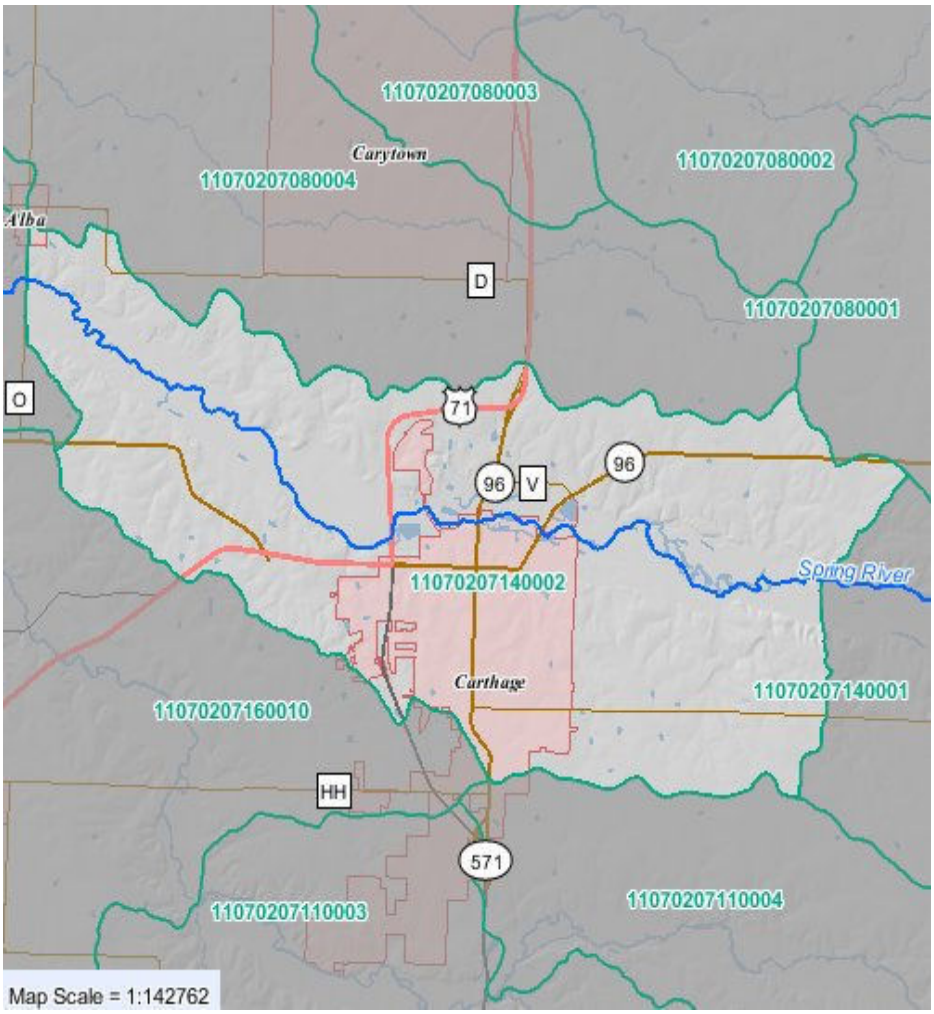
# Spring River NPS Watershed Management Plan HUC #: 11070207140002




| | | | |
|---|---|---|---|
| Project Name: | City of Carthage Spring River NPS Watershed Management Plan | | |
| Project Sponsor: | Spring River Watershed Partnership | Water Body Name: | Water Body ID#: |
| Address: | 105 Lincoln<br>Carthage, MO 64836 | Spring River | 3160 |
| Project Manager: | Steve McKarus | Phone: (417) 358-0481 | E-mail: mckars@lpha.mopublic.org |
| Watershed Identification | | | |
| Name of Watershed: City of Carthage Spring River Watershed | | | |
| HUC Codes for 14-Digit Watershed in Planning Effort: | | 11070207140002 | |
| Total Area Covered in Planning Effort (Square Miles): | | Approximately 38.73square miles | |
| Does the area have a Public Watershed Supply? | | YES. The Carthage area is supplied by wells. | |

# Executive Summary

The purpose of this Watershed Management Plan is to provide an initial assessment and a general strategic plan for the Spring River Watershed, and to focus on a 14-Digit HUC Code portion located in Central Jasper County near Carthage. The whole length of Spring River is listed for elevated bacteria levels. The Total Maximum Daily Load (TMDL) that will be written by the Missouri Department of Natural Resources (scheduled to be developed in 2013) will incorporate the entire 8-Digit HUC Code for Spring River, however, to begin with and be proactive, the Spring River Watershed Partnership will focus on the smaller 14-Digit HUC Code. The organizational format will follow the nine elements recommended in the United States Environmental Protection Agency (EPA) *Handbook for Developing Watershed Plans to Restore and Protect Our Waters (2008).*

The total Spring River Watershed encompasses an area approximately 2,271 square miles and is located in southwest Missouri in Barry, Barton, Christian, Dade, Jasper, Lawrence, Newton and Stone Counties. The Spring River exits Missouri and passes through southeastern Kansas where it is collected by the Grand Lake O' The Cherokees in Oklahoma. The basin lies along the border between the Osage Plains and Springfield Plateau physiographic regions. Major Tributaries within the watershed are the North Fork of the Spring River, Center Creek, Turkey Creek and Shoal Creek. Numerous smaller tributaries flow throughout the watershed.

The objective of this watershed plan is to reduce bacterial levels (total coliform and *Escherichia coli*) to below the whole body contact level for recreational waters. Missouri Department of Health and Senior Services recommends that, for whole body contact, a maximum *E. coli* level of 235 colonies per 100 ml of water is needed for a single sample, or a maximum contaminate level of 126 colonies per 100 ml is appropriate for the geometric mean of multiple samples which may be calculated over a month or a season. The Missouri Department of Natural Resources (10 CSR 20-7.031) cites the standard of 126 colonies per 100 ml as a geometric mean for sampling efforts over a single recreational season. The standard of 126 colonies per 100 ml has an estimated risk that eight or fewer swimmers per 1000 will experience an adverse illness.

Bacteriological water quality is monitored as an indicator of fecal waste entering the surface water. *Escherichia coli* are commonly used as an indicator species because it is primarily found in fecal waste of warm blooded animals. High levels of *E. coli* indicate that fecal waste is entering the stream. This fecal waste may come from humans, domestic animals, livestock or wildlife. Due to the geographic area of this portion of Spring River there are multiple pollutant sources of concern, these include: failed private on-site sewer systems, failed public sewer systems, storm water runoff, agricultural and livestock runoff and other wild animals that congregate near the river.

Bacteria is also transported through sediment and sediment erosion, therefore projects aimed at the reduction of sediment loading will also help to reduce the contamination from the source. The Best Management Practices (BMPs) that we propose will be funded by a combination of private, local, state and federal funds.

# I. Incentive Programs

## A. United States Environmental Protection Agency

*Nonpoint Source Management Program (319 Grant)*

In 1987, Congress amended the Clean Water Act (CWA) to establish the section 319 Nonpoint Source Management Program because it recognized the need for greater federal leadership to help focus State and local nonpoint source efforts. Under section 319, State, Territories, and Indian Tribes receive grant money which support a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects.

*604 B Grant*

This guidance represents EPA's Office of Water's statement on the principles and procedures for the award and oversight of water quality planning grants using section 604 (b) funds. Section 205 (j) (1) of the Clean Water Act (CWA) directs states to conduct water quality planning; section 604 (b) establishes the funding authority. Actual funds are derived from State Revolving Fund appropriations under Title VI of the CWA, using a legislatively mandated formula. It details with great clarity the principles and procedures that EPA Regional offices and state water quality planning offices should use in the management and award process for water quality planning using section 604 (b) funds. The concepts, principles and procedures contained in the document are still highly relevant and meaningful to the section 604 (b) grant program.

## B. Missouri Department of Conservation

*Environmental Quality Incentive Program (EQIP)*

This is a federally funded program that offers assistance as cost-share payments. These payments defray the cost of implementing certain forest and wildlife habitat management practices. The two most common programs are tree planting and improvement to an existing stand of trees.

*Conservation Reserve Program (CRP)*

The Conservation Reserve Program is a federally funded program that allows landowners with highly erosive land to establish permanent vegetative cover, such as grass or trees. In return for taking the land out of production, the landowner is paid a certain amount per acre each year. CRP is beginning a new phase. Many of the original agreements have or are about to expire. Landowners have been given the option to renew their agreements or to negotiate new agreements. Landowners

are also being given the opportunity to extend their current contracts for an additional five years if they convert the enrolled acreage to trees.

*Forest Crop Land (FCL)*

This incentive program is provided by the Missouri State Forestry Law. The Forest Crop Land program is designed to increase production of forest crop land in Missouri by encouraging improved management and protection of privately owned forest land. A tax reduction is provided as encouragement to landowners devoted to growing trees on their property. Timber tracts more than twenty acres, valued at no more than $400 per acre, are eligible for classification as Forest Crop Land for 25 years. To make up for the loss of tax revenue, the Conservation Department makes an annual payment in lieu of taxes to the counties where Forest Crop Land is located.

For more information on Missouri Department of Conservation incentive programs, visit: http://mdc.mo.gov/forest/products/private.htm

### C. Natural Resources Conservation Service

*Wildlife Habitat Incentive Program (WHIP)*

The Food, Conservation, and Energy Act of 2008 reauthorized WHIP as a voluntary approach to improving wildlife habitat in our Nation. The Natural Resources Conservation Service administers WHIP to provide both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. WHIP cost-share agreements between NRCS and the participant generally last from one year after the last conservation practice is implemented but not more than 10 years from the date the agreement is signed.

For more information on National Resources Conservation Service incentive programs visit: http://www.nrcs.usda.gov/programs/

## II. Area of Concern

The area of concern of Spring River that is the focus of this Watershed Management Plan is approximately 38.73 square miles and is located in the area of Carthage, Missouri in Jasper County. This area of Spring River has been noted as impaired water due to its high levels of bacteria (*E.coli*) (http://www.dnr.mo.gov/ENV/wpp/waterquality/303d/2008/proposed-2008-303d-list-data.htm) . Although this area of the river does not have a current TMDL, one is scheduled to be developed. Taking a proactive stance to begin Best Management Practices (BMPs) would help start this process in the right direction. In communicating with the Missouri Department of Natural Resoures, a TMDL does not have to be written to institute Best Management Practices (BMPs), however, once the TMDL is written, it will validate the implementation of these BMPs. This part of Spring River is primarily dominated by grassland (approximately 52 %) and urban land (approximately 21%). Land Use/Land cover information

was provided by the CARES Watershed Evaluation and Comparison Tool. This information can be found at: http://ims.missouri.edu/website/watershedTool/selecthu.asp

*Septic Systems*

Failing or poorly maintained septic systems contribute to pathogen and nutrient problems in both groundwater and surface waters if leakage or illicit discharge occurs. Septic systems cause these problems if they are not pumped or checked on a regular basis (pumping should occur every three years) or if they are poorly sited or sized in particular soils. Bacteria that are in the groundwater can enter surface water through seeps or springs, especially through karst bedrock and other areas that allow rapid movement of sub-surface flow. Systems that are in closer proximity to the water body in the watershed will be of higher priority when trying to remediate this area of concern.

*Urban Areas*

There are four main concerns of pollution caused by urban and suburban areas. The first concern is the high nutrient concentrations that stem from over-fertilization of residential, commercial or recreational lawns. Fertilizers are often used more excessively on smaller urban lawns than on farms because of the cost differential. Fertilizing a small plot is much less expensive than covering larger areas and the sum of many small lawns can have a cumulative effect on water quality. The second, sediment erosion, is widespread where protective vegetation is stripped on construction sites. Instituting proper usage of best management practices in these areas reduces the amount of sediment erosion considerably. The third, concentrated runoff from impervious surfaces, such as a parking lot or a sloped street, can contribute to soil erosion as well as stream bank erosion because the streams fill more rapidly and thus allowing rushing water to eat away at the stream bank. Runoff from parking lots or roadways can also introduce other pollutants such as salts, oil and other chemicals that cars leave behind. And the final concern, pesticides and herbicides that are used on residential, commercial and recreational lawns and gardens can also wash into streams through soil erosion, and although these are smaller areas the pollutants that can come from these areas can be quite concentrated.

*Rural Areas*

Rural areas also cause high sediment loads as well as fecal bacteria to pollute streams. Erosion from farmland can be caused by two things, water and wind. Repeated tillage to an area can cause lower amounts of organic matter in a soil and cause poor soil structure thus causing a greater chance of erosion. The loss of good topsoil causes more erosion to subsurface soils because of the lack of soil structure. The slope of a field can also cause greater amounts of erosion, since water takes the pathway of least resistance; water can concentrate and run downhill causing rill erosion to occur. Fecal bacteria may enter the stream through livestock waste. Storm water runoff areas where livestock feed or graze may carry fecal waste directly into the stream or fecal pollution may enter the stream from livestock watering directly from the stream. By constructing off-stream watering structures, such as bioretention ponds and capturing storm water runoff it will allow

livestock to water in these ponds and not in the stream. These structures will also allow for infiltration of water and nutrients.

*Wildlife*

Wild animals which have direct access to streams include deer, coyotes, opossums and other small mammals as well as many bird species. These animals contribute fecal bacteria and other nutrients to streams and other water bodies in the watershed, however most likely at a smaller rate than livestock, domestic animals and humans.

## III. History of Area

*Mining*

During the mid-1800s this area was considered part of the Tri-State mining area, which covered more than 2,500 square miles and included parts of southwestern Missouri, southeastern Kansas and northeastern Oklahoma (US EPA, 2007). Mining, milling and smelting of lead and zinc ore continued in this area until the 1970's. Due to the heavy mining in the area, 150 million tons of waste was left behind. Today, approximately 9 million tons of waste remains (USA EPA, 2007). There were hundreds of mines and 17 smelters in the area. The Environmental Protection Agency plans to remediate approximately 7,000 acres of land in Jasper County over a 10 year span and their goals are:

- Removing or containing mining/milling wastes, contaminated soil, and stream sediments
- Disposal of excavated contaminated material in mine subsidence pits
- Re-contouring and re-vegetating excavated areas, and capping the disposed wastes
- Plugging selected mine shafts and diverting surface water from mine openings
- Establishing a monitoring program to determine the effect of the cleanup on Site streams
- Creating land use controls for future residential development in contaminated areas and the use of the disposal areas

http://www.epa.gov/region07/factsheets/2007/fs_second_five_year_review_orongo-duenweg_mining_belt_jasper_county_mo0507.htm

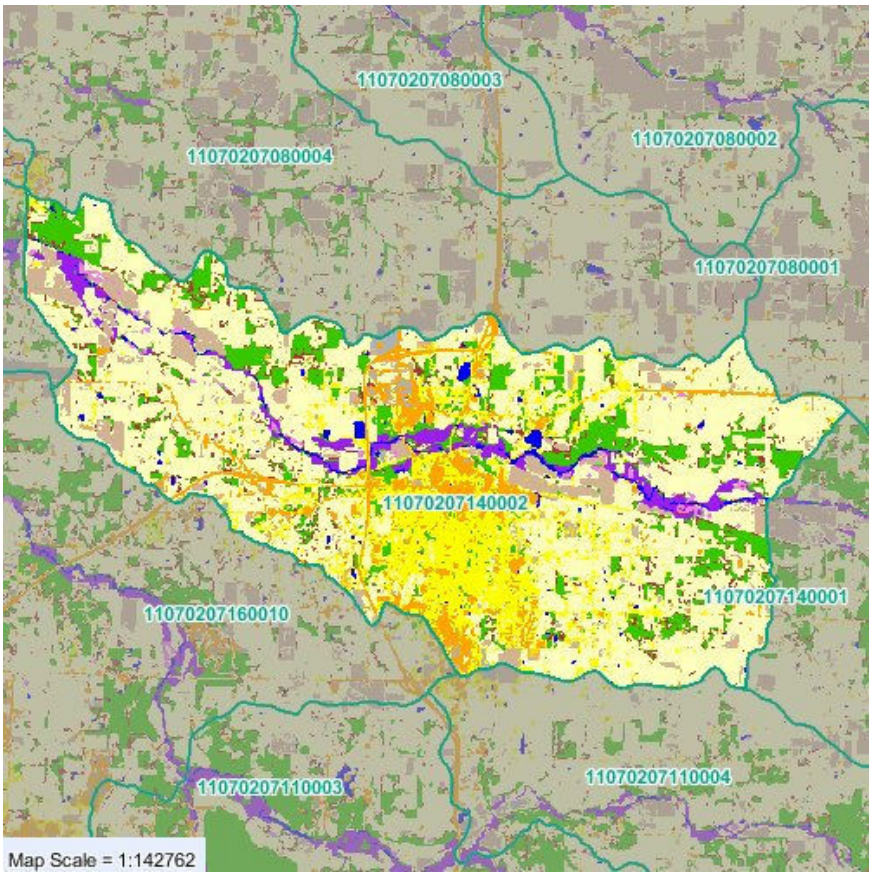
*Battle of Carthage State Historic Park/Civil War Museum*

The Battle of Carthage was fought on July 5, 1861 roughly 9 miles North of Carthage. The State Historic Park is located where both armies set up camp. The Union soldiers the night before the battle and the Confederate Soldiers after the battle. This battle is one of the first battles of the Civil War and an area frequented by historical enthusiasts. In the Carthage Civil War Museum there are murals and dioramas of the battle that took place, as well as other historical facts about this area and the Civil War.

## Quantify Sources of Pollutant (Element 1/A)

### A. Land Use/Land Cover

In the Land Use/Land Cover map seen below grassland dominates this area of Spring River, covering nearly 52% of the area of concern. Urban areas follow grassland covering about 21% of the area of concern. Farmland covers approximately 7% of the area of concern. These three land uses will be the focal point of this watershed management plan due to the area of concern being bacteria (*E. coli*) contamination. Some sources of this impairment could be mismanagement or poor maintenance of urban sewers or septic systems or runoff from rural livestock areas as well as wild animal contamination. All possible sources should be accounted for and work towards making better management practices on all facets for this watershed. Other maps provided below show other variables that could factor into this watershed impairment such as; Hydrologic Soil Groups, Highly Erodible Lands, Elevation/Relief and Census Data.




Impervious

High Density Urban

Low Density Urban

Cropland

Grassland

Deciduous Forest

Evergreen Forest

Mixed Forest

Deciduous Woody/Herbaceous

Evergreen Woody/Herbaceous

Woody Dominated Wetland

Herbaceous Dominated Wetland

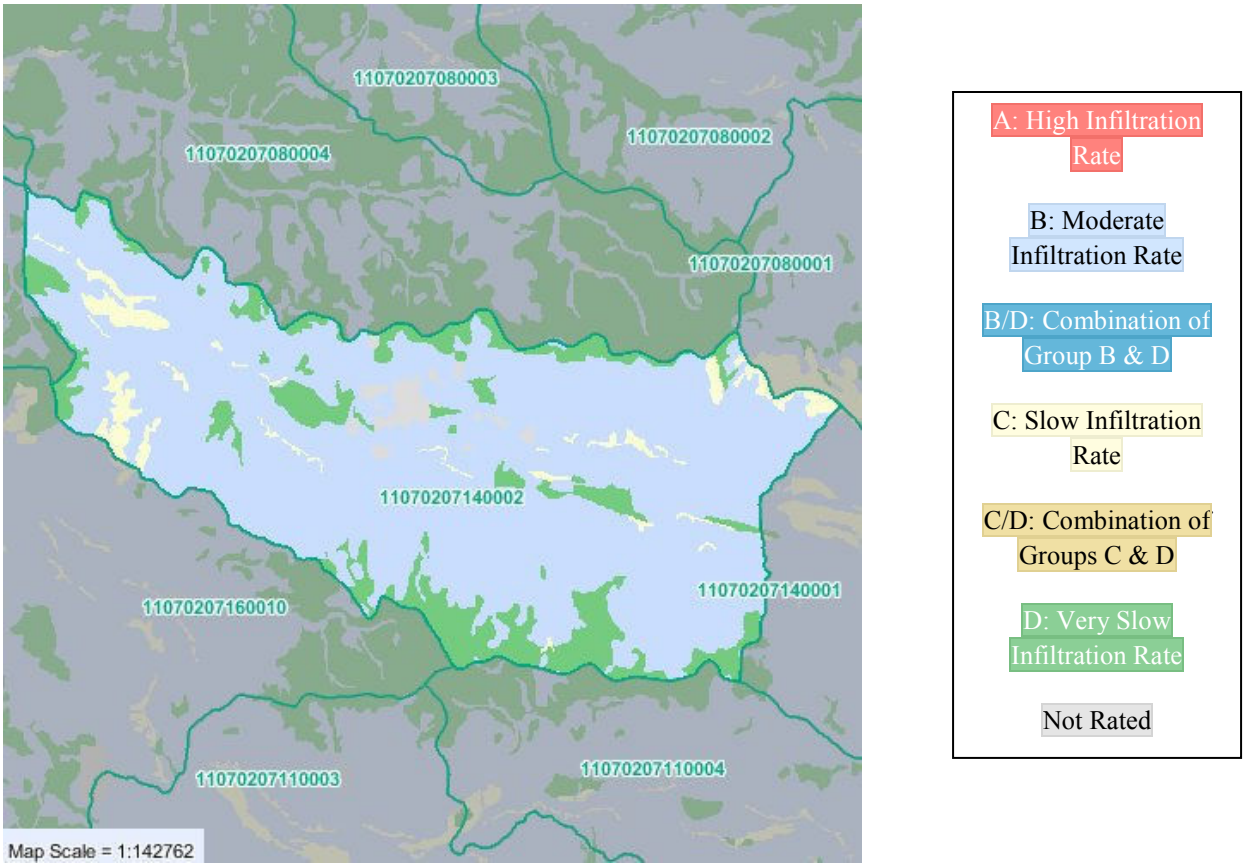
Open water

Barren or Sparsely Vegetated

| Land Use/Land Cover | Cropland | Grassland | Forest | Wetland | Urban | Water |
|---|---|---|---|---|---|---|
| Acres | 1,732.90 | 12,835.07 | 3,636.59 | 928.50 | 5,309.90 | 342.71 |
| Percent | 6.99% | 51.78% | 14.67% | 3.75% | 21.42% | 1.38% |

## B. Hydrologic Soil Groups

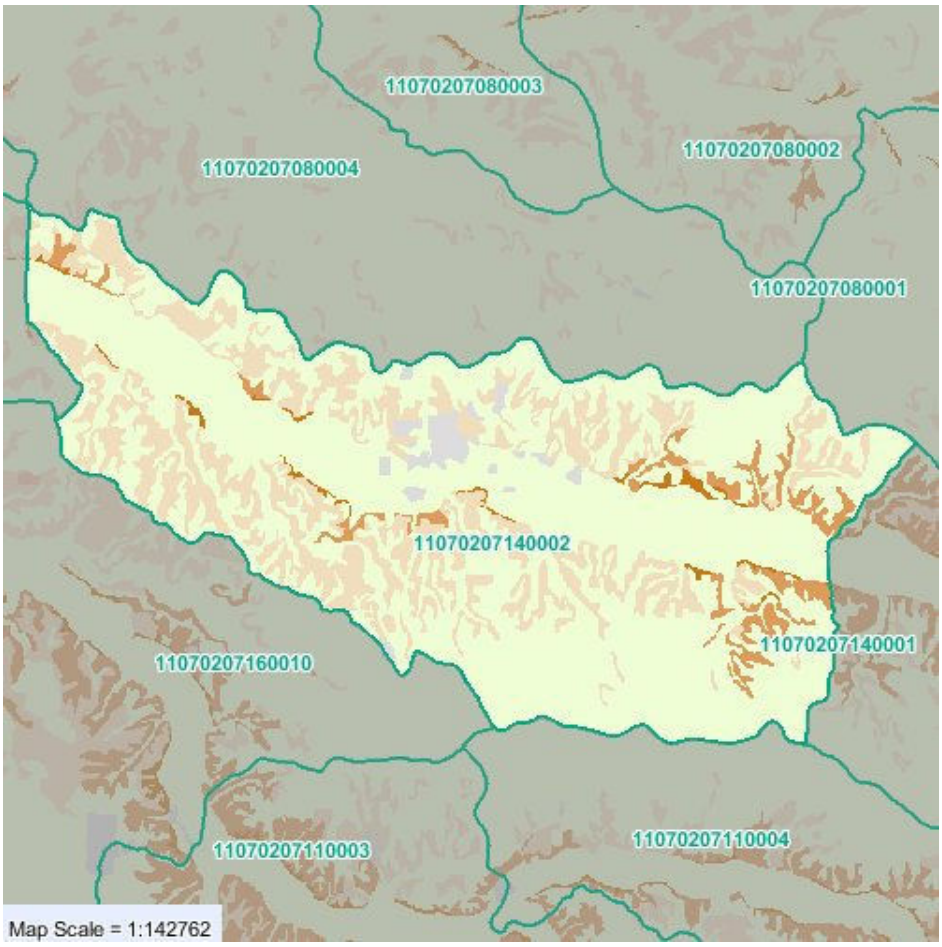
This hydrologic soil groups map shown below shows how fast or slow water will infiltrate the soils in the concerned area. Most of this area is categorized as Group B, which has a moderate infiltration rate, and covers approximately 80 percent of the sub-watershed. Other areas that are characterized by this map are Group D, which has a very slow infiltration rate and covers approximately 14 percent of the sub-watershed. The last significant hydrologic group is Group C, which has a slow infiltration rate and covers approximately 4 percent of the sub-watershed. These infiltration rates show that there are no soils in this sub-watershed that allow water to infiltrate at a high rate of speed. During rain events where there is any amount of storm water runoff a majority of the water is not going into the soil to be filtered, it is going directly to the stream. Also, leakage of sewer lines or septic tanks can be flushed into the stream. This watershed management plan is being developed to install BMPs to slow the amount of storm water runoff from urban and rural areas alike.




| Group Type | A | B | B/D | C | C/D | D | Not Rated |
|---|---|---|---|---|---|---|---|
| Acres | 0 | 19,708 | 0 | 1,046 | 0 | 3,511 | 519 |
| Percent | 0.00% | 79.52% | 0.00% | 4.22% | 0.00% | 14.17% | 2.09% |

## C. Land Slope

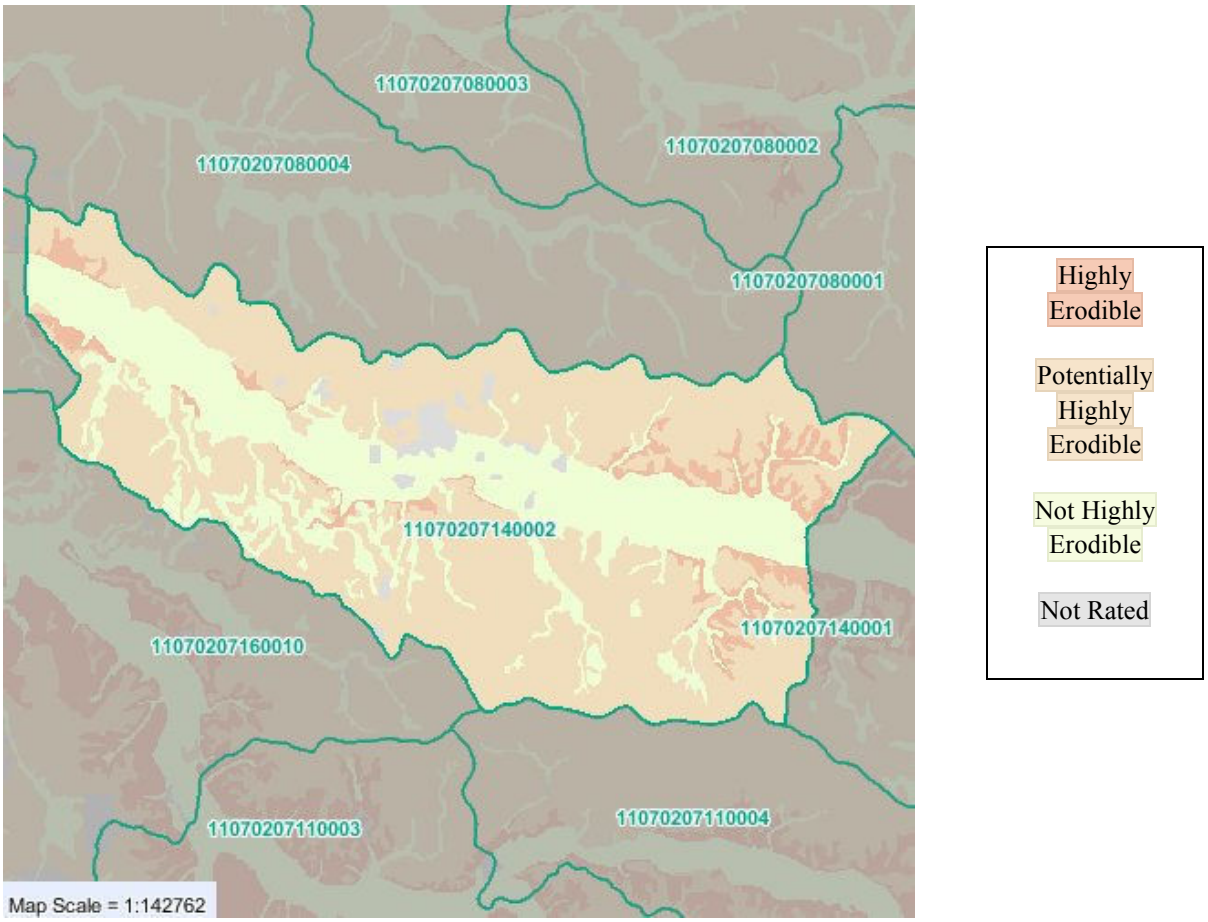
This land slope map shown below shows the percent slope that occurs in this sub-watershed. The majority of this area has a slope range of 0 to 2.5 percent slope; this covers an area of approximately 13, 657 acres or 55 percent of the sub-watershed. The other abundant slope range is 3 to 5 percent slope and approximately 7, 120 acres or 29 percent of the sub-watershed. The third predominate slope range is 11-15 percent slope and approximately 3,048 acres or 12 percent of the sub-watershed. Having knowledge of the slope range in this area is very helpful because it shows where storm water from a rainfall event will flow fastest. This will give an idea where to initiate best management practices to slow runoff from these rainfall events.




| Slope Range | 0-2.5% | 3-5% | 6-10% | 11-15% | >15% | Total |
|---|---|---|---|---|---|---|
| Acres | 13,657 | 7,120 | 3,048 | 687 | 271 | 24,783 |
| Percent | 55.11% | 28.73% | 12.30% | 2.77% | 1.09% | 100.00% |

## D. Highly Erodible Lands

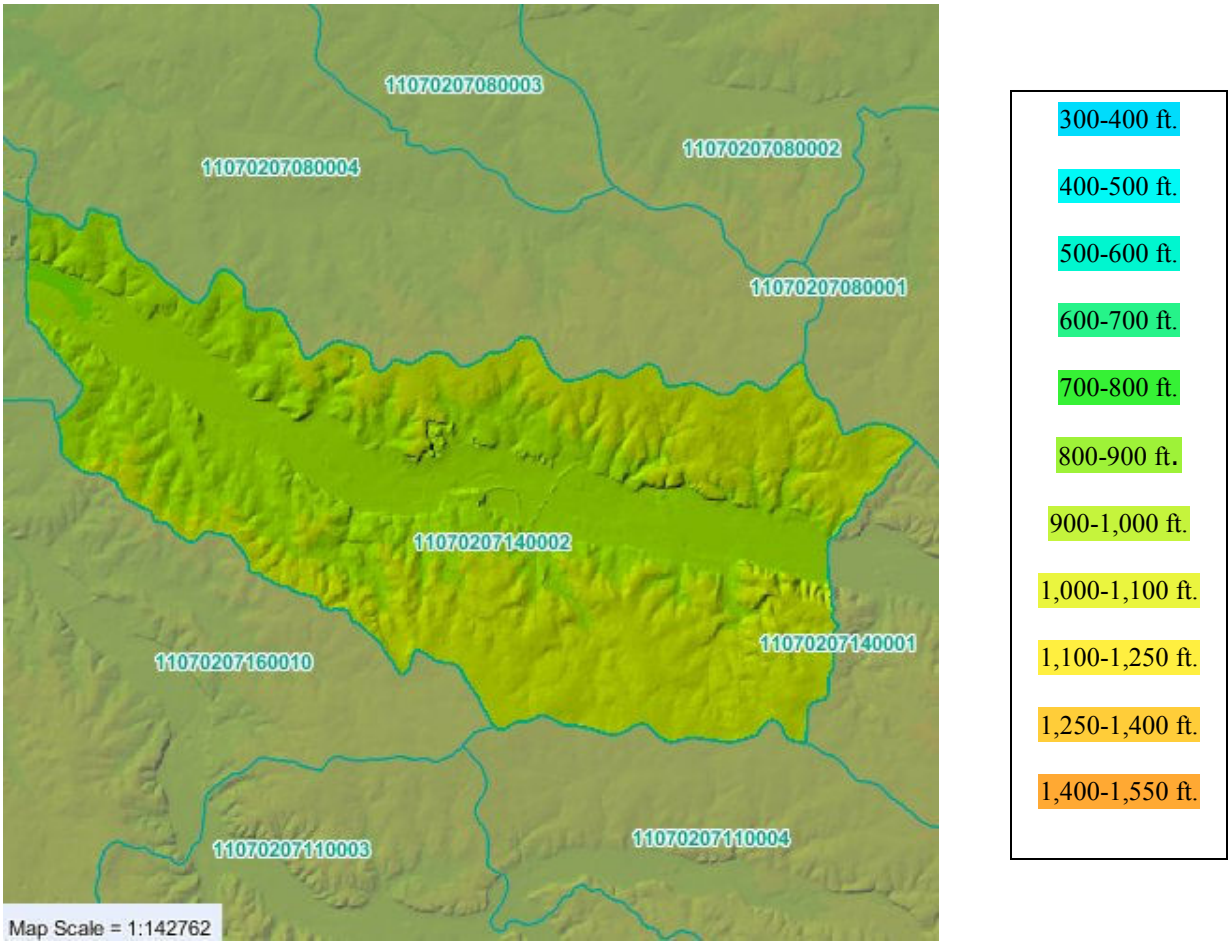
The map below shows three different types of erodible lands: highly erodible, potentially highly erodible and not highly erodible. The potentially highly erodible land is the most abundant in this sub-watershed with approximately 15,334 acres or 62 percent. The second most abundant land in this sub-watershed is not highly erodible with approximately 7,373 acres or 30 percent. The highly erodible lands cover approximately 1,558 acres or 6 percent of the sub-watershed. This map shows that there is over two-thirds of this sub-watershed that is highly erodible or potentially highly erodible lands. Also, the area that is not highly erodible corresponds to where Spring River flows. This map shows that during a rainfall event most of this area could suffer potentially large soil losses. This map will also help in the initiation of installation of different soil preserving best management practices in this sub-watershed.




| | Highly Erodible | Potentially Highly Erodible | Not Highly Erodible | Not Rated |
|---|---|---|---|---|
| Acres | 1,558 | 15,334 | 7,373 | 519 |
| Percent | 6.29% | 61.87% | 29.75% | 2.09% |

## E. Elevation/Relief Map

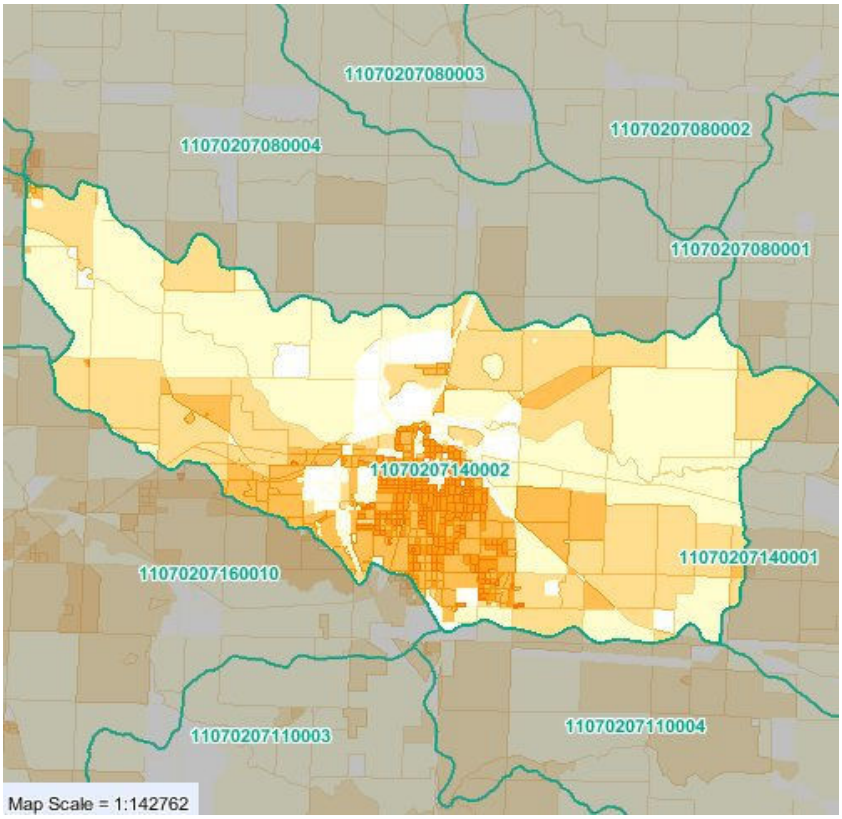
This elevation map shows the different elevations of this sub-watershed. The maximum elevation in this area is approximately 1,101 feet and the minimum elevation is approximately 894 feet and the mean elevation is approximately 994 feet. Since water takes the path of least resistance this map helps to show where and how water will run in this sub-watershed. This map in comparison with the maps above: *Hydrologic Soil Groups, Land Slope and Highly Erodible Lands* will aide in the application of best management practices by showing where the water will run, over what type of soils, if these soils are erodible and at what slope it will be flowing. This information together will help to install best management practices in the right areas of this sub-watershed.

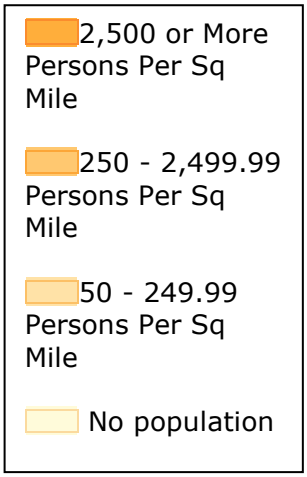



| Minimum Elevation | Maximum Elevation | Mean Elevation | Elevation Difference |
|---|---|---|---|
| 894.30 ft. | 1,101.10 ft. | 994.20 ft. | 206.80 ft. |

## F. Census Data

The census data is provided by the 2000 U.S. census. This map shows the population distribution throughout the area of concern. The darker shaded colors show an increase in population size. There are approximately 4.5 acres per household in this area. This number was attained by taking the total number of households (5,512) and dividing that number by the total square miles in this area (38.73). The number that was attained from that calculation is approximately 142 households per square mile. There are 640 acres in a square mile, this number is divided by 142, and this gives the number 4.5.




| | | |
|---|---|---|
| Total Population | 16,040.00 | |
| Persons / sq. mile | 414.21 | |
| Age 0-4: | 1,095 | 7.42% |
| Age 5-17: | 2,753 | 18.66% |
| Age 18-64: | 8,610 | 58.35% |
| Age 65 and up: | 2,298 | 15.57% |
| College Degree: | 1,646 | 17.67% |
| Some College: | 1,190 | 21.36% |
| High School Only: | 3,212 | 34.48% |
| No High School: | 2,468 | 26.49% |
| Households: | 5,512 | |
| Average Household Income: | $38,779.08 | |

*Previous Studies of the Spring River Watershed*

The Missouri Department of Conservation has prepared a Spring River Watershed Inventory and Assessment plan. This plan is available at http://mdc.mo.gov/fish/watershed/spring/lit/. In this document the MDC discusses the entire Spring River Watershed area.

*Facts*

This area (HUC Code: 11070207140002) used 977.16 tons of fertilizer per square mile (University of Missouri Annual Fertilizer Tonnage Report).

**Agriculture and Livestock Numbers as of 2007 Agriculture Census for Jasper County HUC #: 11070207140002**

| | Corn | Hay | Sorghum | Soybeans | Wheat |
|---|---|---|---|---|---|
| Agriculture (acres harvested) | 1,073.21 | 3,048.91 | 113.03 | 2,032.30 | 1,188.60 |

http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Missouri/cp29097.pdf

**The numbers provided here were attained by: total number of acres harvested in the county, then divided by the total number of square miles in the county. This number was then multiplied by the total number of square miles of the 14-Digit HUC Code.

| | Turkeys | Horses/Ponies | Cattle/Calves | Hogs/Pigs |
|---|---|---|---|---|
| Livestock | 31,365 | 110 | 3,213 | 1,739 |

http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Missouri/cp29097.pdf

**The numbers provided here were attained by: total number of livestock in county, then divided by the total square miles of county. This number was then multiplied by the total square miles of the 14-Digit HUC Code.

## Estimates of Pollutant Load Reductions (Element 2/B)

The Jasper County Health Department began weekly water sampling during the recreational season of 2007. This sampling has continued through the 2009 recreational season. The Health Department sampling has shown a couple interesting facts:

- Geometric means for sampling points on Spring River are generally worse when they enter the county than when they leave.
- If we are to assume the same bacterial concentrations, stream flow is directly related to bacterial loading (increased flow results in increased bacterial loading). It would be safe to assume the same bacterial concentrations, or even greater bacterial concentrations, in the future, due to the fact that there are no BMPs in place to reduce to levels of bacteria.

Because stream flow is directly related to bacterial loading, initiating the use of several land conservation BMPs will directly lower the stream flow due to heavy rainfall events. Land conservation can span both agricultural and urban areas. Rain gardens and grass swales can be constructed in urban areas to reduce the amount of storm water runoff that will find its way into Spring River. Catch basins/ponds and stream bank stabilization BMPs can be constructed in agricultural areas to reduce the amount bacteria and sediment loading of storm water runoff that reaches Spring River. These are a few examples of BMPs that can be used to address heavy stream flows caused by a large rainfall event, that cause heavy bacterial and sediment loading. Overland runoff is the key control in this situation because it washes contaminated particles and organic matter into the river. If BMPs are instituted now, in a proactive position, lower bacterial concentrations can be attained and the TMDL that will be developed by the Missouri Department of Natural Resources (2013) can validate the time, work and money that will be used to institute these practices.

**Pollutant Load Reduction Targets**

Because the TMDL for Spring River development date is not due out until 2013, the pollutant load reduction target for the Spring River Watershed Partnership is set below the standard of Total Body concentration of 235 colonies per 100 milliliters and a geometric mean of 135 colonies per 100 milliliters.

Areas that will be addressed first will be homes that have failing or poorly maintained septic systems and rural areas that have livestock closest to Spring River. Further remediation of septic systems and institution of BMPs for rural areas will have higher priorities the closer they are to Spring River, until the entire 14-Digit HUC Code has been remediated and BMPs installed.

## Non-Point Source (NPS) Management Measures (Element 3/C)

### A. Goals and Objectives for NPS Management Plan Practices

In developing a watershed management plan, local citizens, farmers, producers, and other professionals will take a proactive position to take charge of their local stream. A management plan should:

- Enable use of grant funds to power existing programs
- Make it easier to obtain grant funds
- Empower the local community to initiate change
- Allow the community to get additional agency support
- Provide a way to track progress with measurable results
- Inform the surrounding community
- Record ideas and progress through public partnership meetings
- Most of all, to improve the quality of life for people in the watershed.

In addition to water quality and wildlife habitat improvements from lowering *E. coli* levels, a number of other benefits can be attained. Some of these benefits are listed below:

- Provision of off-stream water sources for livestock, keeping them out of the stream
- Livestock relying on surface water retention ponds instead of groundwater, thus allowing for aquifer recharge
- Keeping nutrients on land instead of allowing runoff into streams or other land
- Improvement of riparian zones and stream bank stabilization
- Reducing stream bank erosion by the reduction of storm water runoff and peak flow rates during rainfall events
- The stabilization of road construction ditches with excessive erosion reducing sediment loads
- Grass plantings that can withstand a flooding period, that will improve wildlife nesting and also enhance grassland feeding after nesting periods for native wetland species

The primary goal of this Non-Point Source (NPS) management plan is to reduce and/or eliminate the levels of fecal coliform specifically *Escherichia coli*, in this specific area of Spring River. Because *E. coli* lives only in warm-blooded animals, the focus of this plan will be on humans and livestock in the area. To successfully implement this NPS management plan, realistic goals will be set to try to reduce or eliminate known sources of *E. coli* pollution.

The human factor to *E. coli* pollution would most likely come from failing or unmaintained septic systems in the area. Cost-share programs will be offered to eligible landowners to have septic tanks pumped and inspected. The exact number of septic systems that will need remediation or repair is unknown but can be estimated by examining current septic system repairs and the percent of septic systems in the watershed.

The livestock aspect of *E. coli* pollution could possibly come from runoff of pasture and agricultural areas. The goal of the NPS management plan is to confine and filter peak runoff due to a heavy rainfall event into a catch basin. By capturing storm water runoff before it enters a stream, *E. coli* pollution can be lowered or eliminated. These catch basins can also be used as

off-stream sources of drinking water for livestock as well as be used to filter the storm water. Constructing points along the river to keep livestock from entering and watering in the river can be complicated by flooding. For example, when a fence is constructed to keep out livestock and there is a heavy rainfall event, flooding can occur, and natural debris that is already in the river (i.e. fallen tree limbs) can destroy these structures. Therefore, careful planning and placement of these structures needs to happen in order for them to be successful best management practices.

Each landowner may choose which management measure fits their goals and grazing/agricultural activities. This Nonpoint Source (NPS) watershed management group will focus on the impaired stream portion of the watershed for these management measures. Assistance in focusing on these measures may be provided by the Spring River Watershed Partnership, Jasper County Environmental Task Force, Jasper County Health Department, Natural Resources and Conservation Service, Rural Development (located in Carthage), or the Jasper County Soil and Water Conservation District. The management measures and practices discussed above will depend on available financial and technical assistance available from these different agencies.

**B. Possible Best Management Practices (BMPs)**

*Septic System Maintenance & Repair*

Septic system failure has the potential to become a major contributor to stream pollution. Thus regular maintenance and repair to already existing septic systems is something that should be of great importance. In order to have an effective BMP a management plan must take a proactive stance. Thus, the maintenance and repair of an already failing septic system is a poor management practice because it takes a reactive stance to a problem. We propose a proactive stance and have a septic system pumped at least once every three years and keep drainage troughs and surface water flow away from the septic system drainage field.

*Rain Gardens*

Rain Gardens are gardens that contain native species of flowering plants and grasses that thrive in soil saturated with water from rain storms. However, these gardens are not built to have standing water; they will collect and slow storm water runoff and increase filtration into the soil. These gardens reduce heavy storm water flow from homes and businesses to storm drains, therefore protecting streams and lakes from pollutants that are washed away from house roofs and paved areas or other impervious surfaces. See the appendix section of this Watershed Management Plan or go to http://www.lakesuperiorstreams.org/stormwater/toolkit/raingarden.html for more information on applications, locations, designs, maintenance and other tips about rain gardens.

*Rain Barrels*

Rain barrels are above ground, water storage vessels that used to capture rain runoff from a building roof using the gutter and downspout structures. A common home has a roof area of approximately 1,200 square feet with four downspouts that drain about 300 square

feet of roof. A rainfall event of 0.3 inches will fill a 55-gallon rain barrel placed under each downspout. These rain barrels can be used to store large amounts of water to be used between rain events, or emptied out at a slower pace by using a valve at the bottom of the barrel which will reduce runoff and increase the filtration of the storm water. However, standing water can also be a breeding ground for mosquitoes, by collecting storm water in these barrels and letting the water out at regular intervals can eliminate breeding of mosquitoes in these barrels. See the appendix section of this Watershed Management Plan or go to http://www.lakesuperiorstreams.org/stormwater/toolkit/rainbarrels.html for more information on applications, designs, maintenance and other tips about rain barrels.

*Grass Swales*

Grassy swales are graded and engineered landscaping features that appear as linear, shallow, open channels with trapezoidal or parabolic shapes. The swale is planted with flood tolerant erosion resistant plants, preferably native species. Avoiding the use of grasses that are too dense for nesting birds is also important. The design of these swales transports storm water at a slower, more controlled rate and acts as a filter medium by removing pollutants and permitting better storm water infiltration. The design of these swales to hold a set amount of storm water volume will result in a vast improvement over the traditional drainage ditch in both slowing and cleaning of the storm water. This is because grassy swales have strategically placed check dams, which form small retention ponds. These ponds in turn facilitate improvements in storm water infiltration and sediment retention. The storm water that is collected should drain out in several hours or a few days time. See the appendix section of this Watershed Management Plan or go to http://www.lakesuperiorstreams.org/stormwater/toolkit/swales.html for more information on applications, locations, designs, maintenance and other tips about grassed swales.

*Bioretention Ponds*

Bioretention ponds are predetermined areas where water runoff is designated to flow. These bioretention ponds can allow for pollutant settling as well as watering for livestock, instead of allowing livestock to water in the river. For more information and facts on Bioretention Ponds please visit: http://www.lakesuperiorstreams.org/stormwater/toolkit/bioretention.html.

*Conservation Tillage*

Conservation Tillage is a system of crop production with little, if any, tillage. It increases the residue from the crop that remains in the field after harvest through planting. This results in increased natural recycling of crop residues. Leaving crop materials from past harvests on the soil surface will reduce runoff and soil erosion, conserve soil moisture, help keep nutrients and pesticides on the field and improve soil, water, and air quality. If you would like more information about Conservation Tillage go to: http://www.conservationinformation.org/?action=learningcenter_core4_convotill.

*Crop Nutrient Management*

Crop nutrient management is matching nutrient availability with the plant's nutrient needs. Crop producers do this by increasing the efficiency of nutrient use (manure, fertilizer and natural mineralization). Producers fine-tune application rates, timing and placement of nutrients to match plant growth. By fully managing and accounting for all nutrient inputs helps ensure nutrients are available to meet crop needs while reducing nutrient movements off fields. It also helps prevent excessive buildup in soils and helps protect air quality. If you would like more information about Crop Nutrient Management go to: http://www.conservationinformation.org/?action=learningcenter_core4_cropnutrient.

*Conservation Buffers*

Conservation Buffers are small areas or strips of land in vegetation, designed to slow water runoff, provide shelter and stabilize riparian areas (banks of streams or rivers). Strategically placed in the agricultural landscape, buffers can effectively lessen the movement of sediment, nutrients, and pesticides within farm fields. Buffers include: contour buffer strips, field borders, filter strips, windbreaks, and wetlands. The small amount of land in buffers can assist producers in meeting both economic and environmental goals. Buffers provide an additional barrier of protection by capturing potential pollutants that might otherwise move into surface waters. For more information on Conservation Buffers see: http://www.conservationinformation.org/?action=learningcenter_core4_conservationbuffer

## C. Other BMPs To Be Considered By Spring River Watershed Partnership and Local Landowners

*Stream Protection*

Stream protection is a Missouri State Cost-Share Program that reduces the excess amount of sediment, organic material, nutrients and pesticides in surface runoff and reduces excess nutrients and other chemicals in shallow groundwater flow with a secondary benefit of stream stabilization.

*Waste Management System*

Waste Management System is a Missouri State Cost-Share Program that is used to manage waste from agricultural production in a manner that prevents or minimizes degradation of soil and water resources

## D. Non-Point Sources

Non-point source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

## E. Point Sources

Point sources of pollution consist of discharges from pipes or points, rather than general landscaped areas. These point sources are regulated discharges permitted by state or federal agencies, which means that pollution levels are monitored and mandated not to exceed certain levels. In the State of Missouri, underground storage tanks (USTs) typically holding fuel for gas stations are permitted by the Missouri Department of Natural Resources. Some CAFOs have non-discharging permits that require waste management systems to prevent waste from leaving the site uncontrolled in most weather conditions; however, there are no CAFOs in this 14-Digit HUC Code area.

The National Pollutant Discharge Elimination System (NPDES) permits commercial and industrial facilities that discharge treated waste water into local streams or waterways. In the Spring River basin, a portion of these sites are agriculturally related. A list of all Point Source facilities in Jasper County is listed here:

**Permitted Point Sources in the Spring River Watershed**

| FACILITY NAME | RECEIVING STREAM | LOCATION (T R S) | COUNTY |
|---|---|---|---|
| ALBA WWTP | TRIB TO BUCK BRANCH | NE,NW 29N 32W 15 | JASPER |
| BUTTERBALL TURKEY CO | SPRING RIVER | SW,SW 29N 31W 34 | JASPER |
| CARTHAGE WWTF | SPRING RIVER | NW,NE 28N 31W 5 | JASPER |
| CARL JUNCTION WWTF | CENTER CREEK | SW,NW 28N 33W 8 | JASPER |
| CENTERVILLE LIFT STATION | TRIB TO CENTER CREEK | S 28N 33W 1 | JASPER |
| DOSKOCIL SPECIALTY BRANDS | TRIB TO CENTER CREEK | NW,SE 28N 31W 33 | JASPER |
| EAGLE-PICHER INDUSTRIES | ELM CREEK | NW,NW 27N 33W 3 | JASPER |
| EMPIRE, ASBURY | BLACKBERRY CREEK | NE,NW 30N 33W 17 | JASPER |
| EMPIRE, ASBURY | BLACKBERRY CREEK | NE,NW 30N 33W 17 | JASPER |
| FAIRVIEW GREENHOUSE INC | TRIB TO SPRING RIVER | SE,NE 28N 31W 10 | JASPER |
| FARMERS CHEMICAL CO | SHORT CREEK | SW,NW 27N 34W 2 | JASPER |
| FIBREX INC, JOPLIN PLANT | TRIB TO LONE ELM HOL | NW,NW 27N 33W 3 | JASPER |
| FIBREX INC, JOPLIN PLANT | TRIB TO LONE ELM HOL | NW,NW 27N 33W 3 | JASPER |
| FOUNTAIN ROAD PARK VILLAGE | TRIB TO CENTER CREEK | NE,NW 28N 32W 26 | JASPER |
| HICKORY LANE MHP | TRIB TO GROVE CREEK | SE,NW 27N 32W 13 | JASPER |
| ICI EXPLOSIVES USA INC | GROVE CREEK | W 28N 32W 36 | JASPER |
| ICI EXPLOSIVES USA INC | GROVE CREEK | W 28N 32W 36 | JASPER |
| ICI EXPLOSIVES USA INC | GROVE CREEK | W 28N 32W 36 | JASPER |

| | | | |
|---|---|---|---|
| ICI EXPLOSIVES ENVIRONMENTAL | GROVE CREEK | NW 28N 32W 36 | JASPER |
| INLAND PRODUCTS INC | SPRING RIVER | SE,SE 29N 31W 33 | JASPER |
| IRECO INC | CENTER CREEK | SE,NW 28N 32W 13 | JASPER |
| IRECO INC | CENTER CREEK | SE,NW 28N 32W 13 | JASPER |
| JASPER WWTF | TRIB TO OPOSSUM CREEK | NW,SE 30N 31W 23 | JASPER |
| JOPLIN, TURKEY CREEK WWTP | TURKEY CREEK | SE 28N 33W 29 | JASPER |
| SARCOXIE WWTF | CENTER CREEK | NE,NE 27N 29W 8 | JASPER |
| TAMKO ASPHALT PRODUCTS | TURKEY CREEK | SE,SE 28N 33W 35 | JASPER |
| TAMKO ASPHALT PRODUCTS | TURKEY CREEK | SE,SE 28N 33W 35 | JASPER |
| VICKERS INCORPORATED | SHORT CREEK | E,NE 27N 33W 8 | JASPER |
| VICKERS INCORPORATED | TRIB TO TURKEY CREEK | E,NE 27N 33W 8 | JASPER |

A full list of permitted point sources throughout the Spring River Basin is found at the following web address: http://www.mowin.org/Project31903/SpringRiver/pointsource.html

## Estimate of Technical and Financial Assistance Needed (Element 4/D)

These NPS management measures will be implemented within 10 years. However, as BMPs are implemented new BMPs can be established and thus ever changing. Each BMP may take different lengths of time to be completely implemented. This NPS management plan will use an estimated timeframe that will be separated into 3 increments: short-term (1-3 years), mid-term (4-6 years) and long-term (7-10 years). These management measures will be brought before landowners to demonstrate a plan of action and a timetable for completion. A list of agencies and services with cost-share programs, grant opportunities, financial incentives, technical assistance and educational programs can be found in Appendix A.

### A. Watershed Management Plan Implementation

The best management practices (BMPs) implementation will start with the approval of this Watershed Management Plan. Short term goals will achieved or reevaluated in the first three years. By the end of this time a TMDL should be developed and the Spring River Watershed Partnership can reevaluate if BMPs are being achieved or if new BMPs should be instituted. Mid-term goals will be achieved or reevaluated in the four to six year range. Long term goals will be achieved by the end of the tenth year.

*Escherichia coli Stream Testing (estimated cost: $30,000-$45,000; per 3 Year Implementation Period)*

*E. coli* stream testing is currently being done by the Jasper County Health Department as a means to monitor *E. coli* levels at certain sample points on different water bodies throughout Jasper County during the recreational season. Weekly sampling has been done since 2007 and will continue in the future, results of these samples can be seen through the Jasper County Health Department website. Results will also be made available at public meetings concerning the watershed, and can be used as identifying milestones. The cost of sampling involves man hours per week, mileage per week and cost of testing the individual samples.

*Septic System Maintenance and Remediation (estimated cost: $180,000; 60 systems @ $3,000 per 3 Year Implementation Period)*

There are approximately 5,500 households in this watershed area, a third of those households having an on-site sewer system; this equals roughly 1,800 homes. And of these 1,800 homes 10 percent of these are failing septic systems and are in need of maintenance and repair. This leaves approximately 180 homes that need technical and financial assistance. The technical assistance that will be provided in this area will be from the Spring River Watershed Partnership (SRWP), the Jasper County Health Department (JCHD) and septic system repair businesses in the area. Some of the technical assistance that will be provided by the SRWP and the JCHD will be flyers/brochures, monitoring of new septic installations, community meetings and septic owner's guide with the installation of new septic systems. Local septic system businesses

will provide maintenance and repair to failing septic systems. Cost-share opportunities would be available to homeowners with septic systems to aid in financial costs.

*Public Landowner Education and Local School Educational Days (estimated cost: $10,000 per 3 Year Implementation Period)*

The technical assistance that will be provided in this area will be from the Jasper County Environmental Task Force (JCETF) and the SRWP. Some of the technical assistance that will be provided is the assembly of public meetings to discuss progress of the BMPs that are going to be initiated. Brochures and flyers will be provided to landowners at the public meetings on BMPs that can be used on their property to help limit the pollution of this area. During school educational days, such as Earth Day, educational material will be provided to help in the distribution of knowledge about the problem in this sub-watershed.

*Rain Garden Development (estimated cost: $50,000; 50 gardens @ $1,000 per 3 Year Implementation Period)*

Rain gardens are relatively easy to construct and could be done by the homeowner/landowner. The technical assistance that will be provided will be through seminars educating the public on how to construct these gardens and the native species of plants to grow in them. Other technical assistance can be provided through companies involved in earthmoving if the owner so chooses to have assistance with this project. Seminars and flyers will cover what is needed to construct these gardens and how much it will cost depending on the size of the garden that is being installed.

*Rain Barrels (estimated cost: $16,000-20,000; 100 Homes @ $160-$200 per household per 3 Year Implementation Period)*

The technical assistance provided in this area will be from educational seminars for the public on general watershed BMPs. In these seminars it will be shown on how to construct a rain barrel, what cost will be involved in the construction, what rain barrels can be used for, overflow capabilities as well as other general maintenance duties required for rain barrel use. These seminars can be held at environmental days at local campuses and for landowner seminars.

*Grassed Swales (estimated cost: $50,000-$75,000; 5,000 per swale @ 10-15 swales per 3 Year Implementation Period)*

The technical assistance that will be provided in the establishment of grassed swale will come from local businesses that have the machinery to accomplish this task; tasks such as accurate grading and excavation. An undated estimate (no older than 2000) suggests a value of $5.50 per cubic foot of storage provided. http://www.lakesuperiorstreams.org/stormwater/toolkit/swales.html. Soil testing will also need to be done to determine soil porosity, and to find the best area for a grass swale to be of the greatest use.

Best Management Practices Technical Aid

**Short Term Watershed Management Plan Implementation (1-3 years)**

| Agency Providing Technical Aid | Technical Aid Being Provided |
|---|---|
| SRWP | Septic System Maintenance & Remediation |
| SRWP | Pumping Demonstrations on Private Septic Systems |
| SRWP | Public/Landowner Education |
| JCHD | *E. coli* Sampling |
| Public Volunteers | Adopt-A-Stream (Trash Pick-Up) |
| SWCD/NRCS/Rural Development | Landowner choice of Best Fit BMP's |
| Area Construction Businesses/Homeowners | Grass Swales/Rain Gardens/Rain Barrels |

**Best Fit BMP's could include but are not limited to: Silt Fences, Stream Bank Stabilization, Storm Water Retention Basins (grass swales or rain gardens).

**Mid Term Watershed Management Plan Implementation (4-6 years)**

| Agency Providing Technical Aid | Technical Aid Being Provided |
|---|---|
| SRWP | Any Additional Septic System Maintenance & Remediation |
| SRWP | Additional Pumping Demonstrations on Private Septic Systems |
| SRWP | Continuing Public/Landowner Education |
| JCHD | Continued *E. coli* Sampling |
| Public Volunteers | Adopt-A-Stream (Trash Pick-Up) |
| SWCD/NRCS/Rural Development | Landowner choice of Best Fit BMP's |
| Area Construction Businesses/Homeowners | Grass Swales/Rain Gardens/Rain Barrels |

**Best Fit BMP's could include but are not limited to: Silt Fences, Stream Bank Stabilization, Storm Water Retention Basins (grass swales or rain gardens).

**Long Term Watershed Management Plan Implementation (7-10 years)**

| Agency Providing Technical Aid | Technical Aid Being Provided |
|---|---|
| SRWP | Additional Septic System Maintenance & Remediation |
| SRWP | Additional Pumping Demonstrations on Private Septic Systems |
| SRWP | Continued Public/Landowner Education |
| JCHD | Continued *E. coli* Sampling |
| Public Volunteers | Adopt-A-Stream (Trash Pick-Up) |
| SWCD/NRCS/Rural Development | Urban/Rural Choice of Best Fit BMP's |
| Area Construction Businesses/Homeowners | Grass Swales/Rain Gardens/Rain Barrels |

**Best Fit BMP's could include but are not limited to: Silt Fences, Stream Bank Stabilization, Storm Water Retention Basins (grass swales or rain gardens).

## Information/Education Component (Element 5/E)

Educational programs will start when this watershed management plan is approved. Programs will be held throughout the entire period of this plan (approximately 10 years). Different educational programs will be headed by different agencies, such as the Spring River Watershed Management Partnership, Missouri Department of Conservation, National Resources Conservation Service and the Jasper County Health Department among others. Tentatively programs will be held quarterly or biannually.

There will be a variety of informative and educational activities planned throughout the life of this watershed initiative. Some of these activities are listed here:

- Pre-Implementation Plan Landowner Meetings
- Post-Implementation Plan Landowner Meetings
- Public Educational Demonstrations and Seminars
- Continued Public Outreach (posters etc.)
- Media Campaign (Flyers, Newspapers, Television) Explaining Best Management Practices

There will be public landowner meetings held quarterly throughout the life of this plan. This will be done to keep the public involved in the continual planning and implementation of this plan as well as keep them updated to milestones that are met. Once old milestones are met new milestones will be set as future goals to achieve, and the public must be a big part of this.

Also, educational classes (demonstrations and seminars) will be held for landowners choosing to install certain BMPs. This will be done to allow them to choose which BMP will be best suited for their land. These classes will provide knowledge on how these BMPs will help the watershed over time. They will also discuss materials that are needed and how they can be installed, where it needs to be installed, they will discuss which native plants to select if one plans to construct a rain garden, what maintenance will be involved to keep a BMP working and the cost that will accompany the selection of a certain BMP.

Local universities can also offer ways on educating the public. By offering seminars for local teachers and professors we can educate them on current BMPs that can be introduced on their campuses. In doing this more students can become involved in the protection of this watershed, through stream teams, adopt-a-stream groups and by them spreading word onto their parents on different BMPs and how they work to protect the watershed.

This plan will be an ever changing document, in that as new milestones are reached new milestones will be set, and as new BMPs are introduced through research and ideas that are introduced by the public to the attention of the Spring River Watershed Partnership and the Jasper and Newton County Environmental Task Force.

## A. Public Involvement

Public involvement will play a critical role in the establishment of this plan. Information that is obtained from the public is very important to the Spring River Watershed Partnership, without public involvement the plan could not work. By having landowner meetings and educational classes ideas to help improve the watershed can be discussed and well thought out before put into action, so the best possible solution can be achieved.

Prior to submission of the Spring River Watershed Management Plan there will be a 30-day public review. This review will allow landowners in the area to review the plan and add comments and questions. These comments and questions will be addressed by the Spring River Watershed Partnership and integrated into the plan.

Here are comments, questions and concerns from the first public landowner meeting that was held by the Spring River Watershed Partnership on April 23, 2009.

**Concerns about the Watershed:**

- How will this impact us?
- How do cow/calf operations affect the watershed?
- What regulations will come with this watershed management plan?
- What are the affects of personally ingesting these pollutants?
- Could this give bad press for the agricultural community?
- What do *E. coli* levels mean?
- Trash: Walnut Bottoms-Turkey Ford
- What effects do raw poultry wastes have on the watershed?
- What effects do pesticides have on the watershed?
- How does human waste (sludge and industrial) have on the watershed?
- Food industry in Carthage bottoms
- How will this effect recreational activity?
- Kellogg Lake
- What are we going to do to support agriculture because everyone wants distilled water flowing down the river?
- Want to be really certain where the problem comes from (if you don't know the source, how are you going to fix it).
- Come up with solutions that aren't a burden to any one entity.
- How are we going to measure any good we do-factor out outside sources such as headwater flow?
- Need to know more about the river and its watershed (i.e. sink holes, karst topography)
- Wildlife being poisoned
- Lagoons
- Educating people: urban and rural
- Prospect of excessive regulation (inc. determination of benchmarks)
- Excessive water usage
- Respect usage

The Spring River Watershed Partnership will initially head the start of the program. As BMPs are set in motion the public will play an important part of continuing what the Spring River Watershed Partnership has started. As stated before public meetings will be held a quarterly or biannually to assess the progress of the plan as well as BMPs that are being used. If BMPs are failing, new ones will be developed with the help of public involvement, so the absolute best practices are instituted.

*E. coli Stream Sampling*

*Escherichia coli* stream sampling will continue as part of the Jasper County Health Departments effort to assess the amount of *E. coli* in Jasper County streams. Weekly sampling will take place during the recreational season. The analysis of these samples will be posted to the public as they are read on a weekly basis. These samples could also be used to track milestones. Although the analysis will be available through the Jasper County Health Department website, results will be given out at stakeholder meetings so the public may track progress as well.

*Septic System Maintenance & Remediation*

The goal of this watershed management plan is to prevent future contamination of local stream through on-site sewer systems that continue to leak and are in need of maintenance and repair. The goal is to remediate approximately 60 on-site systems per short, mid and long term timetables.

*Public Landowner Education and Local School Educational Days*

Public Landowner Education and other educational days will continue throughout the life of this plan. The goal is to have semi-annual public landowner meetings to address the completion and addition of BMPs. Quarterly landowner meetings will be held to inform the public on BMPs that can be implemented on their property, such as rain gardens, rain barrels and retention ponds. Further educational days for local schools will be scheduled on future dates and will provide knowledge of BMPs and how they can help the environment. Completion of these projects will be on a milestone basis.

*Rain Garden Development*

Another goal of this watershed management plan is to reduce storm water runoff. By reducing storm water runoff a much smaller amount of pollutants can reach the stream. One of the many ways to accomplish this is to construct rain gardens. The goal is to construct approximately 50 rain gardens per short, mid and long term timetables.

*Rain Barrel Construction*

Rain barrel construction is another way to reduce storm water runoff, and will reduce the amount storm water flow into the stream. These rain barrels can collect water runoff from houses and then that water can be used during periods of drought. The goal is for 100 homes to institute the use of rain barrels per each short, mid and long term timetable.

*Grass Swales*

With the construction of grassed swales storm water can be slowed, allowed to pool, and then be absorbed through the soil. They can be established as an urban or rural BMP, because they are designed to be similar to ditches and can be installed instead of curbs when in the urban setting. They do require more maintenance than curbs do, however the cost of this maintenance is very low compared to maintenance of curb and guttering. The goal of the Spring River Watershed Partnership is to establish 10 to 15 grass swale areas per each short, mid and long term timetable.

*Bioretention Ponds*

With the construction of bioretention ponds storm water runoff can be directed to these areas and allowed to accumulate. In doing this livestock can be watered from these retention ponds instead of watering in a nearby stream. If this can be accomplished, the probability of fecal contamination in the stream by livestock can be lowered. The goal of the Spring River Watershed Partnership is to inform landowners of this practice so they can benefit from its use. The development of this BMP will be left up to the homeowner to install.

*Crop Nutrient Management*

Instituting crop nutrient management measures can help reduce the amount of nutrient and bacterial loading into the stream. The goal of crop nutrient management is to increase the efficiency of plant growth through application rates, timing and placement of nutrients. By managing these variables to meet crops needs correctly a reduction in nutrient and bacterial loading can be reached. Information will be made available to landowners to assist them in attaining these crop nutrient management goals.

*Conservation Buffers*

Conservation buffers are small areas or strips of land designed to slow water runoff and stabilize riparian areas (banks of streams or rivers). By constructing these buffers storm water runoff can be slowed and nutrients and bacteria can be allowed to settle out before reaching the stream. Another benefit of these buffers is to provide stabilization to river banks. This is done by planting native grasses or trees along a stream bank to provide root systems to hold in sediment so it does not freely run into the stream. Information will be provided to landowners to assist them in the development of these buffers.

*Conservation Tillage*

Conservation tillage is a way to use recycled crop residues to reduce sediment flow due to water runoff. By using the leftover crop from a previous season it can increase soil quality, conserve soil moisture and help keep nutrients and pesticides on the field. If nutrients can be provided by recycled crops from a past harvest then this can contribute in part to less fertilizer having to be put onto fields for future harvests. Information will be provided to landowners to assist them in the development and use of this BMP.

**BMPs to be Implemented (% Completed)**

| BMPs to be Implemented (% Completed) | Short Term (33%) | Mid Term (66%) | Long Term (100%) |
|---|---|---|---|
| *E. coli* Stream Sampling | Annually | Annually | Annually |
| Septic Tank Maintenance & Remediation | 2014 | 2017 | 2021 |
| Public Landowner Education | Annually | Annually | Annually |
| Rain Garden Development | 2014 | 2017 | 2021 |
| Rain Barrel Construction | 2014 | 2017 | 2021 |
| Grass Swales | 2014 | 2017 | 2021 |
| Sediment Retention/Erosion/Water Control Structures/Sod Waterways | 2014 | 2017 | 2021 |
| Inform Poultry Producers/Spreaders On Proper Handling & Spreading | 2014 | 2017 | 2021 |

## Description of Interim Milestones (Element 7/G)

The initiation of this WMP will begin with the steps set forth by the SRWP; however, the actual implementation of BMPs will be left up to the public, farmers and agricultural producers to decide on best options for land usage and grant/cost-share opportunities.

**Description of Interim Milestones:**

- Conduct Quarterly SRWP Directors Meetings & Community Meetings
- Public Outreach & Educational Activities (Semi-Annual Demonstrations, Mailings to Landowners, School Presentations).
- Septic System Maintenance & Remediation
- Promote Settling/Retention Ponds for Landowners
- Facilitate & Promote Landowners/Agricultural Producers Development of CNMPs
- Continued Education of Landowners/Agricultural Producers/Future Farmers of Soil & Nutrient Testing
- Promote Riparian Restoration, Sediment Retention, Erosion Control, Water Control Structures and Sod Waterways.

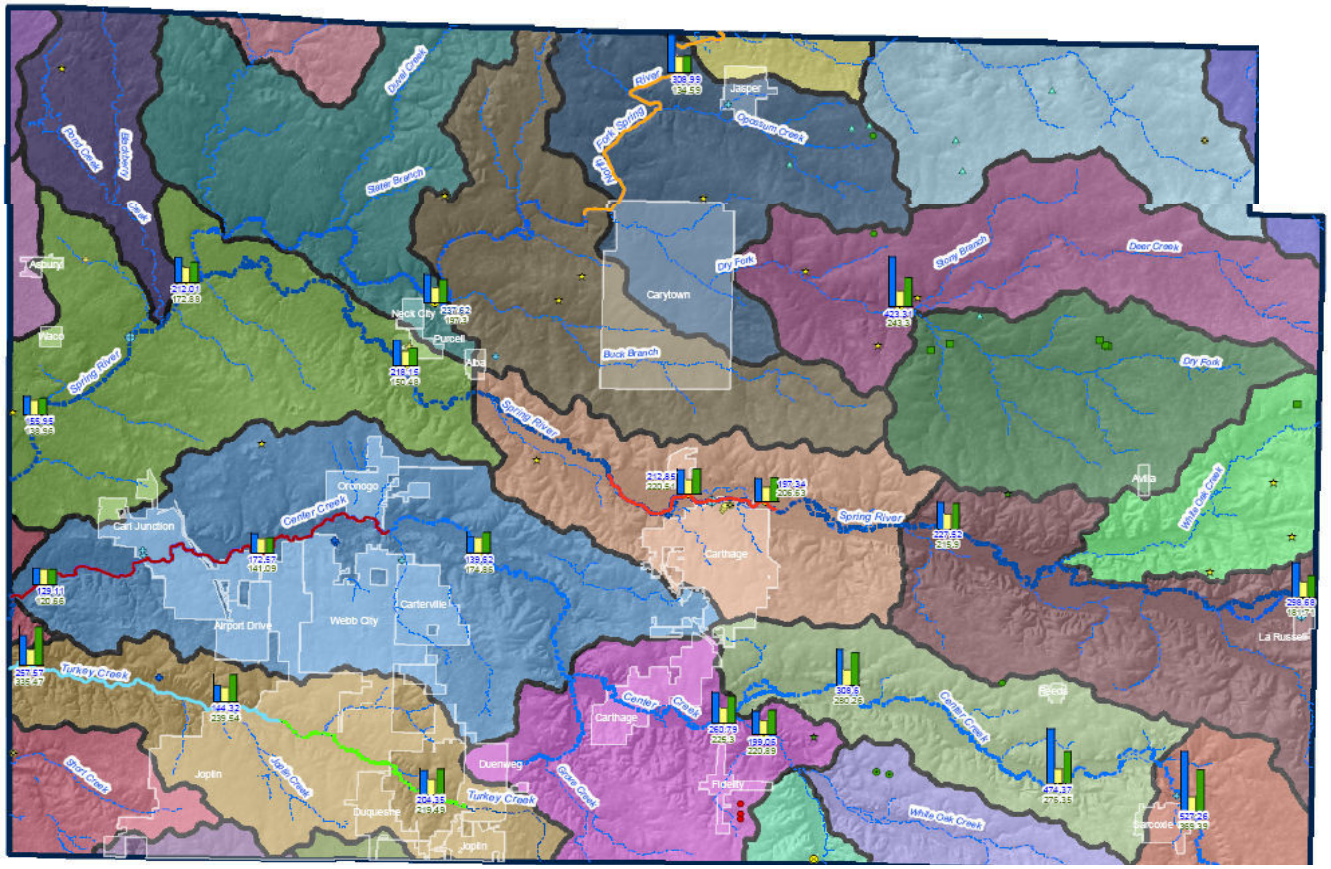
## Method Used to Determine Load Reduction (Element 8/H)

Because a TMDL is not currently available for the listed area of Spring River, the Spring River Watershed Management Partnership will conduct annual samples from seven different samples points in Jasper County. Two of these sample points are located within the 14-Digit HUC Code (11070207140002) one before the stream enters Carthage and one after the stream exits Carthage. Also, there is a sample point located before the stream enters the HUC Code 11070207140002 as well as a sample point just outside of HUC Code 11070207140002.

The two sample points outside of the 14-Digit HUC Code will show what the contamination is prior to entering this area (HUC Code 11070207140002) and what the contamination is after exiting this area. The two sample points that are located inside this area (HUC Code 11070207140002) will show what contamination is coming into the City of Carthage and the contamination that is exiting the City of Carthage. By having these sample points located where they are the Spring River Watershed Partnership can see what effects the urban BMPs are having inside the City of Carthage as well as the effects of the rural BMPs that will be instituted. As the data is analyzed, BMPs can be looked at to determine their effectiveness. As the management plan is being assessed annually BMPs will either be continued due to their effectiveness or new BMPs will be established with the help of public involvement.

Sampling started with the recreational season of 2007, and has continued each recreational season since then. Geometric means can be seen in the table below for each of the seven different sample points along Spring River in Jasper County. Sample points 2 and 5 are the sample points that lie before and after HUC Code 11070207140002. Sample points 3 and 4 are the sample points that lie within HUC Code 11070207140002, and before and after the City of Carthage.

The method that will be used to establish contaminant load reductions will be annual sampling of Spring River and analyzing of the *E. coli* contamination with the use of the IDEXX Quanti-Tray 2000. Once the management plan is approved and BMPs can be established, sampling should show the reduction of contaminate loading. This process will continue annually during the recreational season, if data does not show effectiveness of BMPs new BMPs will be established and put into use. BMP development will come with further education and understanding of the watershed.




| Sample Point | 2007 Geometric Mean (Total Number of Samples: 17) | 2008 Geometric Mean (Total Number of Samples: 22) | 2009 Geometric Mean (Total Number of Samples: 19) |
|---|---|---|---|
| Spring River County Road 3 (SR1) | 298.68 | 181.71 | 308.41 |
| Spring River County Road 85 (SR2) | 227.52 | 215.90 | 250.20 |
| Spring River Kellogg Lake (SR3) | 197.34 | 206.63 | 155.55 |
| Spring River Francis Street (SR4) | 212.85 | 196.74 | 203.35 |
| Spring River Quakermill County Lane 216 (SR5) | 218.15 | 150.48 | 217.38 |
| Spring River County Road 270 (SR6) | 212.01 | 151.51 | 218.35 |
| Spring River Kafir & Stateline (SR7) | 155.95 | 121.28 | 195.54 |

## Water Quality Monitoring Program (Element 9/I)

The water monitoring program that will be implemented on this portion of Spring River will be headed by the Jasper County Health Department. The JCHD has two sampling points along this stretch of Spring River: one before the river enters the city of Carthage and one after the river exits the city of Carthage.

### A. Sampling

The sampling period for the JCHD will be collected during the recreational season, which runs from April 1st to October 31. Grab samples (100 mL) will be collected once per week for the duration of the recreational season. It is the hope that by sampling every week different flow conditions will be seen and bacterial quantities can be evaluated. Samples will be run using the IDEXX Quanti-Tray 2000. The one-hundred milliliter grab samples will have a Colilert reagent added to them before being poured into a Quanti-Tray, the tray will then be sealed and put into an incubator for a 24-hour incubation period. After the 24-hour incubation period, the trays will be pulled out and placed under a black light. The positive wells on the tray of *E. coli* will have a fluorescent hue, negative samples will not. The positive wells will be checked against a table generated by IDEXX for colonies per 100 milliliters.

### B. Criteria Used To Determine BMP Effectiveness

The TMDL for this area of the Spring River watershed has not yet been developed (tentatively 2013), so the criteria that will be used for determining the effectiveness of instituted BMPs will be the annual stream sampling that is performed by the Jasper County Health Department. This testing is performed from Memorial Day in May until the middle of October. This is done because it is the peak time for swimming and other recreational activities. Spring River has been listed as impaired for fecal coliform, so the goal of the Spring River Watershed Partnership is to lower *E. coli* levels to below standards set for whole body contact. These standards are 235 colonies per 100 milliliters for one day or 135 colonies per 100 milliliters for a geometric mean. The goal of the Spring River Watershed Partnership is to start initiating BMPs for this area and as a result see lower contamination numbers.

The Spring River Watershed Management Plan will be reviewed annually by the Spring River Watershed Partnership to make modifications to BMPs or institute new ones. Also during these sessions advice or ideas from public meetings will be addressed.

**APPENDIX A. Agencies Providing Technical and Financial Assistance.**
**Spring River Watershed Management Contacts**

**Jasper and Newton County Environmental Task Force**

- Information pertaining to Spring River Watershed.

  Bob Nichols (President)
  City of Webb City
  South Main Suite 102
  Webb City, MO 64870
  417-673-7151
  bnichols66@sbcglobal.net

**Farm Service Agency**

- Conservation cost-share programs, commodity loans, commodity programs and farm loans.

  416 E. Airport Drive
  Carthage, MO 64836
  417-358-8198

**Jasper County Health Department**

- Provide technical assistance, stream monitoring and educational activities.

  105 Lincoln Avenue
  Carthage, Missouri 64836
  417-358-3111
  http://www.jaspercounty.org

**Missouri Department of Conservation**

Regional MDC Office
2630 N. Mayfair
Springfield, MO 65803
417-895-6880
http://mdc.mo.gov/areas/swest/

**Missouri Department of Natural Resources**

- Cost share, loans, technical, education regulations, permits, monitoring.

  Southwest Regional Office
  2040 W. Woodland
  Springfield, MO 65807-5912
  417-891-4300 or 1-800-361-4827

**Natural Resources Conservation Service**

- Conservation, technical, financial and educational assistance programs

  103 Airport Drive
  Carthage, MO 64836
  417-358-8199
  http://www.mo.nrcs.usda.gov/modirectory.pdf

**Rural Development**

- Loans/Grants for home ownership and repairs; loans/grants for community facilities, water and sewers systems; direct and guaranteed business loans.
  416 E. Airport Drive
  Carthage, MO 64836
  417-358-8196, Ext. 4

**Soil & Water Conservation District**

- Financial incentives, technical assistance, information, education materials.
  416 E Airport Dr
  Carthage, MO 64836
  417-358-8199

**University of Missouri Extension**

- Research-based information, demos, educational programming.
  Basement, Courthouse
  Carthage, MO 64836
  417-358-2158

**Missouri Southern State University**

- Educational Assistance
  3950 Newman Road
  Joplin, MO 64801
  417-625-9300
  www.mssu.edu

**Pittsburg State University**

- Educational Assistance
  1701 South Broadway
  Pittsburg, KS 66762
  620-231-7000

## Appendix B. Index Of Maps

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## Appendix C. Comments From Public Review Period January 1, 2010 to February 1, 2010

**ottovonbraun@hotmail.com**

The Spring River and its watershed have
been abused and taken for granted for so long in this area. There are too many junkyards, chicken houses, and factories along its shores. We are very excited about the possibly of change in the management of this great resource! We take our canoe on the Spring at the Kellogg Lake access...but do not get in the water. It's a shame that you have to go to other areas in the state just to swim. The Spring would benefit from being cleaner in that it could go from being just a mode of transport for chemicals, trash and factory and agricultural waste, to being a river for recreation. Farmers and home owners may get upset, but new monetary resources would flow in.

I think people would be more concerned about water quality if they had a reason to be. If the access points to the Spring River were nicer in and around Carthage, perhaps the public would pitch in. Instead of being an eyesore, the river could be a economic boost like waterways in other towns are. There could be river walks, parks, clean and safe river access. It could serve as reason to visit Jasper County!
Thank you

**jc4686@gmail.com**

I float this stretch many times in the summer. It's great to see the county step in and clean up the water.

**bfizette@hotmail.com**

I have a concern about all of the emphasis on constructing water retention ponds and the installation of rain barrels. These measures will greatly increase the amount of stagnant water which will multiply the mosquito population which may be a greater public health threat than E-coli levels in Spring River. Also, asking livestock producers to rely on ponds instead of groundwater wells presents a potential problem for waterering livestock during periods of drought. We experience many periods of drought during the summer and fall months, causing many ponds to dry up, so without groundwater wells, livestock have no access to any water. Our local economy is greatly affected by the profitability of livestock producers. We must remember that local farmers only apply as little fertilizers (manures and commercial)and/or chemicals that are necessary to remain profitable, and that homeowners in urban areas tend to apply more fertilizer and/or chemicals on a per acre basis than farmers, so urban homeowners are also part of the problem if not a majority of it.

**zmail@joplin.com**

*Evaluation parameters:*

1. Has this proposed watershed been compared to other similar watershed efforts for silt-bottom rivers?
2. Were those programs effective (levels of generic E. coli reduced)?

3. Were analysis blanks run along with samples in for data produced by students in the Stream Team project? Was their training documented? Did only trained (documented) students run the tests?
4. Generic E. coli is ubiquitous. Why were no other types of bacteria tested, even with this being chosen as an indicator organism?
5. How does the level of E. coli in the Spring River compare to pre-watershed levels for other silt-bottom rivers in watershed plans or to other silt-bottom rivers not presently in a watershed?
6. Which microbial organisms (bacteria, protozoans) were tested when those rivers were characterized?
7. What other indicators of ecological health were evaluated for the Spring River? (This is measured by a more comprehensive look at the microscopic organisms, whose presence and diversity are good indicators of water conditions.)

*Plan development*:

1. What brought about the interest in studying the Spring River and developing the watershed plan?
2. Have there been any cases of pathogenic bacteria tied to exposure in the Spring River?
3. Will support be made available to land-owners for additional costs, such as fencing to maintain a boundary to the river and water resources for livestock, such as pumps from the river or wells?
4. Has chemical contamination been addressed? At the first meeting I attended last Spring, there was more interest in aesthetic concerns (physical waste) than in water safety for microbial or chemical parameters. Education is a fundamental tool for pollution prevention. Is there any education planned for area residents (urban, surburban and rural) about the effects of poor practices?
5. What measures are included in the program to assure that continuous review will occur and to determine whether continued funds required to maintain the program are effectively spent?

*Support for loss of use of income-producing land:*

1. For many landowners in this area, trespassing hunters pose a continuous problem. Landowners often confront people on their property rather than contacting the Sheriffs department. Based on my experience, there is a feeling of privilege for many of the people who are caught trespassing. One person who was caught told the Conservation enforcement officer that he and his dad had taken hundreds of deer from our property. If CRP programs are part of the solution, to support landowners with some income from property that will no longer be income-producing, the additional cover and wildlife resources will only reinforce conditions that draw trespassing hunters. At this time, the only penalty is a misdemeanor for trespassing. There should be an increased penalty for those trespassers who are carrying a firearm or other weapon, such as a minimum fine that is not waivable by the court and minimum jail time for a repeat of this offense. (See EQUP p. 3)
2. To what extent will tributaries be impacted by controls in the plan? Loss of land use could be impacted tremendously based on requirements for handling tributaries.

*Issues for plan components:*

1. Implementing above ground water retention practices leads to mosquito harborage, requiring the use of chemical products that pose their own health consequences. (p.13)
2. Will financial support be made available to landowners to put in wells or ponds for livestock use? ( p. 15)
3. Rain barrels: Without covers, barrels and cisterns breed mosquitoes. Rainwater going into the ground filtration replenishes the groundwater resources. Concrete, asphalt and structures reduce the amount of water that filters into the groundwater table. Runoff becomes a problem when rain amounts relative to ground saturation are excessive. At those times, rain barrels are not a practical measure for this purpose. Their purpose is served primarily during drought periods, which are a very small percentage of time per year. This as a management tool appears to be over-estimated in this plan. (p. 15)
4. Grass swales: A better solution between cattle farms and watersheds may be glimpsed here. By engineering the pasture area, planting native species of grasses, and allowing/prohibiting use of the grazing land based on rainfall and season, both purposes could be served. Presently, CRP programs prohibit grazing or baling entirely. (p. 17)
5. Bioretention ponds: Result in need for mosquito controls. (p. 17)
6. Conservation tillage, crop nutrient management, conservation buffers (with distance agreement) are good management practices. Education is a good tool to support these measures.
7. Stream protection: Management of tributaries is important to watershed success, but boundaries established should be practical and any costs for changes to land use that require fencing animals from creek boundaries should be supported (labor and materials.) Use of a pasture should take into account the "animal burden." That is, a herd of XX cattle having access to a creek may constitute an increase in the micro load for the river, but a 10 acre pasture with two horses should not have a significant effect on the load. PRACTICAL measures should be included for REASONABLE land use. Wildlife will continue to use the land and creeks in the way that they are accustomed. (p. 18C)
8. Nonpoint sources:
Man-made chemical products that have some solubility in water which do not tend to break down easily into non-toxic, small molecular weight compounds are the source of enduring groundwater contamination. It is better to encourage the use of management practices and land use to reduce the need for these types of products. Education is a good tool for this purpose. (p. 18D)
Nonpoint sources: â€œRunoff" should be clarified. "Runoff" occurs when the rate of rainfall, or snow melt, exceeds the ability of the ground to absorb and filter the water. Water entering the ground is essential for filtration that becomes groundwater. (p. 18D)
9. Data collected from monitoring the Spring River should be made public, at least on a weekly basis. A chart that is maintained online would be most useful. (p. 33)
10. Public meetings are essential. Where will meetings be held, and how long in advance will they be announced and through what method of notification? (p. 33)

Water resource conservation is an essential practice. The bulk of this document centers around values that I share, but the premise, the basis for justifying the expense of this project for this river, has not been well investigated and the impact of contaminants other than micro or microbial nutrients has not been addressed. Without fully evaluating the upstream contributions to this watershed, impact of management practices may be

minimal. Post-monitoring of this project, and all such projects, should be written into the plan to determine whether practices, and which practices, successfully address the project goals. Without including post-implementation review in any plan, wise use of economic resources cannot benefit future investments.

**downingd@missouri.edu**
Thanks for the great job. I know it was a lot of work. My comments about the plan are as follows:
This is a voluntary plan rather than a regulatory document the word voluntary needs to be highlighted throughout. It talks a lot about the Spring River watershed (even in the title) but, this plan is written focusing on addressing issues within that 14 digit HUC containing Carthage, not the entire watershed. The portion being addressed needs to be emphasized. The name on the plan needs to be changed so it emphasizes the area being addressed instead of the entire watershed.
**randy.haas@mdc.mo.gov**
First, let me say thank you for allowing comments on this document.
After downloading it, I found a few errors that you will need to be aware of. On page 3 (downloaded), under I. Incentive Programs, you have EQIP and CRP listed under Missouri Department of Conservation agency heading, and they should be under USDA/NRCS/FSA programs. We only assist the Federal Agency with these programs...we don't oversee them. I checked one of the links provided in the document to a site on our webpage, and found errors on it, but that is something our agency has to update...they are aware of it, and hopefully, making it correct.
Another question I have is on page 21 of the printed document...cost estimates(septic system maintenance and remediation). You list 1800 homes with septic systems, and approximately 10% are failing, which amounts to approximately 180 systems. Your cost estimate lists 60 systems at $3,000.00 each...are you only concerned about 1/3 of the failing systemsm is this an error? If you are only concerned about 1/3 of the problem systems, how do you prioritize which ones you provide financial assistance too?
In the appedix, you list the Farm Service Agency and the Natural Resource Conservation Service as being at 103 Airport Drive, which is incorrect. The current address for both agencies is 416 E. Airport Dr. (these agencies may have already made comments to this affect...I just noticed it, and wanted to make sure you were aware of it).
Thank you again for the opportunity to comment on this plan.

**Comments From Joplin Globe Article On January 30, 2010**
Comments From Joplin Globe Article on January 30, 2010
Story By Susan Redden

**Baron Von Dexter** writes:
Myself and friends kayak'd down spring river the views are nice and the wildlife was good to see but the river itself is very green i am from tulsa and dont have the abundent creeks and rivers like mo. does please pepole look at what you have and save it.

**Mr. Obvious** writes:
We must stop the millions of tons of poultry waste coming across our state lines. Once the waste leaves an operation(farm?) it is with all intents and purpose unregulated. Stacked outside, stored outside, spread with no setbacks, stored next to wells or streams and creeks. And the tax payer is paying to have this waste hauled. Wake up Missouri

**RUKiddingMe** writes:
When will the common sence kick in? Call DNR and ask for the reports of illegal pumping out of hog lagoons. Of course DNR never finds a proplem, wild animal-is this a joke. You have CAFOs that produce as much waste as the City of Joplin pumping there waste into the aquifer and down the streams. If you live around one of these you have dead frogs,fish,turtles, no aquatic life plus dead cranes and earless bunnies. Follow the money! These people dont care about your health.

writes:
I would be looking at Butterball plant and also the CAFO farms around the tributory springs going into Spring River. A turkey CAFO not too far from White Oak creek has ruined my stock pond due to excessive Nitrogen buildup from manure seeping into the drain that floods into my pond. All plant life, fish and turtles are gone. I have spent a lot of money trying to get the water back, put the drainage is so constant with a good rain that I cannot keep it up.

**plato** writes:
1. fence off the livestock from entering the creeks. 2. prevent offloading from municipal treatment systems. 3. pull back the septic systems furthur from the creeks.

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