Spring Branch Watershed Implementation Plan

2016

Olson Ecological Solutions LLC
www.olsonecosolutions.com

Funding for the plan was provided by Illinois Environmental Protection Agency through Section 319 of the Clean Water Act.

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Chapter 1
Spring Branch Stream Conservation Planning Effort

Written by Julie Jacobs

1.0 Introduction

Spring Branch Watershed is located in the western edge Stephenson County, Illinois, and west of Freeport, Illinois. It is a sub-watershed of Middle Yellow Creek and headwaters to Yellow Creek and the larger Pecatonica River.

The 3,927 acre Spring Branch Watershed is mostly agricultural, with the primary crops being corn and soybeans. At the time of this writing, the watershed was comprised of 56 individual farming landowners, with a small portion of the watershed held Township ownership. The western topography is rolling slopes (11%-7.5%) in the upper reaches of headwaters areas, but flattens out (6%-1%) in the eastern end, before joining the Middle Yellow Creek.

This plan was undertaken to provide the watershed and its stakeholders with an Illinois Environmental Protection Agency watershed-based plan. It was designed to include local stakeholders in the development of a comprehensive plan initiative with locally-driven watershed actions. Watershed planning is a voluntary process that proceeds in collaboration with key local interests and others.

The first chapter of this document provides an introduction to the Spring Branch Watershed planning process. This planning process includes the planning guidance used, funding sources, purpose, scope and limitations, process overview and timeline, and a list of planning participants. Chapter one is intended to provide you with a framework for the plan. The chapters that follow provide: the inventory of the area; goals and recommended projects; future scenarios if the recommended projects are completed; how to implement the projects; how to reach and educate the public; and how to evaluate and monitor success.

1.1 Conservation Planning Guidance

The Spring Branch Watershed Plan is based on input from the local landowners that took part in the planning process and an inventory of the area's natural resources. This plan is consistent with *The Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (USEPA, 2008) and current conservation planning principles for watersheds.

1.2 Funding

Funding was provided by the Illinois Environmental Protection Agency (IEPA) through Section 319 of the Clean Water Act. Many organizations donated their time and staff resources, including Blackhawk Hills Resource Conservation and Development (RC&D), Yellow Creek Watershed Partnership, Olson Ecological Solutions, JadEco Lakes and Natural Resources Consultation and Management (JadEco), USDA Natural Resources Conservation Service, Stephenson County Soil and Water Conservation District, Stephenson County Farm Bureau, and the Illinois Department of Natural Resources. Many residents of the Spring Branch Watershed donated their time and effort to serve on a planning committee or be an active part of the planning process, provide photographic documentation of the area, and collect data about the area.

1.3 Purpose

The need for this plan was initiated by efforts of Yellow Creek Watershed Partnership. This group has been working to improve the health and diversity of Yellow Creek and its watershed, of which Spring Branch is a part. In 2014 and 2015, they joined efforts with the landowners within the Spring Branch Watershed, Blackhawk Hills RC&D, Olson Ecological Solutions, and JadEco to focus on the Spring Branch, a headwater tributary to Yellow Creek listed as impaired by the IEPA. Spring Branch has been identified as not supporting aquatic life on Environmental Protection Agency's (EPA) 303(d) list, with Ammonia and Total Phosphorous listed as primary causes. This issue is best addressed locally, beginning at the headwaters, as is proposed in the Spring Branch Watershed Plan. The main beneficiaries of this plan include local stakeholders of Spring Branch Watershed and residents of Pearl City, Loran Township, and Stephenson County.

The success statement, goals, and projects and programs of this planning effort will serve as a model to increase awareness and restoration of watersheds that are primarily agricultural in the region. This plan will serve as a guide for landowners of the area to implement projects and programs, and it should be updated annually.

1.4 Scope and Limitations

The scope of this project is to address Non-point Source (NPS) pollutants which affect water quality and create a plan to improve the environment that currently does not support aquatic life. It focuses on Ammonia and Total Phosphorous from agricultural and unknown sources, identified by the EPA as causes and sources of water quality impairments.

The plan focuses on preventing pollution from getting into the stream in the first place, which is a proactive approach to managing water quality. The plan is designed to meet the needs of the landowners in addition to the needs of the area's land and water. The plan is designed to suggest reasonable options that result in a compromise that will achieve improvement to water quality and natural areas while allowing other interests to persist: mainly current uses of the land as farms. Therefore, the plan suggests very little land use change and instead recommends making smarter choices for caring for the area's land and water within the confines of current and planned land uses.

1.5 Planning Process Overview and Timeline

The process of creating a watershed plan began in the fall of 2014, when Blackhawk Hills RC&D was granted an EPA's Section 319 grant. The Planning Process included the make-up of two committees: the planning committee and the technical advisory committee. On March 11, 2015 a Spring Branch Watershed Kick-off Meeting was held to encourage involvement from the people who live and work within the watershed. All landowners were sent a formal invitation to the Kick-off Meeting. The landowners (16%) that agreed to participate in the planning process then made up the planning committee. The planning committee was empowered to make decisions and selections on water quality projects which would be included in the plan. A technical advisory committee was made up of professionals in the fields of land and water conservation, agriculture, planning and zoning, outreach and education, and other related fields. The task of the Technical Advisory Committee was to review the inventory and planning process. The Yellow Creek Watershed Partnership played an integral part of writing and gathering information for the watershed plan.

1.6 Local Involvement

Approximately one-third of the effort put forth to create the plan was spent engaging the local people in the planning process. Many individual meetings and phone conversations took place with landowners in addition to the meetings held for technical advisors and planning participants. Before any meetings took place, Joe Rush of JadEco contacted landowners within the watershed to speak individually about the plan and invited them to become involved in the planning process. The remainder of the time was spent in meetings. Participants at the meetings were residents of the watershed, consultants, township representative, and staff of Blackhawk Hills RC&D.

The planning committee met nine times and technical advisors congregated four times to weigh in on the contents of the plan. Olson Ecological Solutions LLC, JadEco, and Blackhawk Hills RC&D organized and facilitated all of the meetings. The schedule of meetings is presented in Figure 1.

Figure 1.1 – Schedule of Meetings

Date	**Group**	**Agenda**
8/21/14	Yellow Creek Watershed Partnership	Announcement that Grant was Approved and Tasks
11/20/14	Yellow Creek Watershed Partnership	Timeline and Assigned Tasks
3/11/15 3 PM & 6 PM	Landowners	Kickoff– Introduction, Recruit Landowner Participation
5/21/15	Yellow Creek Watershed Partnership Meeting	To Do List for the Watershed Plan
6/18/15 3 PM & 6 PM	Planning Committee	Explanation of Project, Committee Structure
7/22/15	Planning Committee	Committee Structure, Success Statement, Concerns and Goals
8/20/15	Yellow Creek Watershed Partnership	Update on the Plan, Plan of Work
9/17/15	Planning Committee	Leadership, Revise Success Statement, Goals and Objectives
11/19/15	Yellow Creek Watershed Partnership Meeting	Update on the Spring Branch Watershed Plan Initiative
11/19/15	Planning Committee	Selected Goals and Objectives, Volunteer Time
1/7/16	Planning Committee	Committee Leadership, Projects and Practices for each Campaign
1/14/16	Planning Committee	Monitoring and Evaluation, Education and Outreach
2/3/16	Technical Advisory	Purpose, Inventory
2/15/16	Planning Committee	"Truth" Land Cover, Scheduling of Proposed implementation Projects Practices
2/18/16	Technical Advisory	Success Statement, Goals, and Objectives
3/3/16	Technical Advisory	Recommended Projects and Programs, Implementation Plan
3/10/16	Planning Committee	Goals and Objectives Recommendations from Technical Advisory,
3/17/16	Technical Advisory	Education, Outreach and Awareness, Monitoring Plan
3/31/16	Planning Committee	Review Updated Goals and Objectives, Review Updated Education and Outreach Opportunities, Next Step

1.7 Watershed Inventory

As we were involving the local people in the planning process, an inventory of the watershed was completed using available data. Chapter two of this plan explains the inventory in detail. In April 2015, the EPA reviewed a draft *Spring Branch Sub-Watershed Inventory*. In the winter of 2016, new data was gathered, including an on-the-ground assessment of streambank erosion and a survey of farming practices to verify recorded land uses.

1.8 Watershed Plan

During early planning meetings, planning participants shared their concerns and found common ground in their desire to improve the water quality of Spring Branch. They adopted a success statement and goals to accomplish this. Participants determined which projects and programs should be included in the plan, and which should be given priority. After these elements of the plan had been decided, Rebecca Olson, Nathan Hill, and Shannon Thruman of Olson Ecological Solutions and Joe Rush of JadEco drafted the plan to further develop these projects.

1.9 Watershed Planning Participants

Many people participated in the watershed planning effort, including landowners and working farmers; and representatives from federal, state, and local environmental and planning organizations. We would like to acknowledge the following individuals for their dedication to the planning effort.

Planning Committee Members:

1. Jim Endress,
   Chairman and Landowner
2. Doug Block, Landowner
3. Chad Bremmer, Landowner
4. Ross Bremmer, Landowner
5. Kristine Dinderman, Logo Designer
6. Marvin Edler, Loran Township Supervisor
7. Vince Edler, Landowner
8. William Kloepping, Landowner
9. Mike Plager, Landowner

Yellow Creek Watershed Partnership Members:

1. Lee Butler
2. Joe Ginger
3. Jack Carey
4. Roger Carson
5. John Edler
6. Stan Slachetka
7. Steve Spudich
8. Mike Malon

Technical Advisory Committee:

1. Stephen Simpson, Highland Community College
2. Karen Rivera, Illinois Department of Natural Resources
3. Nancy Williamson, Illinois Department of Natural Resources
4. Michael Malon, Jo Daviess County Soil and Water Conservation District
5. Kerry Leigh, Natural Land Institute
6. Bruce Johnson, Stephenson County Farm Bureau
7. Jim Ritterbusch, USDA-Natural Resources Conservation Service
8. Jim Dykema, USDA-Natural Resources Conservation Service
9. Terry Kerchner, USDA-Natural Resources Conservation Service
10. Matt Wagner, Wagner Consulting

Consultants and Staff:

1. Andrew Shaw, Blackhawk Hills RC&D
2. Julie Jacobs, Blackhawk Hills RC&D
3. Joe Rush, JadEco Natural Resources Consultant and Management
4. Rebecca Olson, Olson Ecological Solutions
5. Shannon Thruman, Olson Ecological Solutions
6. Nathan Hill, Olson Ecological Solutions

Chapter 2
Watershed Inventory

2.0 Introduction

This is a plan to keep the soil and key farm inputs where they serve best. This plan is to improve water quality, encourage wildlife and protect a way of life. As each watershed is different, the demographics, the footprint and the natural characteristics, in each plan and its goals and projects within are also different. The next planning principle for the watershed is to document Spring Branch's current inventory.

This chapter contains information about the current state of the watershed. It includes: 1) boundaries, 2) soil characteristics, 3) topography, 4) geology, 5) climate, 6) demographics, 7) stream bank characteristics and assessment, 8) past reports on the streams, and 7) general information on phosphorus and ammonia in the waterways.

This knowledge, applied to each specific project in chapter 4, increases the long-term success of the chosen best management practice (BMP) to reduce nutrient and sediment loading in the water.

The watershed plan is to help those who live and work in the watershed (stakeholders), voluntarily set goals and objectives to reduce the nutrient and sediment loading in the creek. Once excessive nutrients and/or sediment get into the creek, it's pollution. Though point source discharge into waterbodies is regulated by the EPA, any non-point source (NPS) of pollution, is not. Point-source discharge is essentially any discharge easy to recognize the source, a pipe from an industrial plant, a sewage treatment plant for example. Non-point source is run-off from a number of diffuse sources carried by rainfall or ground water. NPS includes but is not limited to excess fertilizer, sediment from construction or streambanks, salt, acid, and/or bacteria.

Figure 2.0- Hydrologic Unit Code System

Each watershed in the United States is given a code, from the Hydrologic Unit Code system. The HUC system organizes drainage systems (or watersheds) by very large numeric numbers. Once representative numbers a code is understood, the large number becomes easier to read. The Mississippi River Watershed is "07"; the Rock River, "09," and is a smaller watershed in the Mississippi. The Rock River has the number "07" at the start of its HUC 0709, and so on (See below.) The smallest division of a watershed is a 12 digit number. The Middle Yellow Creek is HUC 070900031304, which is not yet enough numbers to include this watershed, the Spring Branch Watershed. The Middle Yellow Creek is approximately 17,500 acres. The HUC number identifies the greater basins (watersheds) that Middle Yellow Creek is a part of, as follows:

HUC-12 for Middle Yellow Creek

"0709"	The Rock River of the Mississippi
"07090003"	Pecatonica River
"0709000313"	Yellow Creek
"070900031304"	Middle Yellow Creek

2.1 Spring Branch Watershed Boundaries

2.1.1 Location of Watershed

The Spring Branch Watershed is located on the western edge of Stephenson County, Illinois, just south of Pearl City and west of the larger town of Freeport. It is a sub-watershed and headwater to the Yellow Creek which is a watershed in the Pecatonica River watershed. See Figure2-1 for location map.

Spring Branch is 6.14 square miles and is considered a sub-watershed, because it is small. It is part of the 805-square-mile Pecatonica River watershed. Currently the Pecatonica River watershed is listed with the Environmental Protection Agency as an "impaired water." Impaired water is a specific term from the Clean Water Act and is defined as rivers, lakes or streams that do not meet one or more of the water quality standards and are considered too polluted for their intended uses. The Spring Branch is currently listed as "impaired" for total ammonia and total phosphorus and does not meet its intended use for aquatic life.

Because of the Pecatonica River impaired listing, the EPA requires a Total Maximum Daily Load (TMDL) and Load Reduction Strategies (LRS) Report. A TMDL and LRS are basically "pollution budgets" for the impaired water. The Pecatonica River Watershed (in Illinois) is divided into 12 segments, four were determined to need more data collection in the Stage 1 TMDL Report. One of the four, is Spring Branch. At the time of this inventory the TMDL was completed through Stage 2. Stage 3 has not yet been completed. But the Stage 2 report shows that Spring Branch can be recommended for delisting for total ammonia and an LRS should be conducted for total phosphorus (Tetra Tech 2014).

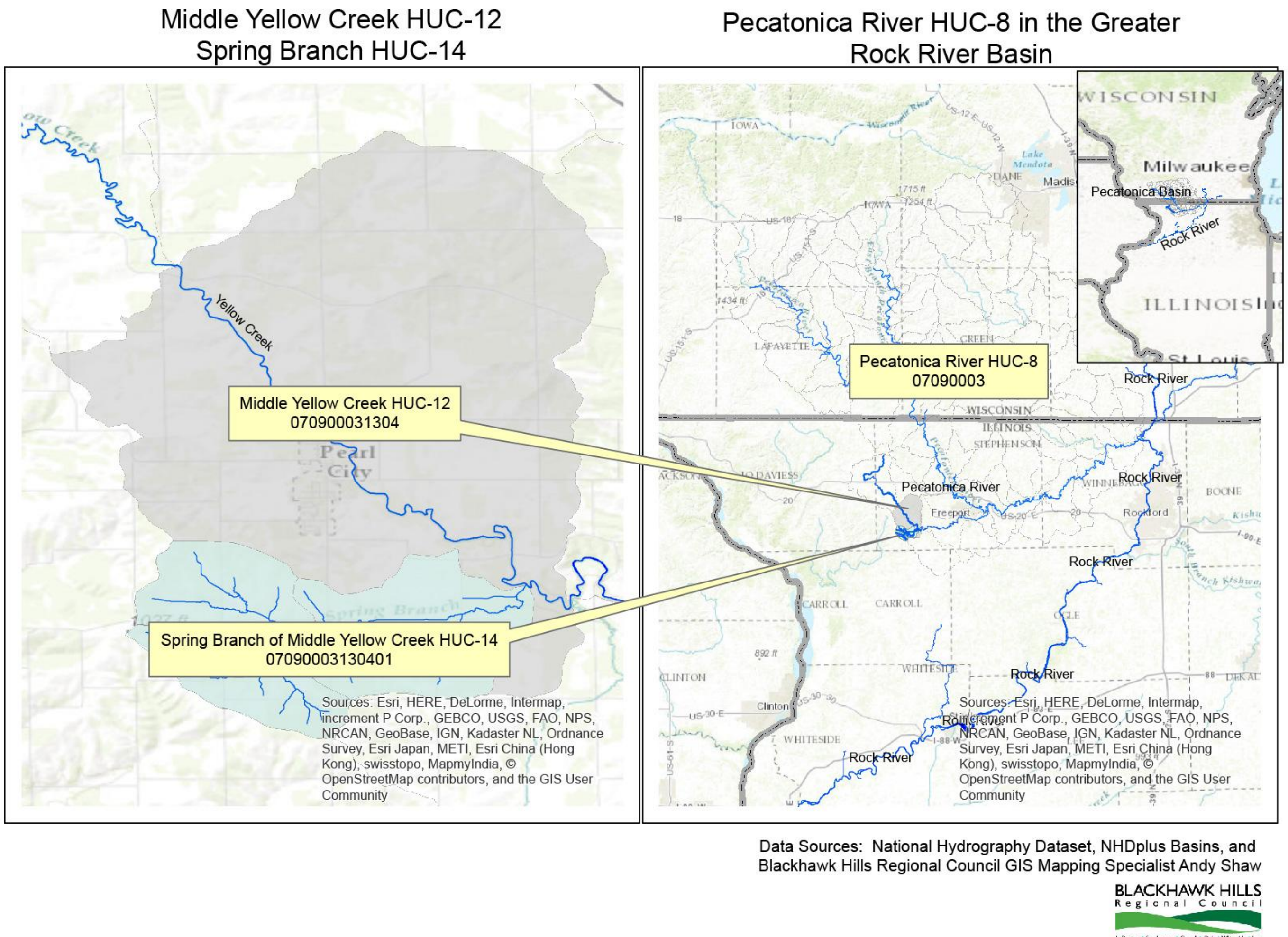


Figure 2-1 Location map of Spring Branch Watershed

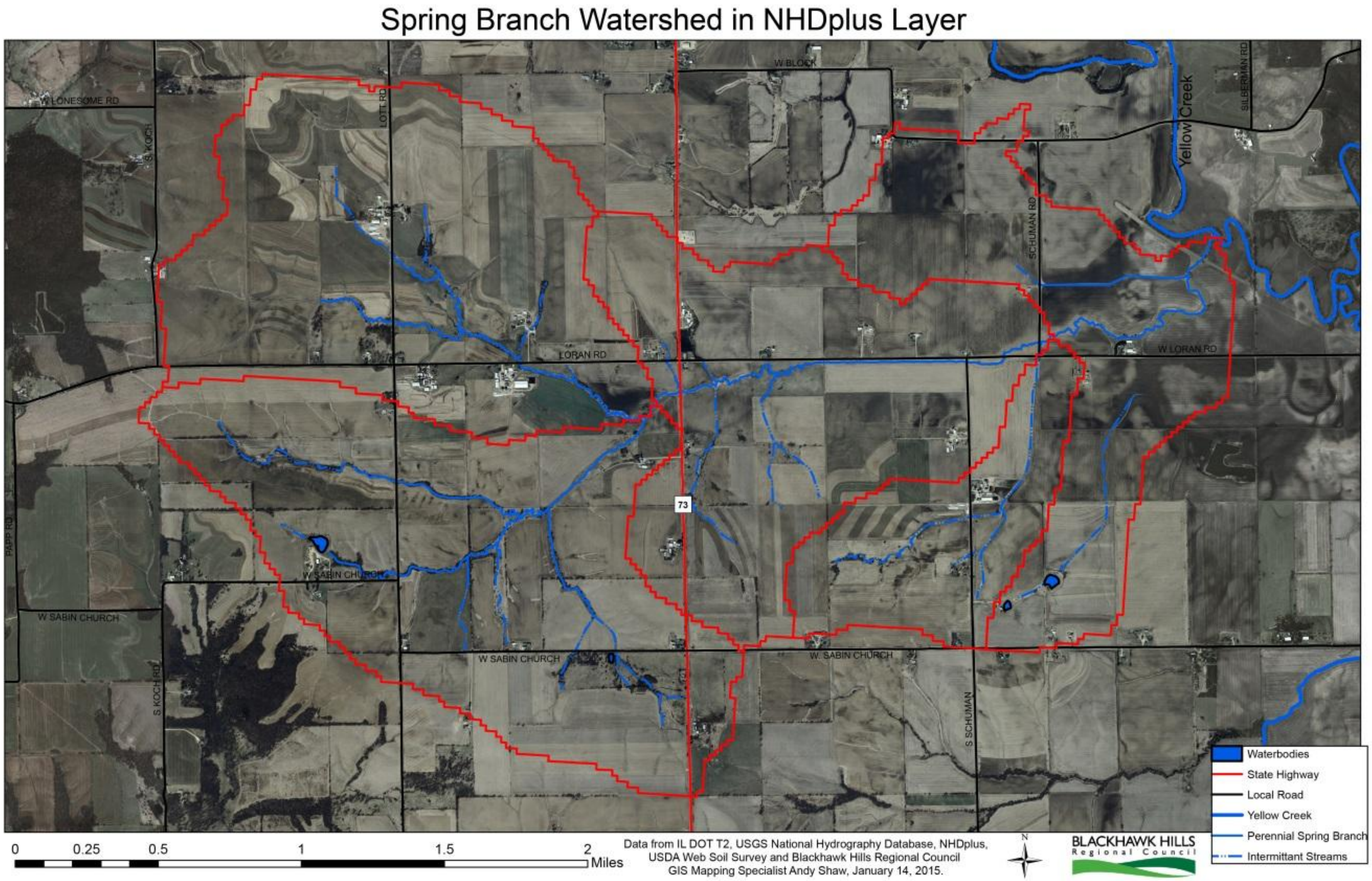


Figure 2-2 Spring Branch Watershed boundaries

2.1.2 Watershed Size

The Spring Branch Watershed is 3,927 acres in size, or 6.14 square miles. This is a rural watershed with a relatively small population. It is not small in that watersheds are any and every size as demonstrated in explaining HUC codes on page 2. There are a total of 56 landowners in this watershed (see *2.5 Demographics* on page 25 for more detailed information on the population of the watershed). By contrast, the Mississippi watershed is 40% of the U.S. and has 70,000,000 people in its watershed.

2.1.3 Geographic Boundaries

Watershed boundaries for the Spring Branch are delineated in Figure 2-2(above). A watershed is the area of land where all the streams and rainfall flow down into a particular stream.

2.1.4 Connectivity and Water Flow of Streams

The watershed was divided into 3 sections as illustrated in Figure 2- 3. The most easterly and nearest to its confluence with Yellow Creek was dubbed "Lower Spring Branch," which has 1871 of 3927 acres or about 48% of the total Spring Branch basin. Spring Branch has two major forks dividing its upper, or westerly reaches. The "Upper Spring Branch" segment (1060 of 3927 acres or about 27% of total area) was identified as the segment that continued to carry the name, above the fork, of Spring Branch in the National Hydrography Database (NHD). The other fork that was unnamed was dubbed "North Fork" to distinguish it for further analysis, and had 996 of 3927 acres or about 25% of total area.

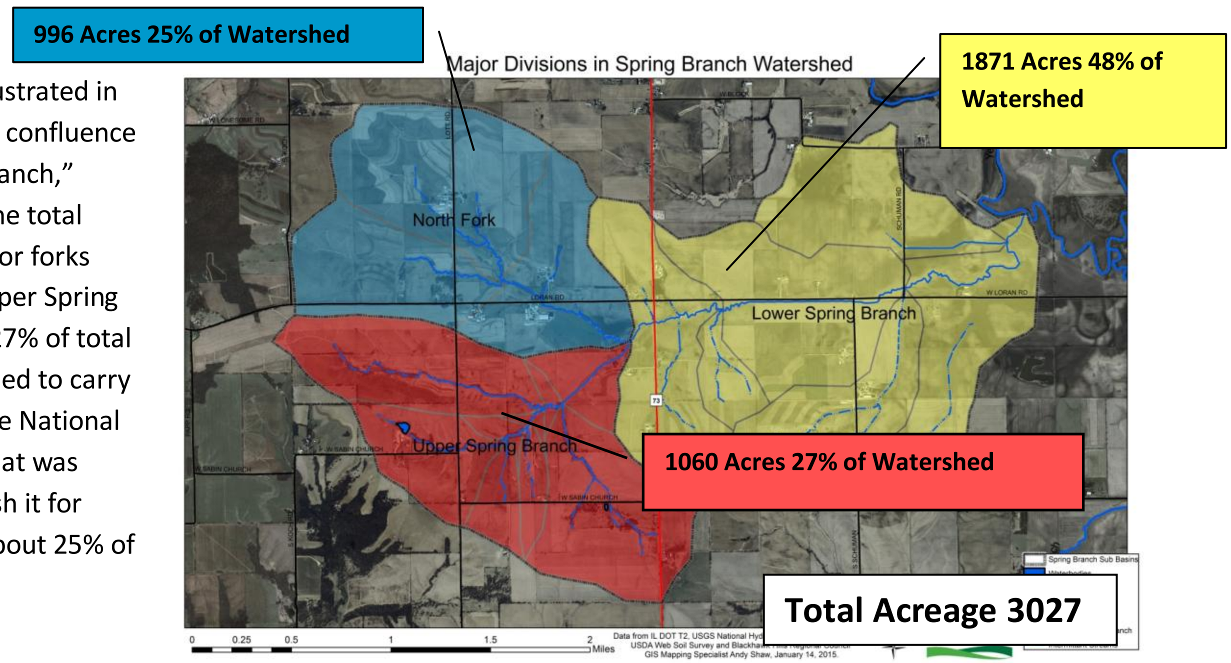


Figure 2-3 Major Divisions in Spring Branch Watershed

2.1.5 Locations of Waterbodies

There are four small water impoundments (ponds) visually identified from 2011 imagery. Two are in intermittent upper reaches of Upper Spring Branch (1.35 acre and .27 acre) and there are two in intermittent upper reaches of Lower Spring Branch (.98 acre and .35 acre).

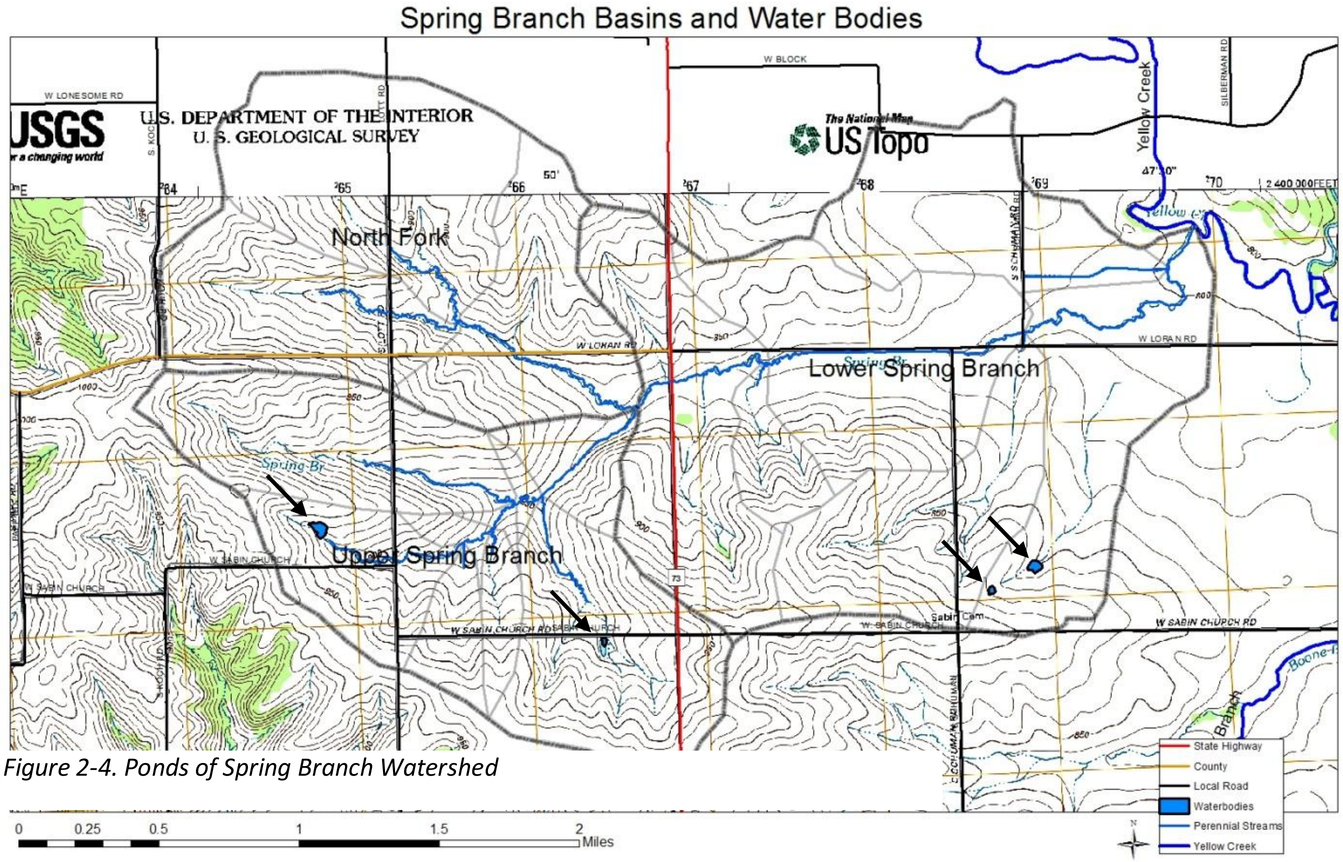


Figure 2-4. Ponds of Spring Branch Watershed

2.1.6 Topography

The topography of the Spring Branch Watershed is rolling in the upper reaches and flatter toward the perennial tributaries and the lower part of the watershed. Topography can be seen from the US Topo overlay map in Figure2-4, while analysis from the later soils inventory found that about 24% of Spring Branch is in areas with slope of less than or equal to 1%. Another 27% has slope between 3 and 6%. 46% has 7.5% slopes and 3.33% has slopes between 8 and 11%. The areas of greatest slope and topography are those in the furthest reaches of the stream network, and furthest up each stream branch from the Yellow Creek confluence with Spring Branch.

The highest elevation in the watershed is 1,020 feet above mean sea level in the northwest corner of the watershed, and the lowest elevation is 840 feet above mean sea level at the confluence of the Spring Branch and Yellow Creek. The upper reaches of the creek become perennial streams at an elevation of approximately 900 feet above mean sea level. These forks meet at 850 feet, and the main stem of the Spring Branch is relatively flat until it reaches the confluence of the Yellow Creek at 840 feet above mean sea level.

2.1.7 Water Flow through the Watershed

Water flow through the watershed appears to be primarily through the surface stream network seen from aerial photography. This aerial photography was taken in the spring leaf-off period (March/April) that also coincides with periods of high water flow. The flatter area of topography nearest to the Yellow Creek confluence sees areas of saturation that seem to identify both historic channels that the creeks have abandoned, and also areas of saturated flow in a seasonally high water table. A close up of the confluence is illustrated in Figure 2-5.

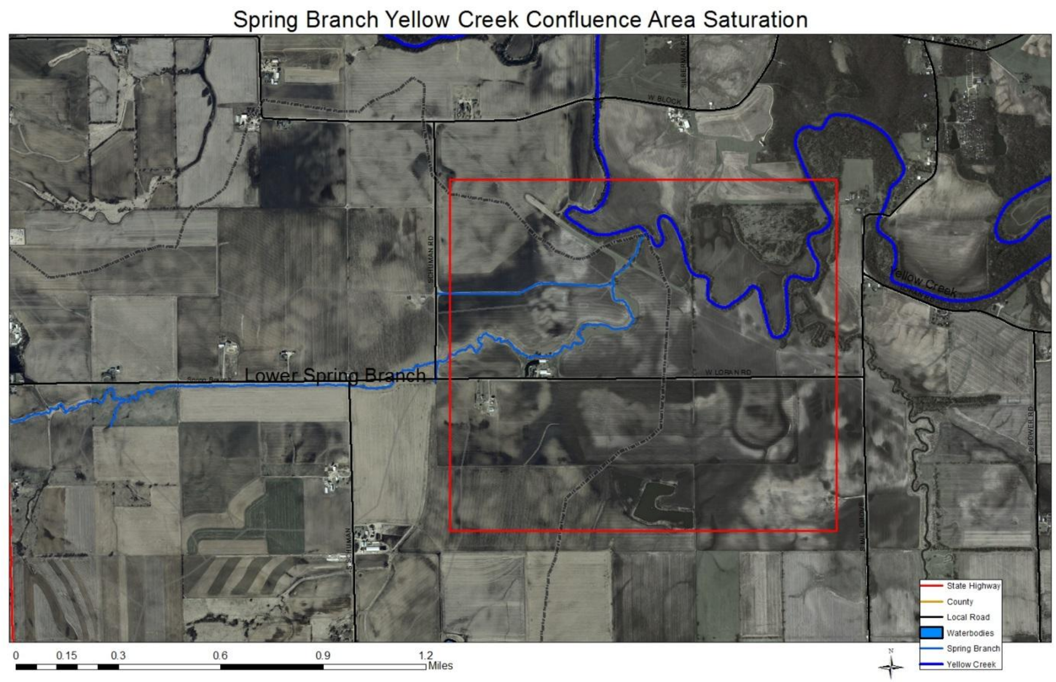


Figure 2-5 Spring Branch. Yellow Creek confluence area saturation.

2.2 Geology and Climate

2.2.1 Geology

The geologic features of the Spring Branch watershed are unusual for Illinois due to the near absence of glacial till, which in most of the state is tens to hundreds of feet thick. In the SW portion of Stephenson County, the till is generally less than 5 feet thick, consisting of the Glasford formation deposited during the Illinoisian glacial advance (200,000-130,000 years bp.) This region is near the western limit of the Illinoisian advance, with the margin of glacial deposits located less than 10 miles west of Pearl City on the Surficial Geology map of Jo Daviess Co. (Riggs, 2000.) A 1-2 ft. mantle of Peoria loess tops the till in a few locations, but in some steeply sloping areas of the watershed, the bedrock is only covered by a thin layer of soil derived from weathering of the underlying shale.

Because of the relative lack of surficial glacial deposits in the watershed, bedrock geology exerts a very large influence on the hydrology and determines the locations of springs and seeps that feed the Spring Branch. A great number of these groundwater discharge sites are located along the contact between the Mosalem formation of the Silurian aged Alexandrian series and the underlying Maquoketa Group of late Ordovician age. The contact between the two is a regional unconformity and forms a prominent hydrogeological barrier, resulting in a perched aquifer in the Silurian rocks.

Because of the relative lack of surficial glacial deposits in the watershed, bedrock geology exerts a very large influence on the hydrology and determines the locations of springs and seeps that feed the Spring Branch.

While the geologic map of Illinois shows the Galena Dolostone as the bedrock underlying the lowermost mile or so of Spring Branch, just before the confluence with Yellow Creek, this map may be in error as numerous locations along Yellow Creek at Hideaway Park, just a half-mile downstream from the confluence with Spring Branch, show Maquoketa Shale at creek level and in the creekbed (Simpson, 2014, Personal observations.) Therefore, there are just two bedrock units forming the bedrock of the watershed: the Maquoketa shale underlying most of the lower elevations, with the Mosalem formation making up the ridges with elevations above 850 to 900 feet.

The Maquoketa shale is predominantly a clay shale unit with thin beds of limestone and dolostone. It was formed from mud (clay) washed into the shallow epieric sea that covered the central North American continent during the late Ordovician Tippicanoe I transgression. The source of the clay was weathering of volcanic rocks in the growing Taconian Mountain range in what is now Pennsylvania and New York State. The thin carbonate layers represent periods where changing ocean currents or climate fluctuations decreased the amount of clay being carried into Illinois, allowing limestone-producing organisms to flourish in the clear water (Kolata, 2010.) The dense clay that makes up the bulk of the Maquoketa shale, often called "blue clay" in well logs, is nearly impermeable to groundwater.

The contact between the Niagara and the Maquoketa is at an elevation of 850 to 900 feet in the watershed, dipping toward the southwest. There are several tens of feet of relief along this disconformity, as it represents an extensive period of erosion while the area was above sea level during the regression separating the Tippicanoe 1 and Tippicanoe II transgressions. Above the disconformity, the shaly limestone (later dolomitized) of the Silurian Mosalem formation was deposited in clear, shallow water as the Tippicanoe transgression once again inundated the central portion of North America. For those unfamiliar with the rock "dolostone," it is a type of limestone that has been altered by the replacement of some of the calcium in the original calcite by magnesium as Mg rich solutions seeped through the rock sometime after original deposition. While there are no good surface exposures of the Mosalem in the watershed, the characteristics of this bedrock unit can be seen at two locations less than a mile outside the basin. One is in a small quarry just north of Sabin Church road, about 1,500 feet east of the bend where S. Koch Rd. intersects Sabin Church. The other locality is on the west side of IL. Rt. 73 at the south edge of Pearl City, where the road goes through a deep cut in the Mosalem. A both locations the rock can be seen as thinly bedded dolostone with very thin (5-20 mm) shale separations. At the Rte. 73 location, the extensive fracturing and jointing of the unit, along with some evidence of solution cavities, can also be observed. These features are some of the characteristics that make this unit a good aquifer, and the solution cavities show the susceptibility of this unit to the development of karst features.

Due to the contrast in permeability between the shale and the overlying dolostone, springs and seeps are common along the contact. The local abundance of these springs is probably the reason for the name of the creek, and is responsible for the stenothermal property of the creek water. Some of the larger volume springs may represent discharge points for small cave systems, though none large enough for human exploration has been found in the watershed.

2.2.2 Climate

The climate of this region has four distinct seasons. It is an especially important factor to the crop producers in the area. Climactic factors included are precipitation, snow and ice cover, temperature, wind speed, and evaporation.

Precipitation

Average precipitation in the Spring Branch Watershed and the rest of the Pecatonica River Assessment Area vary from year to year with the highest averages occurring over the past 20 years. Trends over the past 60 years show significant increases, while the same data only amounts to slight increases when considering the past 100 years (IDNR, 2001). On average, the watershed and the rest of northern Illinois receives from 32 (ISWS, 2005 to 2013) to 40 inches of precipitation annually and is subject to droughts, major prolonged wet periods, and flash floods that drop four to eight inches of rainfall in a few hours in localized areas. There are on average 117 days of measurable precipitation, including, on average, eight days with one inch or more of rainfall and 12 days on average with one inch or more of snowfall. Once per year on average, the area may experience a snowfall of six inches or more. The average annual snowfall is 35 inches (ISWS, 2005 to 2013). April, May and June are typically the wettest months and January and February are the driest (ISWS, 2013). Of the annual average rainfall, 65% (38 inches) usually falls April through September (ISWS, 2005 to 2013). Thunderstorms account for about 50 - 60% of the precipitation, half of which occur between June and August (ISWS, 2013). Typically, snow storms that release one inch or greater of snowfall occur between November 20 and March 26 (ISWS, 2013).

Average precipitation varies from year to year with the highest averages occurring over the past 20 years. Trends over the past 60 years show significant increases, while the same data only amounts to slight increases when considering the past 100 years (IDNR, 2001).

Temperature

Average annual temperatures in the watershed are 49°F. Average winters see highs in the 30s and lows in the teens, with an average of 142 days at or below 32°F and 16 days at or below 0°F. Average summers have highs in the 80s and lows in the 60s with 24 days at or above 90°F and one day over 100°F occurring about every other year. Spring and fall have moderate temperatures, with spring highs around 57°F and lows of 36°F and fall highs of 60°F and lows of 40°F. The average length of the frost-free growing season is 165 days. The last occurrence of 32°F in the spring is on average April 28 and the first occurrence of this temperature in the fall is on average October 7 (ISWS).

2.3 Soils

2.3.1 Major Soil Types in Spring Branch

Soil types within the Spring Branch Watershed are dominated by Osco silt loam (86) and Ashdale silt loam (411). Together, these two soil types make up 48% of the soils within the watershed. The other 52% of soils consist of mostly silt loams, including Radford (8074), Muscatune (51), Parkway (686), and Nasset (731) silt loams. All of these soil types are considered prime farmland, although some need to be drained and some are soils of statewide importance based on their slope. Osco and Ashdale silt loams are well drained soils located in the upper reaches of the watershed that were formed on ground moraines. The parent material of Osco is loess and of Ashdale is loess over residuum derived from limestone. Table 2-1 lists all soil types and acreages in the watershed.

Table 2-1 Soil types in the watershed.

Map Unit	Acres
Ashdale silt loam	716.82
Assumption silt loam	29.3
Atterberry silt loam	45.23
Batavia silt loam	31.44
Birkbeck silt loam	16.29
Dodgeville silt loam	94.16
Dorchester silt loam	4.75
Dubuque silt loam	4.35
Edgington silt loam*	3.72
Elburn silt loam	5.09
Fayette silt loam	6.32
Greenbush silt loam	165.59
Harpster silty clay*	4.55
Harvard silt loam	0.77
Hitt silt loam	119.04
Huntsville silt loam	15.1
Keltner silt loam	46.25
Lawson silt loam	31

Map Unit	Acres
Massbach silt loam	20.12
Muscatune silt loam	237.29
Nasset silt loam	209.81
Oneco silt loam	0.01
Osco silt loam	1329.94
Palsgrove silt loam	5.15
Parkway silt loam	221.6
Plano silt loam	31.64
Proctor silt loam	0.37
Radford silt loam	260.42
Sable silty clay loam*	226.39
Sawmill silty clay*	7.81
Schapville silt loam	30.14
Shullsburg silt loam	1.36
Virgil silt loam	4.1
Water	0.87
Sum	**3926.79**

**hydric soils*

2.3.2 Soil Texture

Soil texture in the watershed is relatively homogenous, with 94% Silt Loam and 6% Silty Clay Loam, defined by their percentage of sand, silt, and clay. Figure 2-6 indicates the locations of the Silt Loam (pink) and Silty Clay Loam (green) and provides a comparison of the amount of acreage in the watershed per soil texture and acres and percent of the watershed for Silt Loam and Silty Clay Loam soil textures.

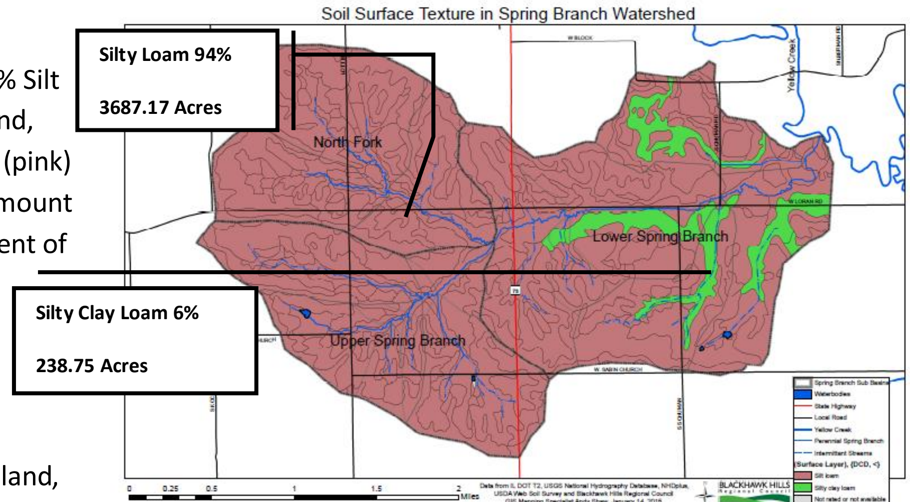


Figure 2-6. Soil surface texture and acreage in Spring Branch Watershed

2.3.3 Farmland Quality

Thirty-nine percent of the watershed is classified as Prime Farmland, with another seven percent as Prime Farmland contingent on if the land is drainage improved by tile, which is very likely, for a total of 46% Prime and 54% as Farmland of Statewide Importance. Essentially all of Spring Branch is very important and valuable farmland. Figure 2-7 locates farmland types in the watershed, and provides acreage and percentage of the watershed in each farmland type.

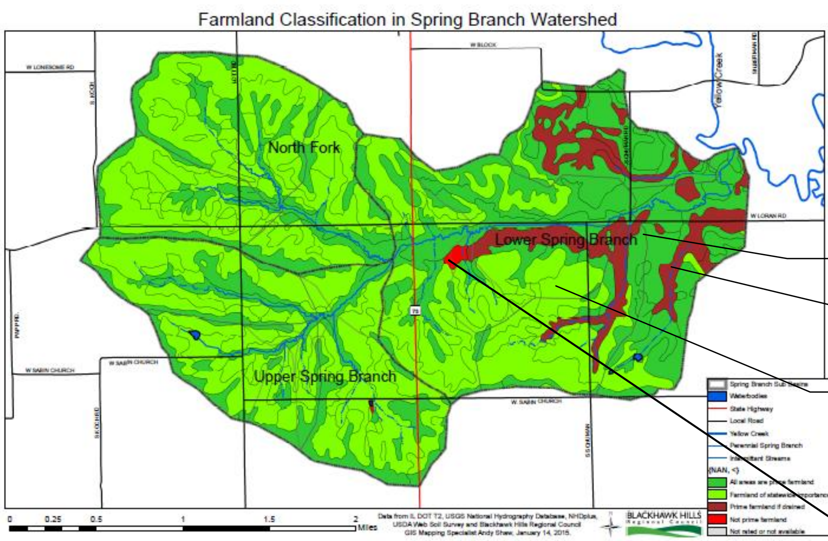


Figure 2-7. Farmland classification and acreages in Spring Branch watershed.

2.3.4 Representative Slope

Slope is another important factor in slowing erosion. Almost half of the watershed (46%) has a slope of 7.5 percent. About another quarter of the watershed (27%) has a slope between three and six percent, and the other quarter (24%) is in areas with slope of less than or equal to one percent. The remaining 3.33 percent of the watershed has the greatest slopes between eight and 11 percent. Figure 2-8 shows the locations of the lands with various slopes, a representation of the acreage and percent of the watershed by slope.

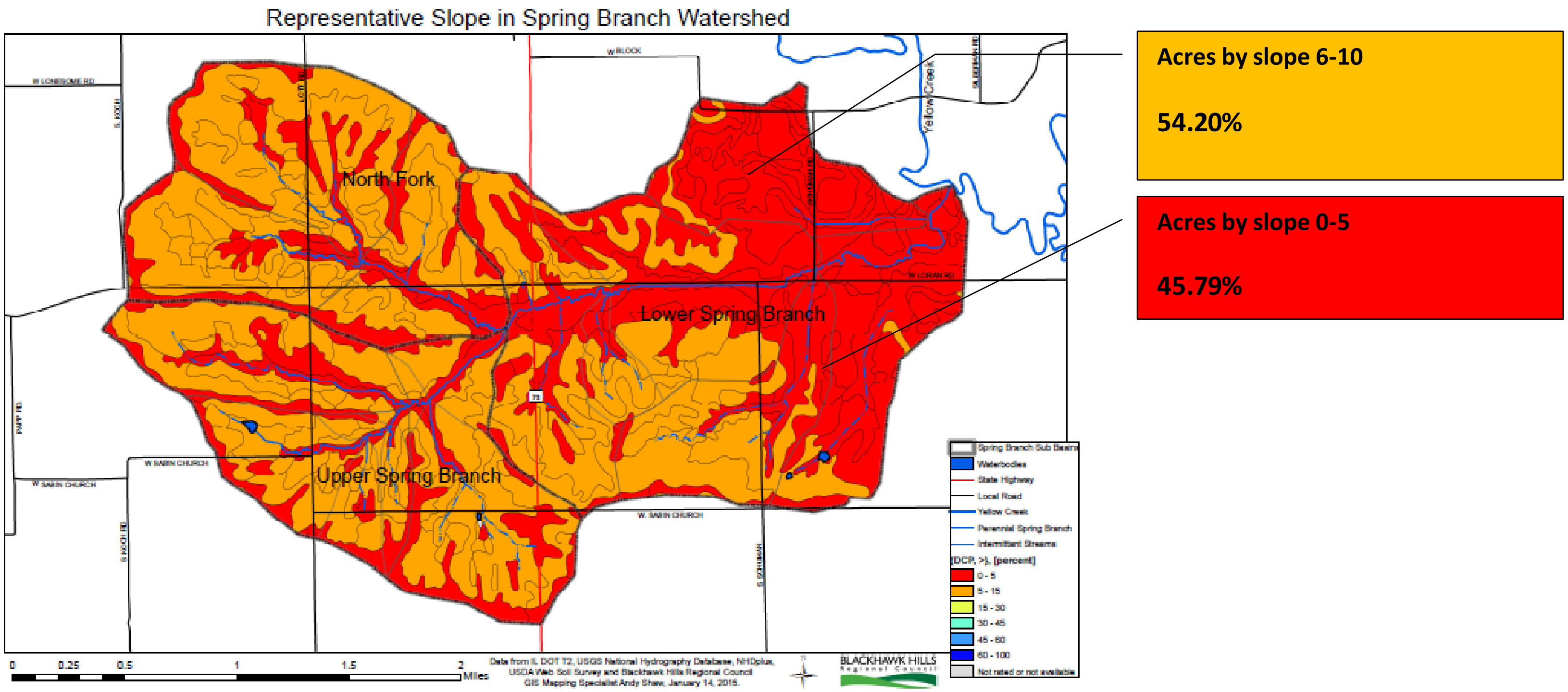


Figure 2-8. Representative slope in Spring Branch Watershed

2.3.5 Hydric Soils

Hydric soils are poorly drained soils associated with wet prairies, forested floodplains, and wetlands and are prone to flooding or wet conditions if they are not drained (NRCS, 2013). In the watershed, predominantly hydric soils comprise 6.17% of the soils. They are mostly located in the floodplains and major drainage areas, although there are a few isolated areas in shallow depressions on terraces as illustrated in Figure 2-11 and further explained in Figure 2-12. Hydric soil types in the watershed include Harpster silty clay loam (67A), Sable silty clay loam (68A), Edgington silt loam (272A), and Sawmill silty clay loam (1107A). There are 226 acres of Sable silty clay loam in the watershed, while there are only traces of the other hydric soils adding up to 16 acres (See Figure 2-9).

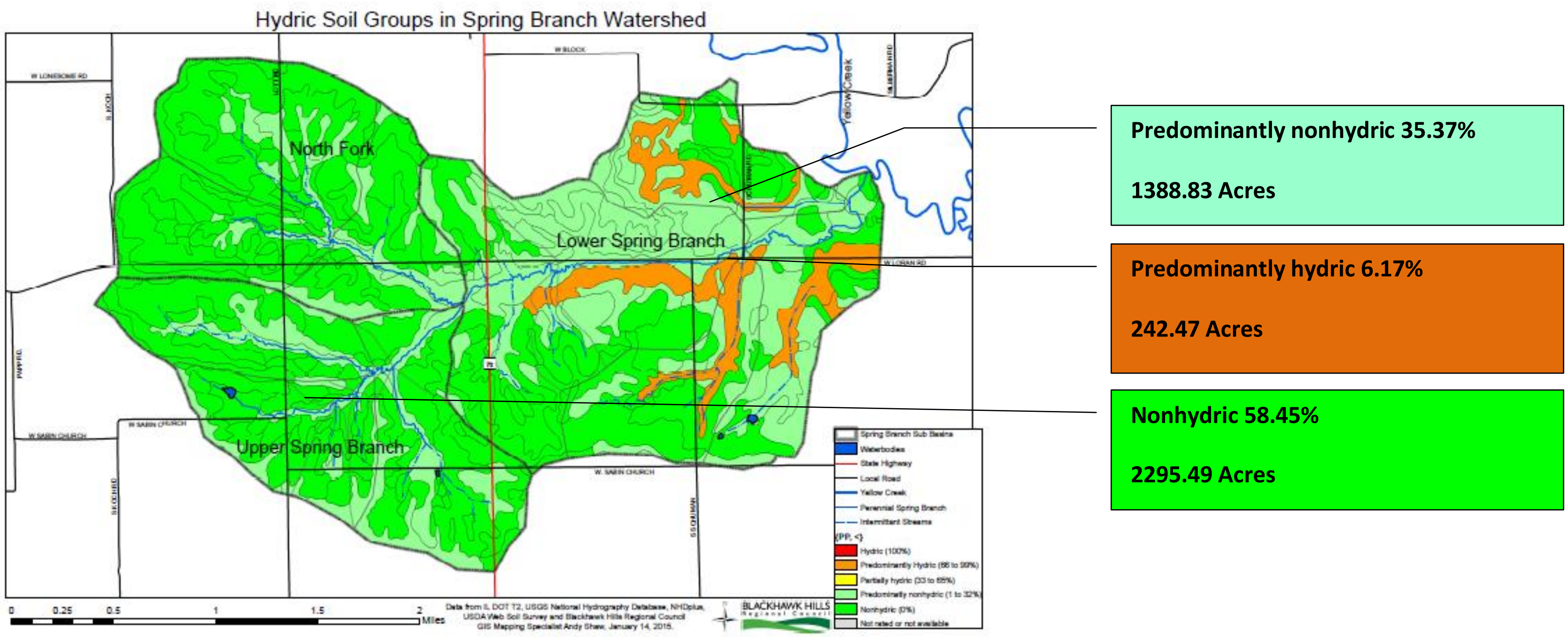


Figure 2-9. Hydric soil groups in Spring Branch Watershed.

In Figure 2-11, predominantly hydric soils (66-99% percent of the soils are hydric) are colored orange, and soils that are either nonhydric (0%) or predominantly nonhydric (33-66%) are colored dark and light green, respectively. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform.

2.3.6 Hydrological Soil Groups and Water Transmission in Spring Branch

Hydrological Soil Groups (HSG) tell us about the runoff potential and infiltration rate of soils. Soils are assigned to group A, B, C, or D or dual class A/D, B/D, or C/D based on estimates of runoff potential (according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from storms of long duration). These rankings take into consideration texture, permeability, and level of drainage.

Table 2-2 Hydrological Soil Groups

Hydrological Group	Transmission Qualities	Acres by Hydrological Group	Percent
B	Moderate (.15-.30 in/hr)	2755.6	70.17%
B/D	If Drained Moderate (.15-.30 in/hr), Undrained Very Low (0-.05 in/hr)	821.88	20.93%
C	Low (.05-.15 in/hr)	343.37	8.74%
C/D	If Drained Low (.05-.15 in/hr), Undrained Very Low (0-.05 in/hr)	3.72	0.09%
D	Very Low (0-.05 in/hr)	1.36	0.03%
Water	_	0.87	0.02%
Sum		**3926.79**	

If a soil is naturally in Group D but has been drained, it is assigned to a dual class; the first letter is for drained areas and the second is for undrained areas. Most of the soils in the watershed (70%) are in HSG B, which means that they have a moderate infiltration rate and runoff potential when thoroughly wet. Another nine percent of the soils are in HSG C with a slow infiltration rate and high runoff potential. Of the soils that would be in HSG D in a natural state, with a very slow infiltration rate and high runoff potential, 21% are in HSG B/D and follow the streams and grassed waterways, and very small fractions are in HSG C/D and D. HSGs and acreages are located in Figure 2-10. The drainage of each group is defined below in Table 2-2.

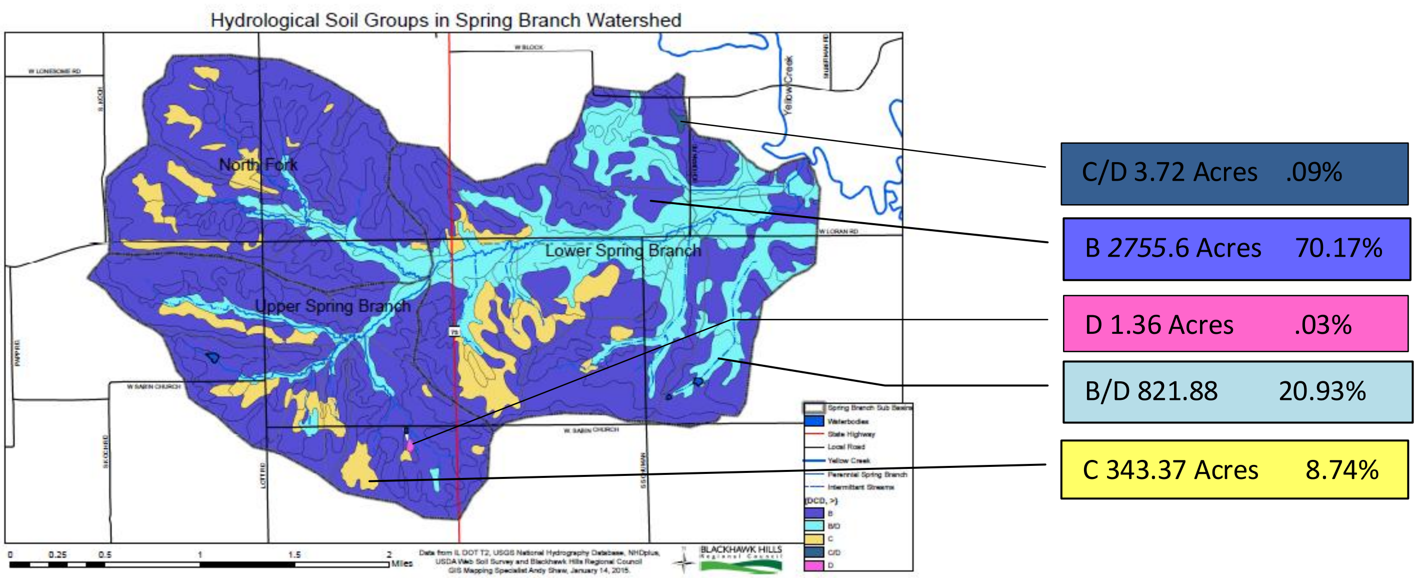
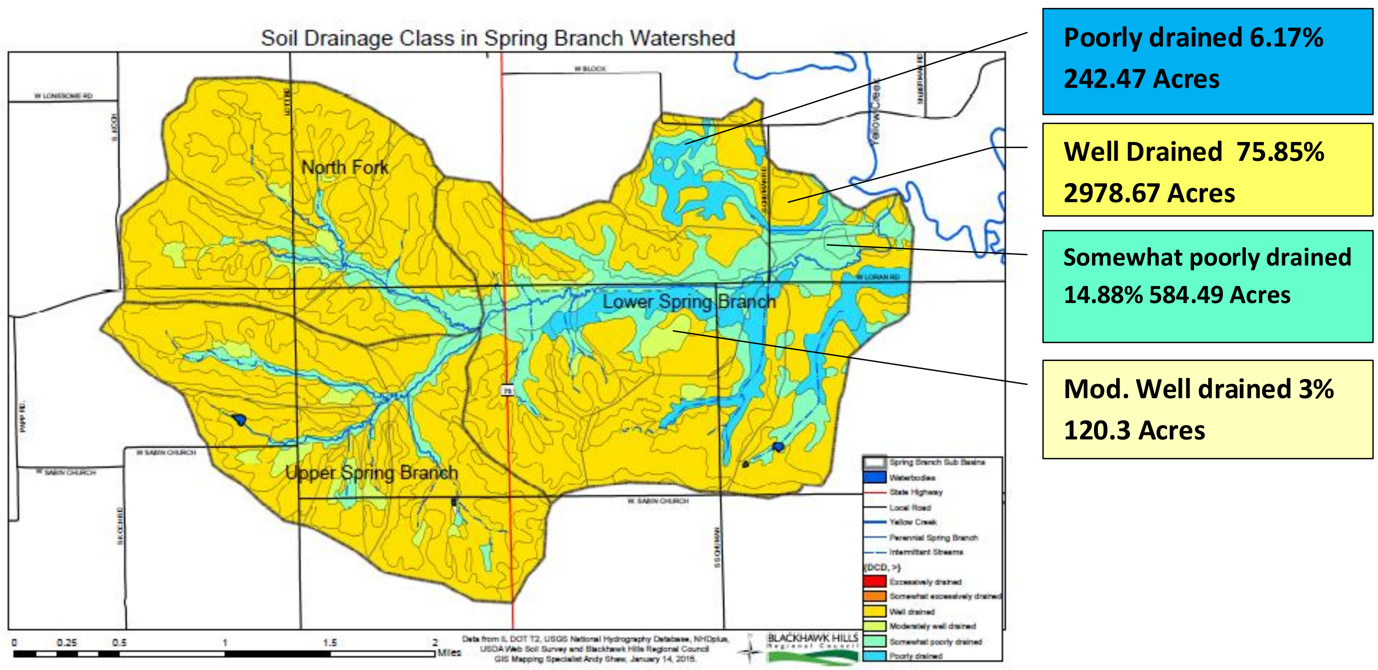


Figure 2-10. Hydric soil groups in Spring Branch Watershed.

2.3.7 Soil Drainage Class

Most of the soils in the watershed (76%) are well drained, which supports why this area is an important agricultural region. These drainage classes are based on the soils in their natural conditions and do not consider human alterations like drainage or irrigation (unless they have significantly changed the morphology of the soil). Figure 18 indicates the locations of soils of various drainage classes in the watershed. In addition to well-drained soils (dark yellow), there are also moderately well drained soils (light yellow) in the uplands and somewhat poorly drained (green) and poorly drained (blue) soils bordering the streams. Figure 2-11 indicates the acreage in each drainage class and percent of the watershed.

Figure 2-11 Soil Drainage Class Map



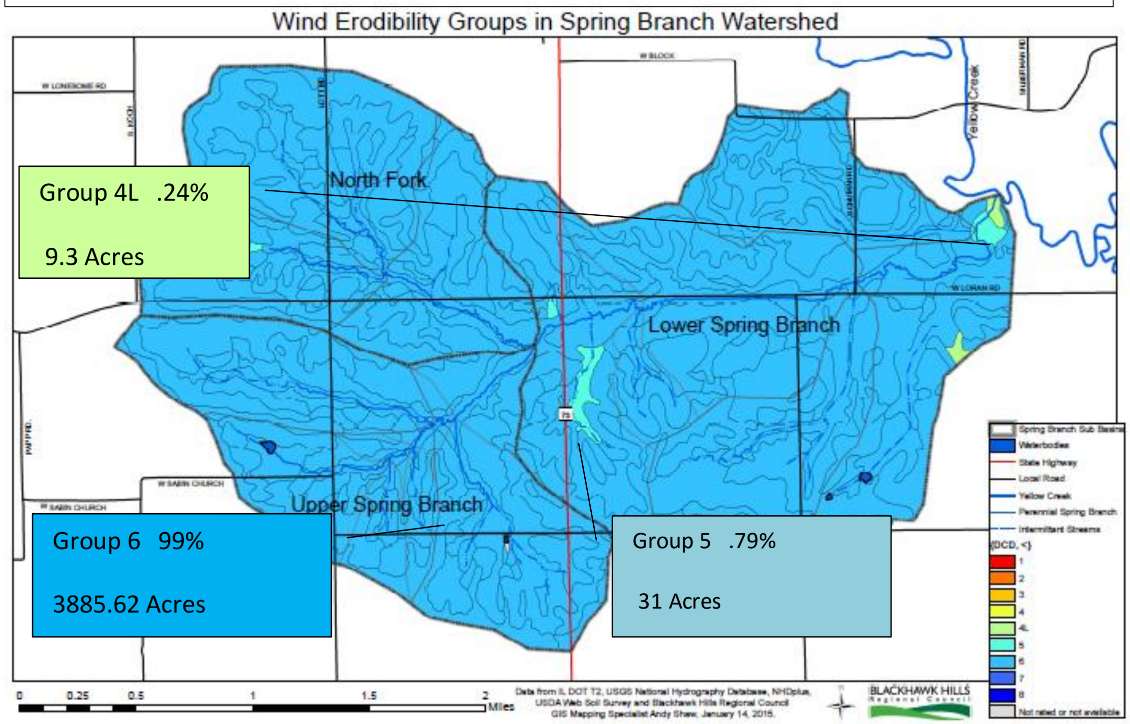
2.3.8 Soil Erodibility

Soil erodibility can be measured according to erosion by water, wind, or tolerance of soil loss on cropland. Soil erodibility by water is determined using tools such as Highly Erodible Land (HEL) values and soil erosivity (Kw) values and wind erodibility group (WEG).

Land is HEL if the erodibility index of a soil map unit is greater than eight (8). Soil erosivity (Kw) measures how easily soil detaches and is transported by rainfall (tons per acre). Soil with a higher Kw factor, on a scale of 0.02 to 0.69, is more susceptible to sheet and rill erosion by water.

Wind Erodibility Group (WEG) consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas: Group 1 (Red colored soils below) soils are the most susceptible and Group 8 (Blue colored soils below) are the least susceptible. See Figure 2-12.

Figure 2-12 Wind (WEG) Erodibility Groups Map



Soil in the watershed is usually eroded by *water*, as wind is not a strong factor of erosion in northwestern Illinois.

Fifty-four percent (54%) of the watershed is considered HEL with slopes ranging from five to 11 percent. Higher soil erosivity factors (Kw) in the watershed are seen in areas upslope from the flow lines of the stream, and the lowest erosivity factors are in areas nearer to the Yellow Creek confluence. Kw ranges from .20 to .49, with the vast majority rated in the watershed are .32 (32%) and .37 (51%).

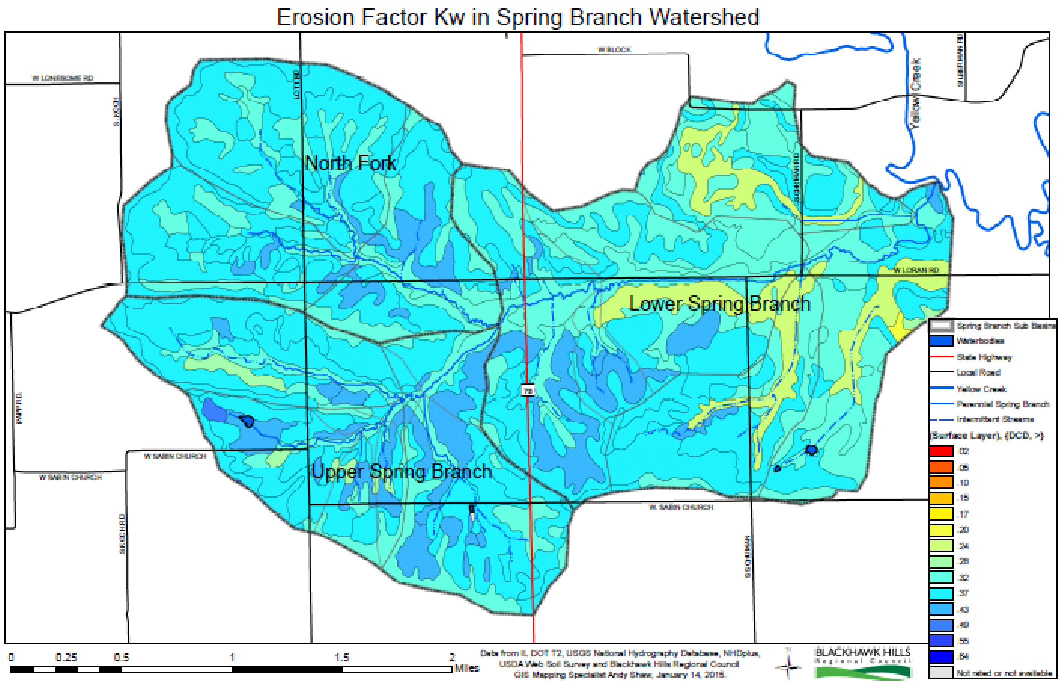


Figure 2-13 Erosion Factor (Kw)

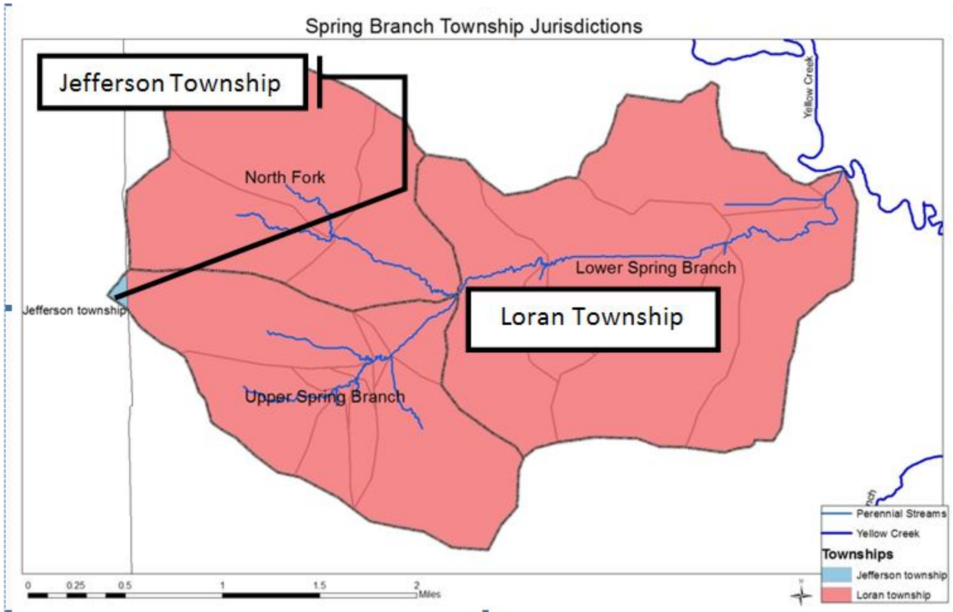
Figure 2-13 locates the soils of various erodibility factors, which are listed by acres and percent area in Table 2-3.

Most of the soils in the watershed (99%) are in Wind Erodibility Group 6, with fractions of a percent in groups 5 and 4L (see Figure 2-12).In 70 percent of the watershed soil erosion of five tons per acre can occur without affecting crop productivity over a sustained period. Another 27 percent of the watershed can tolerate soil erosion of three tons per acre, and two percent can tolerate four tons per acre.

Table 2-3 Acres and percent of watershed by erosion factor (Kw).

Kw Factor	Acres by Kw Erosion Factor	Percent Area
NA/Water	0.87	0.02%
0.2	4.55	0.12%
0.24	226.39	5.77%
0.28	35.24	0.90%
0.32	1267.36	32.27%
0.37	2002.08	50.98%
0.43	385.15	9.81%
0.49	5.15	0.13%

Figure 2-14. Spring Branch township jurisdictions.



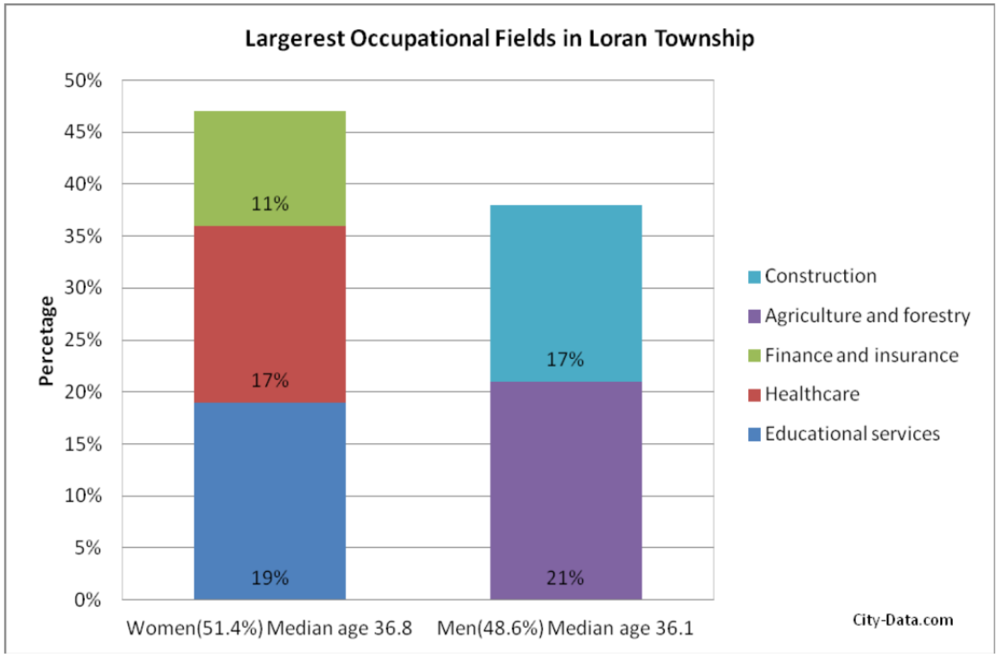
2.4 Watershed Jurisdictions

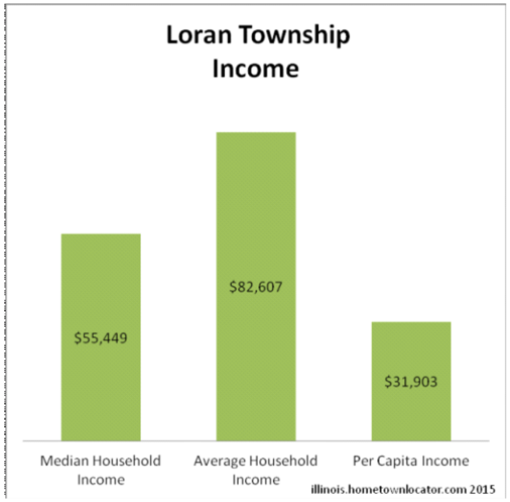
The Spring Branch Watershed is contained completely in Illinois and likewise is completely within the County of Stephenson. The watershed area is nearly all inside Loran Township, except a very small section (6.31 acres or .16% of the 3926.79 total acres of the basin), which is in Jefferson Township. Stephenson County governs the watershed. They are responsible for zoning and planning, water quality protection, and nonpoint source pollution control. Township jurisdictions are portrayed in Figure 2-14.

2.5 Demographics

Within the Spring Branch Watershed, there are 56 landowners: 55 private individuals, trusts, or family farm operations and 1 church. The demographics of Loran Township and Rural Loran Township provide the most reliable information for the Spring Branch Watershed. The Spring Branch watershed comprises about six of the total 35 square miles within the Loran Township. Income and occupational statistics for Loran Township may not fully represent Spring Branch Watershed, as Pearl City is within the Township and Spring Branch is completely a rural, agricultural landscape. The median household income of Loran Township is $55,449, which is higher than that of the county ($42,966). See Figure 2-15.

Information from 2009 through City-Data.com closely represents the area of the Spring Branch Watershed, which has not encountered any significant population or land use changes since 2009. There are no known, predicted population changes or growth forecasts.





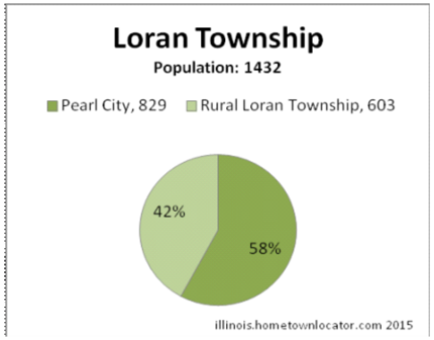


Figure 2-15 Demographics charts

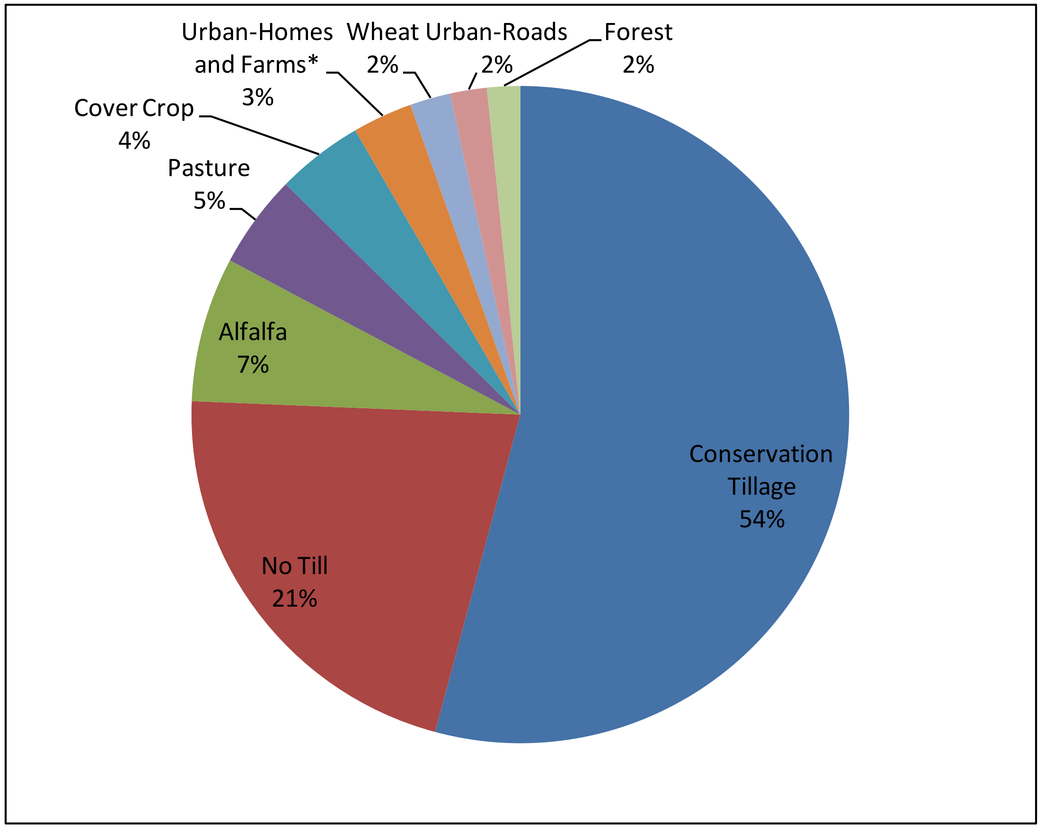
2.6 Land Use / Land Cover

Current land use practices in the Spring Branch watershed include 100 percent of the farmers using at least on BMP to protect the soil surface and control erosion and most use several erosion control practices. These include: conservation buffers, minimum tillage, no-till, contour farming, combine choppers that shred the stalks when corn is picked, and cover crops.

Land use and land cover are closely related in this mostly agricultural watershed area. The vast proportion of the watershed is devoted to agricultural land cover. Summation of the categories show 75-80% in major crops like corn and soybeans, along with 2-9% in cultivated grasses, for a total of 77-89% devoted to traditional agriculture. The area of urban homes and farms totals 115.89, or 3% of the area. Figure 2-16 maps current land cover, and Table 2-4 breaks down the acreage into land use by percentage of the watershed.

There is no significant future development planned for the watershed according to Terry Groves, the Director of Planning and Zoning in Stephenson County. The Freeport and Stephenson County Greenways and Trails Plan (2000) indicates that there is an "Urban Growth Boundary" that overlaps the Lower Spring Branch sub-watershed from the east. Based on these sources, we assume that land uses, land cover, and impervious surface within the watershed will remain relatively constant within the foreseeable future.

Table 2-9 Stakeholder-sourced Land Cover Data Spring 2016



Spring Branch of the Yellow Creek-Crowdsourced Land Cover

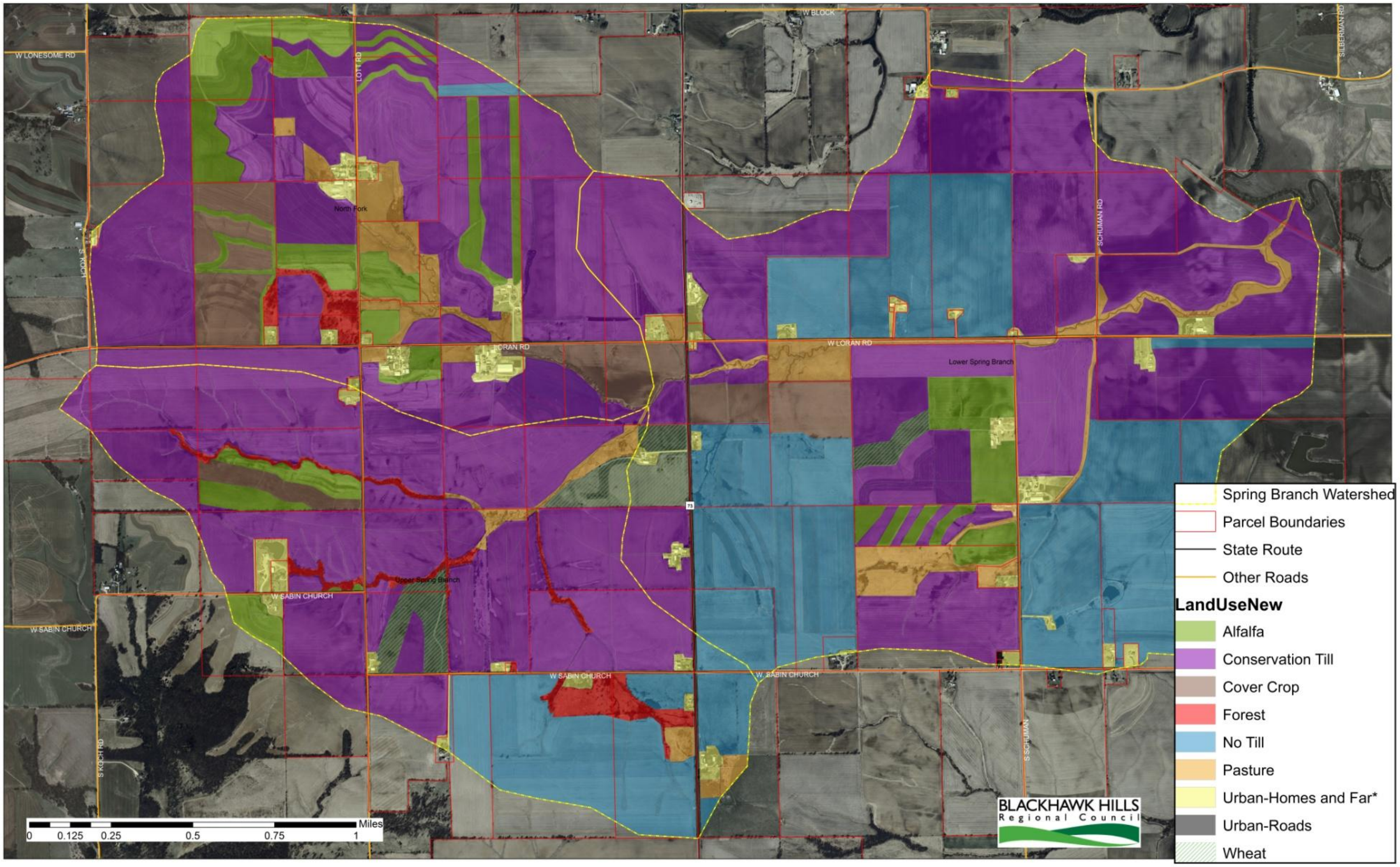


Figure 2-16. Spring Branch land use cover.(Stakeholder sourced Spring of 2016)

CDL 2012	**Acres**	**Percent**	**NLCD 2011**	**Acres**	**Percent**	**Stakeholder 2016**	**Acres**	**Percent**
GRASSES	1060.54	27.01%	GRASSES	933.79	23.78%	GRASSES-WHEAT,PASTURE	258.4	7%
CROPS	2686.61	68.41%	CROPS	2791.67	71.09%	CROPS	3417.35	85%
FOREST	11.25	0.29%	FOREST	18.39	0.47%	FOREST	64	2%
OTHER	2.89	0.07%	OTHER	12.08	0.31%	OTHER	N/A	N/A
DEVELOPED	165.66	4.22%	DEVELOPED	170.64	4.35%	DEVELOPED	186	5%

Table 2-4. Land cover in Spring Branch Watershed according to three sources: CDL 2012 and NLCD 2011 and Stakeholder Meeting March 2016

2.7 Watershed Drainage System

2.7.1 Delineation and Description of Drainage System

Water flow through the watershed appears to be primarily through the surface stream network seen from aerial photography. This aerial photography was taken in the spring leaf-off (March/April) that coincides with periods of high water flow. The flatter area of topography nearest to the Yellow Creek confluence sees areas of saturation that seem to identify both historic channels that the creeks have abandoned, and also areas of saturated flow in a seasonally high water table. There are four small ponds.

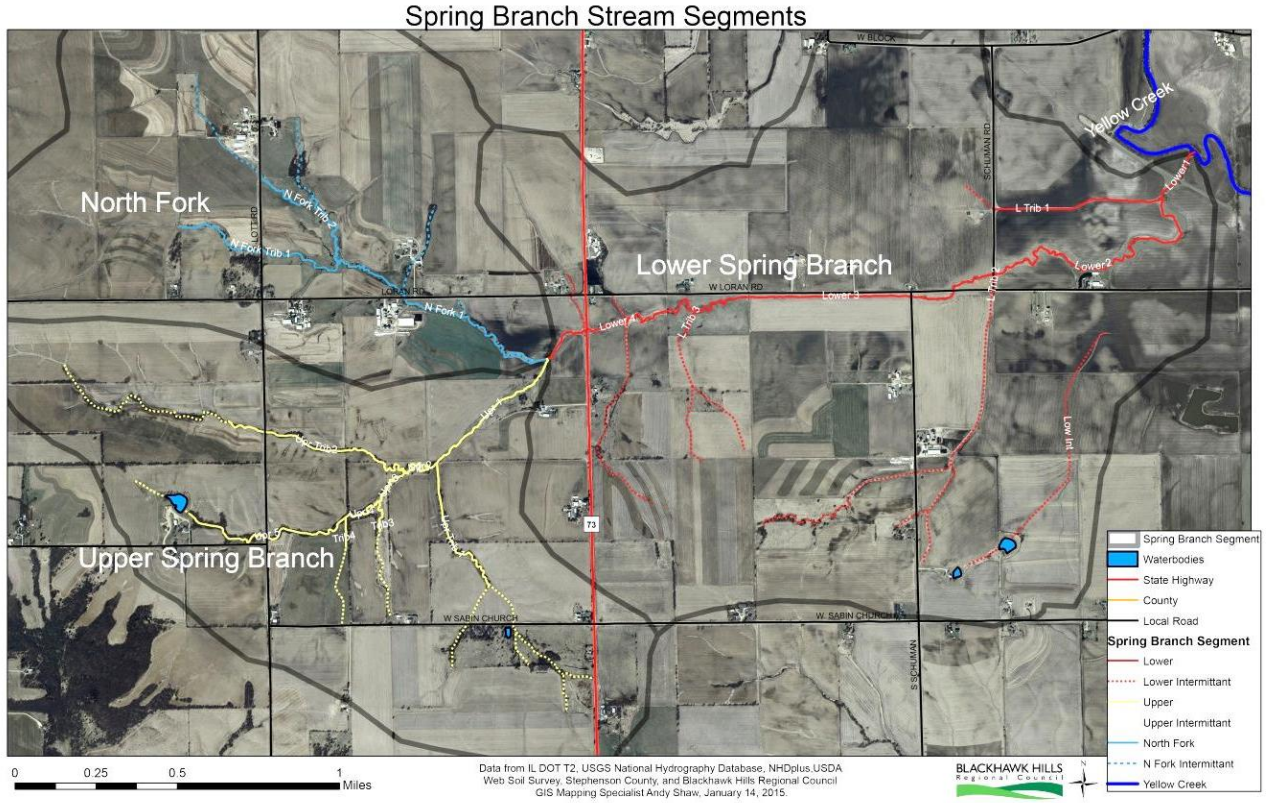


Figure 2-17. Spring Branch stream segments on an aerial photograph

The stream layer was created by correcting the National Hydrography Database (NHD) stream layer over a localized IDOT color imagery from 2011. The NHD is created at a more regional scale that overlooks detail, especially of very small streams like Spring Branch. The stream segments were divided between confluences with connecting streams at each confluence. Spring Branch begins at its confluence with Yellow Creek at approximately (42.248, -89.789). It flows from upstream generally westward as Lower 1 for 986 feet where it meets Lower Trib 1. Lower Trib 1 continues generally westward for 2794 feet, then becoming an intermittent stream to its source. Lower 2 also continues upstream generally westward for 5082 feet to its next confluence of Lower Trib 2 and Lower 3. The following maps and chart (*Figures 2-17 and 2-18 and Table 2-5*) show the relationship of stream segments and their lengths.

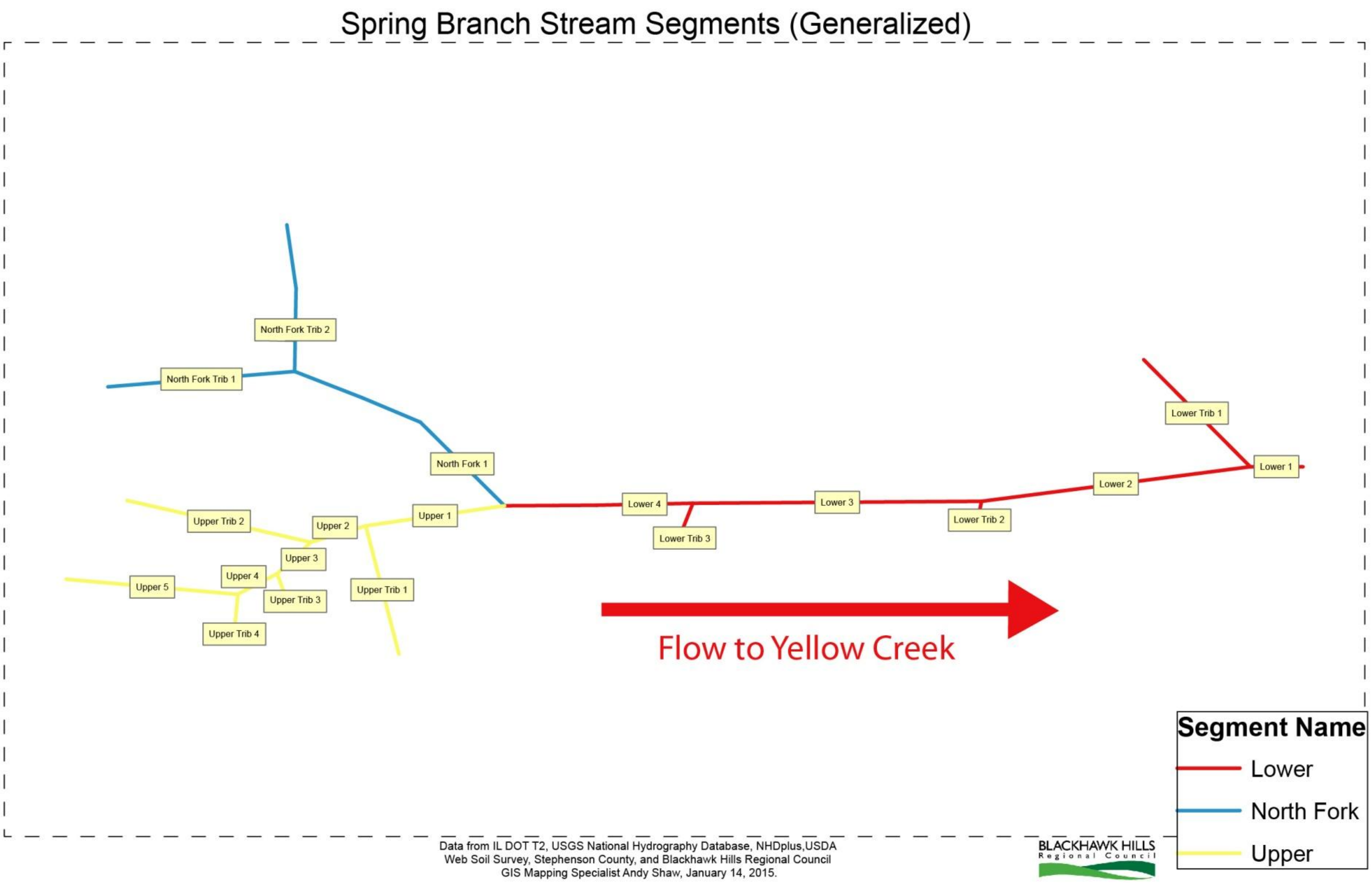


Figure 2-18. Spring Branch stream segments, generalized on a schematic.

Table 2-5 Lengths of stream segments (calculated by GIS not on foot)

Segment	Feet	Miles
Lower 1	986.04	0.19
Lower 2	5082.52	0.96
Lower 3	5425.76	1.03
Lower 4	3529.95	0.67
Lower Spring Branch	15024.27	2.85
Lower Trib 1	2794.47	0.53
Lower Trib 2	338.49	0.06
Lower Trib 3	523.82	0.1
Lower Tributaries	3656.77	0.69
North Fork 1	4790.12	0.91
North Fork Trib 1	3537.18	0.67
North Fork Trib 2	2755.26	0.52
North Fork	18396.1	3.48

Segment	Feet	Miles
Upper 1	2623.83	0.5
Upper 2	1076.75	0.2
Upper 3	863.96	0.16
Upper 4	837.9	0.16
Upper 5	3214.83	0.61
Upper Spring Branch	8617.28	1.63
Upper Trib 1	2468.2	0.47
Upper Trib 2	3501.92	0.66
Upper Trib 3	576.28	0.11
Upper Trib 4	482.9	0.09
Upper Tributaries	7029.3	1.33
Length of Main Stems	42037.64	7.96
Length of Minor Tribs	10686.07	2.02
Total Length	52723.71	9.99

2.7.2 Spatial Relationship and Connectivity through Pseudo-HUC System

There is no assigned numbering system attached to the basins that are subordinate to Middle Yellow Creek. In order to illustrate the spatial relationship and connectivity of the Spring Branch, we have applied a pseudo-HUC system following similar guidelines. The pseudo-HUC-14 level sees a “01” added to make 14 digits, or 070900031304***01***. This level covers the entire Spring Branch Basin. The pseudo-HUC-16 level represents the 3 major divisions of Spring Branch: the North Fork Spring Branch (“0101”), Upper Spring Branch (“0102”), and Lower Spring Branch (“0103”). Each of these major branches of Spring Branch is further divided wherever the perennial stream forks. The North Fork then has three subdivisions, the Upper Spring Branch has nine divisions, and the Lower Spring Branch has six divisions. These smallest divisions are the final two digits of the 18-digit coding scheme, for example, North Fork Basin #1 (“0101”), is numbered “010101” or “070900031304***010101***” as a simplification of the combination of Middle Yellow Creek's "070900031304", and the last six "010101". This pseudo-HUC system builds upon the 12-digit HUC system as delineated in Table 2-6. It is illustrated in Figure 2-19 and tabulated in Table 2-7.

Table 2-6. 12-digit HUC system of Spring Branch Watershed's river system.

HUC-12 for Middle Yellow Creek	
"0709"	The Rock River of the Mississippi
"07090003"	Pecatonica River
"0709000313"	Yellow Creek
"070900031304"	Middle Yellow Creek

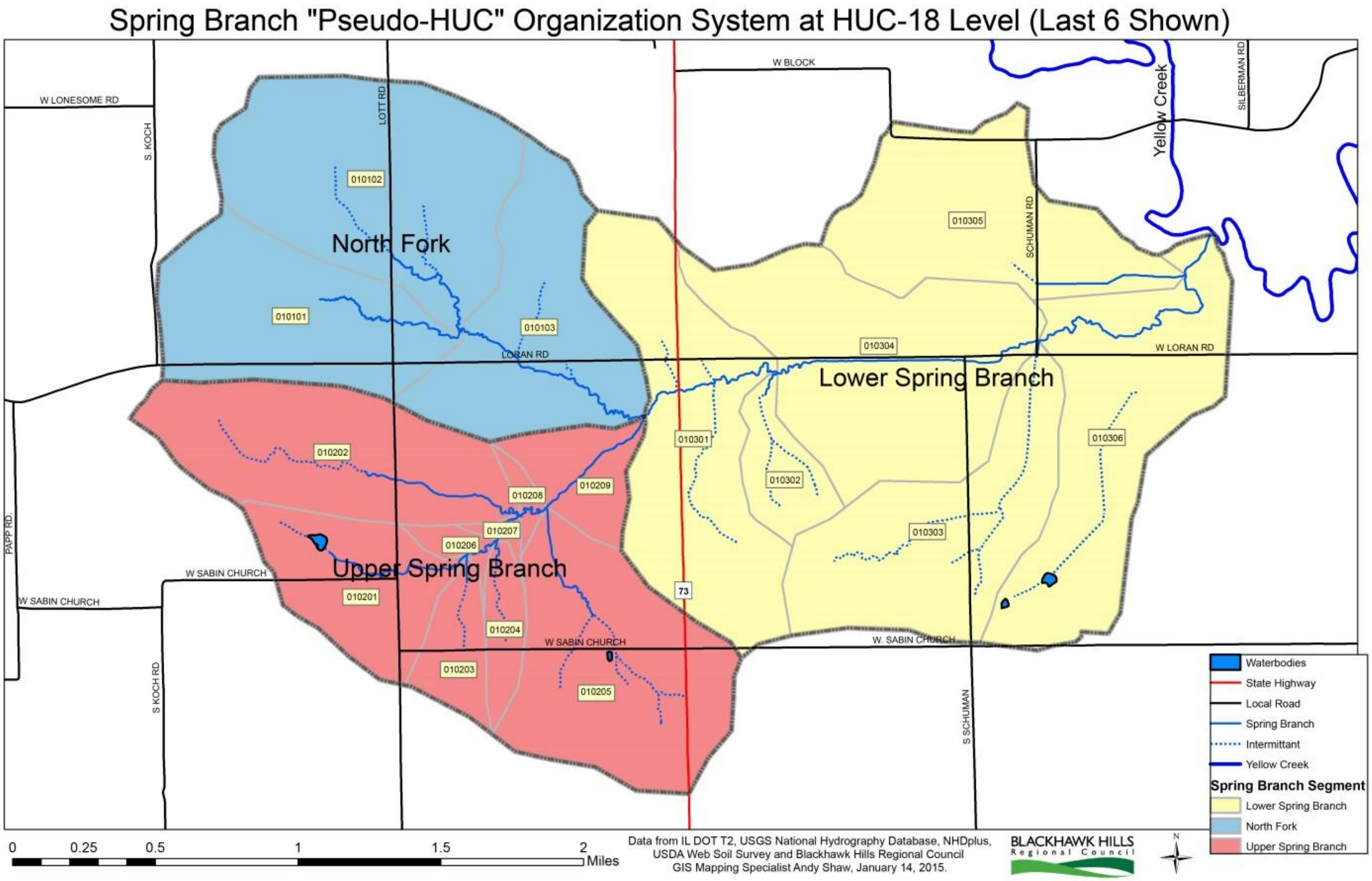


Figure 2-19. Spring Branch “Pseudo-HUC” organization system at HUC-18 level.

Table 2-7. HUC-18 for Spring Branch divisions.*

**Note: All start with "070900031304" and end with the following last six digits:*

010101	North Fork Spring Branch #1
010102	North Fork Spring Branch #2
010103	North Fork Spring Branch #3
010201	Upper Spring Branch #1
010202	Upper Spring Branch #2
010203	Upper Spring Branch #3
010204	Upper Spring Branch #4
010205	Upper Spring Branch #5
010206	Upper Spring Branch #6
010207	Upper Spring Branch #7
010208	Upper Spring Branch #8
010209	Upper Spring Branch #9
010301	Lower Spring Branch #1
010302	Lower Spring Branch #2
010303	Lower Spring Branch #3
010304	Lower Spring Branch #4
010305	Lower Spring Branch #5
010306	Lower Spring Branch #6

2.7.3 Inventory by Stream Segment

A streambank inventory has been conducted. Two blockages were noted in Lower Spring Branch 2. The stream inventory includes 17 sites, numbered Site 1 through Site 16 (Site 12A is the 17th site). Each site has been assessed for channelization, riparian area condition, and bank erosion. A windshield survey was conducted early on and photos taken as seen in Figure 2-20. Overall, the watershed exhibits the following conditions as summarized in Tables 2-8 through Table 2-10.

Table 2-8. Summary of stream and tributary channelization.

Reach Code	HUC	GPS Waypoint	Stream Length Assessed (ft)	None or Low Channelization (ft/%)		Moderate Channelization (ft/%)		High Channelization (ft/%)	
	TOTAL		***32155***	***21940***	***68%***	***1884***	***6%***	***8331***	***26%***

Table 2-9. Summary of riparian area condition.

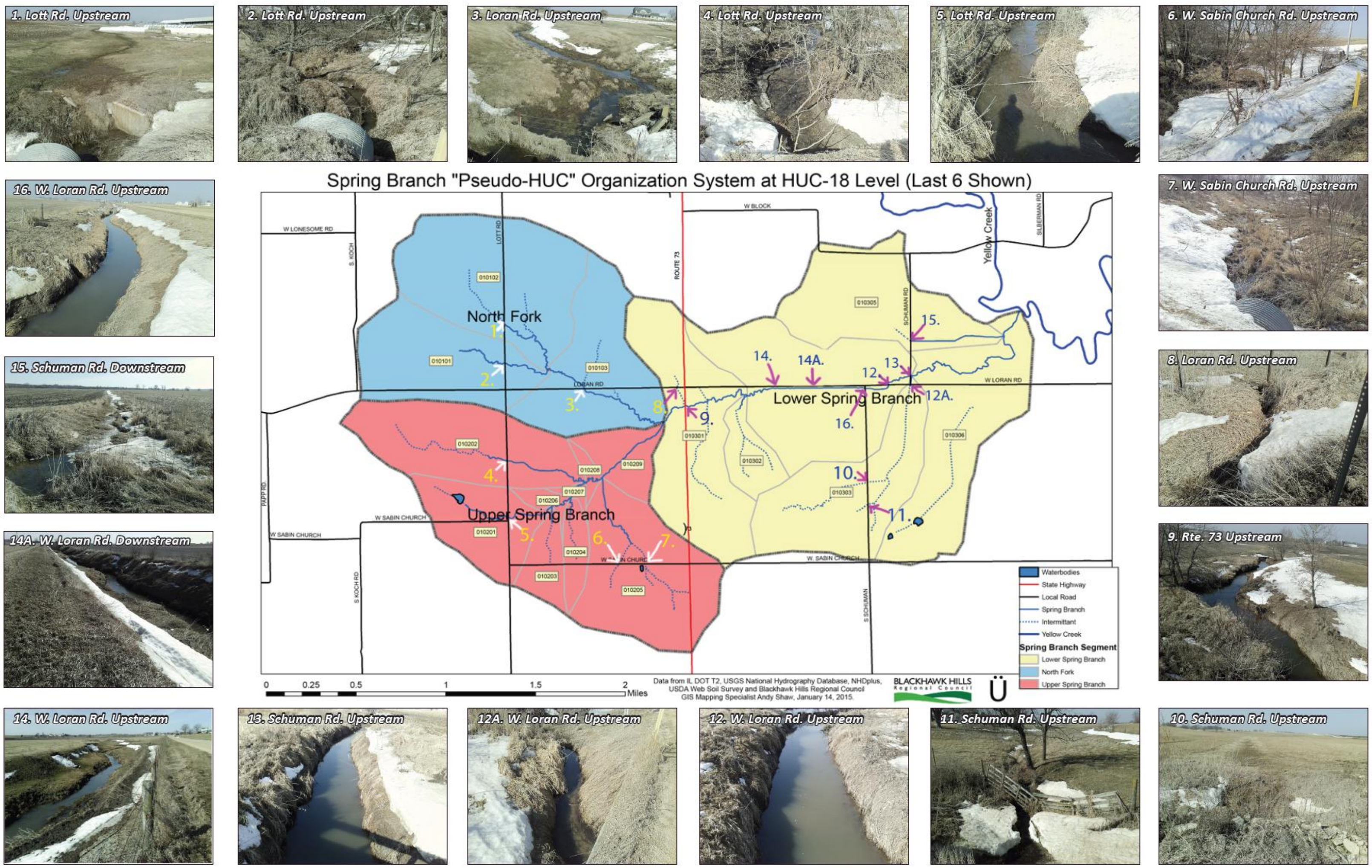
Reach Code	HUC	Stream Length Assessed (ft)	Good Condition (ft/%)		Fair Condition (ft/%)		Poor Condition (ft/%)	
	TOTAL	***32155***	***0***	***0%***	***10256***	***32%***	***21899***	***68%***

Table 2-10. Summary of stream and tributary bank erosion.

Reach Code	HUC	Stream Length Assessed	None or Low Erosion (ft/%)		Moderate Erosion (ft/%)		High Erosion (ft/%)	
	TOTAL	***32155***	***13786***	***43%***	***7538***	***23%***	***10831***	***34%***

Figure 2-20 and Tables 2-11 through 2-13, detail the conditions.

Figure 2-20. Map of streambank inventory sites. This depicts conditions at each site. Each photograph was taken while standing on a bridge or culvert from a public road, looking upstream, plus one photograph looking downstream at Site 15 as indicated below.



2.7.4 West Loran Road (Site 14)

In the 1930's, a half mile of Spring Branch was straightened to avoid building three bridges connecting Schuman Rd to Route 73.. Prior to 1930, Spring Branch zigzagged back and forth across West Loran Road. The RED circle in Figure 2-21 shows the crooked segment on West Loran Road. On the map where it shows "Yellow Cr. PO" (most likely post office) is where Pearl City is located. Figure 2-22 photographically depicts this channelized section of Spring Branch. It is located in the Lower Spring Branch, reach code Lower 3 or L3 in Table 2-11 through 2-13 on pages 36-38.

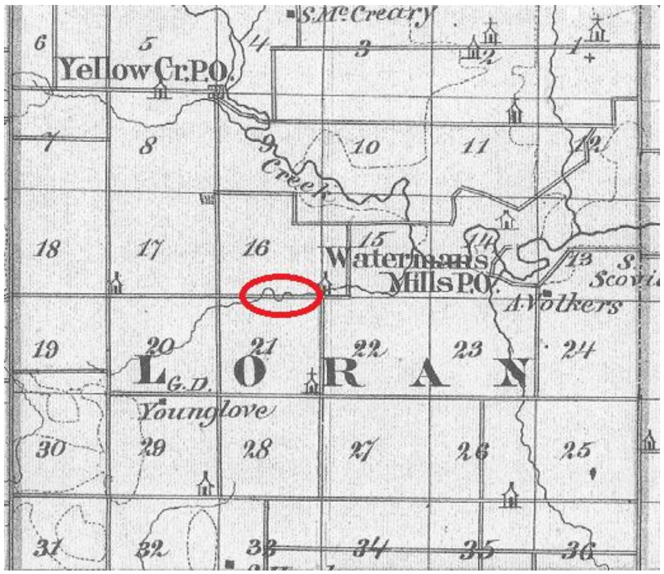


Figure2-21: 1876 Map

Figure 2-22
Site 14, Photo 1 – looking upstream from farm bridge toward Rte 73

Site 14, Photo 2 – looking upstream from farm bridge

Site 14, Photo 4 – looking downstream

Site 14, Photo 3 – looking downstream from farm bridge

Site 14, Photo 5 – looking downstream

Site 14, Photo 6 – looking downstream

Site 14, Photo 8 – looking downstream

Site 14, Photo 7 – looking downstream

Site 14, Photo 9 – field tile

Table 2-11. Stream and tributary channelization.

Reach Code	HUC	GPS Waypoint	Stream Length Assessed (ft)	None or Low Channelization (ft/%)		Moderate Channelization (ft/%)		High Channelization (ft/%)	
L1	10301	60-62	900	135	15%	60	7%	705	78%
L Trib 1	10301	132	2655					2655	100%
L2	10302	63-74	5755	3324	58%	1236	21%	1195	21%
L3	10303	77-90	5365	2068	39%	133	2%	3164	59%
L4	10304	91-104	3607	3607	100%				
NFI	10101	105-114	4516	4516	100%				
NFT1	10101	115	1615	1615	100%				
NFT2	10102	115-119	2195	2195	100%				
UP Trib 5	10205	131	2118	2118	100%				
Upper 1	10301	120-125	2647	1842	70%	455	17%	350	13%
Trib 3	10303	91	520	520					
Trib 2	10302	75-76	262					262	100%
	TOTAL		***32155***	***21940***	***68%***	***1884***	***6%***	***8331***	***26%***

Table 2-12. Riparian area condition.

Reach Code	HUC	Stream Length	Good Condition (ft/%)		Fair Condition (ft/%)		Poor Condition (ft/%)	
L1	10301	900			45	5%	855	95%
L Trib 1	10301	2655	0		2655	100%	0	
L2	10302	5755	0		485	8%	5270	92%
L3	10303	5365	0		1012	19%	4353	81%
L4	10304	3607	0		245	7%	3362	93%
NFI	10101	4516	0		2534	56%	1982	44%
NFT1	10101	1615	0		1615			
NFT2	10102	2195	0		1665		530	
UP Trib 5	10205	2118	0				2118	100%
Upper 1	10301	2647	0				2647	100%
Trib 3	10303	520	0				520	100%
Trib 2	10302	262	0				262	100%
	TOTAL	***32155***	***0***	***0%***	***10256***	***32%***	***21899***	***68%***

Table 2-13. Stream and tributary bank erosion.

Reach Code	HUC	Stream Length Assessed	None or Low Erosion (ft/%)		Moderate Erosion (ft/%)		High Erosion (ft/%)	
L1	10301	***900***			***315***	***35%***	***585***	***65%***
L Trib 1	***10301***	***2655***	***2124***	***80%***	***531***	***20%***		
L2	***10302***	***5755***			***760***	***13%***	***4995***	***87%***
L3	10303	5365	2224	41%	1367	25%	1774	33%
L4	10304	3607	954	26%	1572	44%	1081	30%
NFI	10101	4516	3313	73%	1056	23%	147	3%
NFT1	10101	1615	1615	100%				
NFT2	10102	2195	2019	92%	165	8%	11	1%
UP Trib 5	10205	2118			318	15%	1800	85%
Upper 1	10301	2647	1017	38%	1454	55%	176	7%
Trib 3	10303	520	520	100%				
Trib 2	10302	262					262	100%
	TOTAL	***32155***	***13786***	***43%***	***7538***	***23%***	***10831***	***34%***

There are no lakes or detention/retention basins within the watershed. Therefore, conducting a shoreline inventory and describing the basin facilities are not applicable to this watershed.

2.8 Wildlife and Habitat

2.8.1 Habitat

Because the Spring Branch Watershed is an agricultural community comprised of private farms, it makes sense that wildlife habitat is located mostly on those private farms. There is not much information on wildlife or specific habitat in the watershed.

Different species have different habitat requirements. There are some good habitat opportunities. The slopes are gentle and drain through grass waterways. The eastern half of the Watershed is fairly flat where it drains into Yellow Creek. The western half of the Watershed is gently rolling hills. (See Figure 2-5 topography map) A very small area is deciduous forest (11-18 acres according to CDL, but 64 according to the stakeholders) and there are 29.2 acres of grasses in the Conservation Reserve Program according to the Natural Resources Conservation District and 180 acres in pasture. There are no dedicated conservation areas, natural areas or parks. There are more forested areas in the west and south watersheds. There are several programs to assist landowners with increasing habitat on their property.

The Illinois Wildlife Action Plan (IWAP) is a detailed proactive plan directing the state towards critical conservation efforts for the benefit of species and habitats before they become critically threatened.

2.8.2 Illinois Wildlife Action Plan

The Illinois Wildlife Action Plan (IWAP) is a detailed proactive plan directing the state towards critical conservation efforts for the benefit of species and habitats before they become critically threatened. The IWAP has six campaigns: Farmland and Prairie, Forest and Woodlands, Green Cities, Invasive Species, Streams, andWetlands. The Farmland and Prairie Campaign and Streams Campaigns are the most relevant. The Farmland and Prairie Campaign is to work in agricultural landscapes to improve habitat. One of the Streams Campaign 'Area of Priority Work' is to buffer and restore channels in 8-10 headwater stream segments to support listed fishes and mussels in Rock River Hill Country natural division, which were Spring Branch is located. The Southern Redbelly Dace, Largescale Stonerollers, and Brook Stickleback are in Spring Branch and are on the list of Species in Greatest Need of Conservation according to the Illinois Wildlife Conservation Plan and Strategy.

The species directly addressed in the plan are birds, fish, herptiles, invertebrates, and mammals.

The Watershed goals and projects (Chapters 3, 4 and 5) can implement farming practices that would address the goals of the IWAP and include plans to increase the habitat of the species directly addressed.

The IWAP has several concentrated focus areas statewide. These are called State Acres for Wildlife Enhancement or SAFE. Below is Stephenson County's focus areas (Southern Till Plain SAFE Areas are in Southern Illinois) The "Proposed Grand Prairie SAFE Area" is just north of the watershed. An "Existing Grand Prairie SAFE Area" is directly south of the Spring Branch Watershed. See Figure 2-24 (IDNR, 2005). Increasing wildlife habitat in such close proximity will likely benefit the watershed's wildlife as well.

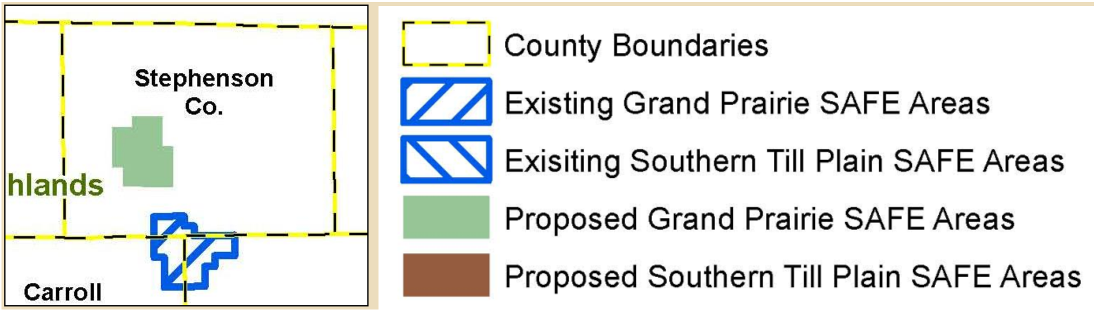


Figure 2-23: State Acres for Wildlife Enhancement (SAFE) or Priority Places for Work in IWAP.

2.8.3 Grassland and Game Birds

Grassland and game birds benefit from a mosaic of different grass heights and densities. Grazing wildlife and fire have historically altered grasslands. Farming requires mowing, haying and grazing, and with conservation grasslands, fire. With all these techniques and the knowledge of when birds need cover for breeding and nesting, it is possible for there to be good grassland bird habitat. There is no recorded data on birds for the watershed. There is one Breeding Bird Survey inventory near the watershed. The area has no forests. Increasing grassland and game bird habitat is the intuitive choice.

Table 2-14

1968-2012 Trend Estimates: Grasslands Habitat

Species	Survey	Trend
Blue-winged Teal	FWS	2.25
Northern Shoveler	FWS	2.51
Upland Sandpiper	BBS	0.85
Wilson's Phalarope	BBS	-0.49
Sedge Wren	BBS	1.26
Vesper Sparrow	BBS	-0.86
Lark Bunting	BBS	-3.57
Grasshopper Sparrow	BBS	-2.99
Henslow's Sparrow	BBS	-0.45
Le Conte's Sparrow	BBS	-1.68
Dickcissel	BBS	-0.74
Bobolink	BBS	-2.02
Eastern Meadowlark	BBS	-3.21
Western Meadowlark	BBS	-1.3

Stateofthebirds.2014.com

Table 2-15

Breeding Bird Survey route is located near Shannon, IL (BBS Route 34065) to the southeast of the watershed .

Cumulative Breeding Species List (n=84):

All historical records of Breeding bird species detected at sample locations along this route.

Northern Flicker	Chimney Swift	Great Blue Heron
American Crow	Chipping Sparrow	Great Crested Flycatcher
American Goldfinch	Cliff Swallow	Great Egret
American Kestrel	Common Grackle	Great Horned Owl
American Redstart	Common Yellowthroat	Hairy Woodpecker
American Robin	Dickcissel	Horned Lark
Baltimore Oriole	Double-crested Cormorant	House Finch
Barn Swallow	Downy Woodpecker	House Sparrow
Barred Owl	Eastern Bluebird	House Wren
Belted Kingfisher	Eastern Kingbird	Indigo Bunting
Black-capped Chickadee	Eastern Meadowlark	Killdeer
Blue Jay	Eastern Phoebe	Least Flycatcher
Blue-gray Gnatcatcher	Eastern Towhee	Mallard
Bobolink	Eastern Wood-Pewee	Mourning Dove
Brown Thrasher	European Starling	Northern Bobwhite
Brown-headed Cowbird	Field Sparrow	Northern Cardinal
Canada Goose	Grasshopper Sparrow	Northern Harrier
Cedar Waxwing	Gray Catbird	Swallow
Chimney Swift	Great Blue Heron	Orchard Oriole
Chipping Sparrow	Great Crested Flycatcher	Purple Martin
Cliff Swallow	Great Egret	Red-bellied Woodpecker
Common Grackle	Great Horned Owl	Red-eyed Vireo
Common Yellowthroat	Hairy Woodpecker	Red-headed Woodpecker
Dickcissel	Horned Lark	Red-tailed Hawk
Double-crested Cormorant	House Finch	Red-winged Blackbird
Downy Woodpecker	House Sparrow	Ring-necked Pheasant
Eastern Bluebird	House Wren	Rock Pigeon
Eastern Kingbird	Indigo Bunting	Rose-breasted Grosbeak
Eastern Meadowlark	Killdeer	Hummingbird
Eastern Phoebe	Least Flycatcher	Savannah Sparrow
Eastern Towhee	Mallard	Sharp-shinned Hawk
Eastern Wood-Pewee	Mourning Dove	Song Sparrow
European Starling	Northern Bobwhite	Tree Swallow
Field Sparrow	Northern Cardinal	Tufted Titmouse
Grasshopper Sparrow	Northern Harrier	Turkey Vulture
Gray Catbird	Northern Rough-winged Swallow	Upland Sandpiper
Great Blue Heron	Orchard Oriole	Vesper Sparrow
Great Crested Flycatcher	Purple Martin	Warbling Vireo
Great Egret	Red-bellied Woodpecker	Western Meadowlark
Great Horned Owl	Red-eyed Vireo	White-breasted Nuthatch
Hairy Woodpecker	Red-headed Woodpecker	Wild Turkey
Horned Lark	Red-tailed Hawk	Willow Flycatcher
House Finch	Red-winged Blackbird	Wood Duck
House Sparrow	Ring-necked Pheasant	Wood Thrush
House Wren	Rock Pigeon	Yellow Warbler
Indigo Bunting	Rose-breasted Grosbeak	Yellow-billed Cuckoo
Killdeer	Ruby-throated Hummingbird	Yellow-headed Blackbird
Least Flycatcher	Savannah Sparrow	Yellow-throated Vireo

usds.gov Query date: 01/22/2016

Table 2-14 shows grassland-bird species trends in Illinois. The species in **green bold** have been increasing in the past forty years while the species in *red italics* have been decreasing. FWS means Fish and Wildlife Service and BBS means Breeding Bird Survey. By cross-referencing Illinois Grassland Bird Trends data (Table 2-14) with the Illinois Wildlife Action Plan's 'Species in Greatest Need of Conservation', each project plan could include habitat for one or more of the following species: bobolink, brown thrasher, northern bobwhite, red-headed woodpecker, upland sandpiper, wood thrush, yellow-billed cuckoo, and the yellow-headed blackbird. Table 2-15, the Breeding bird survey near the watershed, contains species of concern from IWAP as well. Cross-referencing this list with IWAP, resulted the following species: dicksissel, bobolink, eastern and western meadowlark (which are in decline statewide) and the upland sandpiper which also an endangered species.

2.8.4 Reptiles and Amphibians

Though there is habitat in the Watershed that certainly supports amphibians and reptiles (about one to three acres of wetland according to CDL data) there is no data collected on either.

Though short, the Illinois Natural History Survey's database has a list of Amphibians and Reptiles for Stephenson County: American Toad, Blanchard's Cricket Frog, Western Chorus Frog, Gray Treefrog, Bullfrog, Green Frog, Pickerel Frog, Northern Leopard Frog, Snapping Turtle, Painted Turtle, Rat Snake, Northern Water Snake, Common Garter Snake, and the Plains Garter Snake. The Pickerel Frog is a Species of Concern in the Ilinois Wildilfe Action Plan.

2.8.5 Fish and Macro-invertebrates

Karen Rivera from the Illinois Department of Natural Resources conducted a survey on July 10, 2015 to determine the fish species present. Nicole Vidales from the Illinois Environmental Protection Agency conducted a macro-invertebrate survey at the same location on the same date. The surveys were conducted upstream of the bridge at the junction of Loran Road and South Schuman Road.

A total of 300’ of stream was sampled. Visibility was poor due to extensive beds of Sago Pondweed and mucky sediments that cause excessive turbidity as we moved about in the stream. Sample quality was fair to poor, as many fish were lost in the turbidity and hidden by weeds. In all 396 fish were collected representing 11 different species. Although the bottom sediments were mucky, the water was cool, and the flow was good. The extensive weed beds provided cover and habitat for the species present. Species collected were common to the area, and were represented by eight species of minnows, one species of sucker, 1 species of darter, and one Stickleback. Southern Redbelly Dace, Largescale Stonerollers, and Brook Stickleback are cool water fishes that, although not rare, are highly vulnerable to habitat changes. All three of these species are on the list of Species in Greatest Need of Conservation according to the Illinois Wildlife Conservation Plan and Strategy (IDNR, 2005).

Southern Redbelly Dace

Largescale Stoneroller

Brook Stickleback

Yellow Creek Fish Samples Near Spring Branch

Two other fish surveys were conducted in the summer of 2012 on the Yellow Creek above and below the Spring Branch watershed. These surveys were part of a larger fish community survey, which was a joint effort of the Illinois Environmental Protection Agency and the Illinois Department of Natural Resources. Fish communities, macroinvertebrates, habitat and water quality parameters were sampled at 18 sites throughout the Pecatonica watershed. The following assessments are from the *Pecatonica River Basin Fish Community Survey* done in 2012.

Yellow Creek - PWN-09: The first area sampled on Yellow Creek was located about four miles southwest of Freeport along Loran Road. Game fish were scarce and the sample consisted mostly of smaller minnows and suckers. Included were northern hogsuckers, white suckers, shorthead redhorse, green sunfish, and various minnows and darters. The IBI for this station was 39. This is the first sampling data for this area.

Yellow Creek - PWN-08: The second area sampled on Yellow Creek was located just east of Stockton at the bridge on Tiger Whip Road near the headwaters of the stream. The only game fish were a few bullheads, small bluegill, and green sunfish. Larger fish included carp and white suckers while the smaller fish included five species of minnows, and johnny darters. The IBI for this station was 25, indicating a badly impaired condition. This is the first sample data for this station. (See Figure 2-24)

The laboratory macroinvertebrate sorting process yielded 26 genera comprised of 334 individuals. All macroinvertebrates collected are common to the area. Two-thirds of the individuals in this sample were representatives from two Orders;

- Ephemeroptera (Mayflies), Family: Baetidae (97 individuals), and
- Diptera (True Flies), Families Simulidae and Chironomidae (57 and 64 individuals, respectively).

No mussels (Unionidae) were found in the region sampled for water quality and bugs in 2015.

The Macroinvertebrate Index of Biotic Integrity (mIBI) provides a measurement of select attributes of a macroinvertebrate assemblage. In turn, these measurements position the sample along a gradient of human-induced impact relative to the best benthic samples collected in Illinois. The mIBI is scored on a scale of 0 to 100; scores closer to 100 are optimal (Illinois EPA 2011c). The sample collected in 2015 from Spring Branch Yellow Creek had a mIBI score of 49.9, considered good. The scale is as follows: poor, fair, good, exceptional. Good ranges from 41.8 to 72.9. See Figure 2-24 for summary of sampling sites.

2.8.6 Yellow Creek Watershed Management Plan: Fish Information

The Yellow Creek Watershed Management Plan, prepared by the Yellow Creek Watershed Partnership in 2013, reported the results of fish and mussel sampling on Yellow Creek, into which the Spring Branch flows. Fish and mussels migrate up and down streams. The Spring Branch is upstream from Yellow Creek so the data may be applicable to the Spring Branch.

Some meaningful information can be extrapolated from fish sampling on Yellow Creek above and below a dam at Krape Park in Freeport, downstream from Spring Branch. Sampling between 1984 and 2007 has shown a greater diversity of fish below the dam than above the dam, including important game fish either not found or found sparsely above the dam. Below the dam between 2002 and 2007, Yellow Creek has dropped its Index of Biological Integrity (IBI) rating from 57 to 43 and Biological Stream Characterization (BSC) from an “A” to a “B” category. Above the dam, two samples in 2007 have found an IBI of 35 and 33 and a BSC “C” category. Sparse game fish are immediately above the dam, but as of the sample dates, are not near Pearl City, close to Spring Branch. During a 2010 survey, eleven species of mussels were counted about a half-mile upstream of the dam.

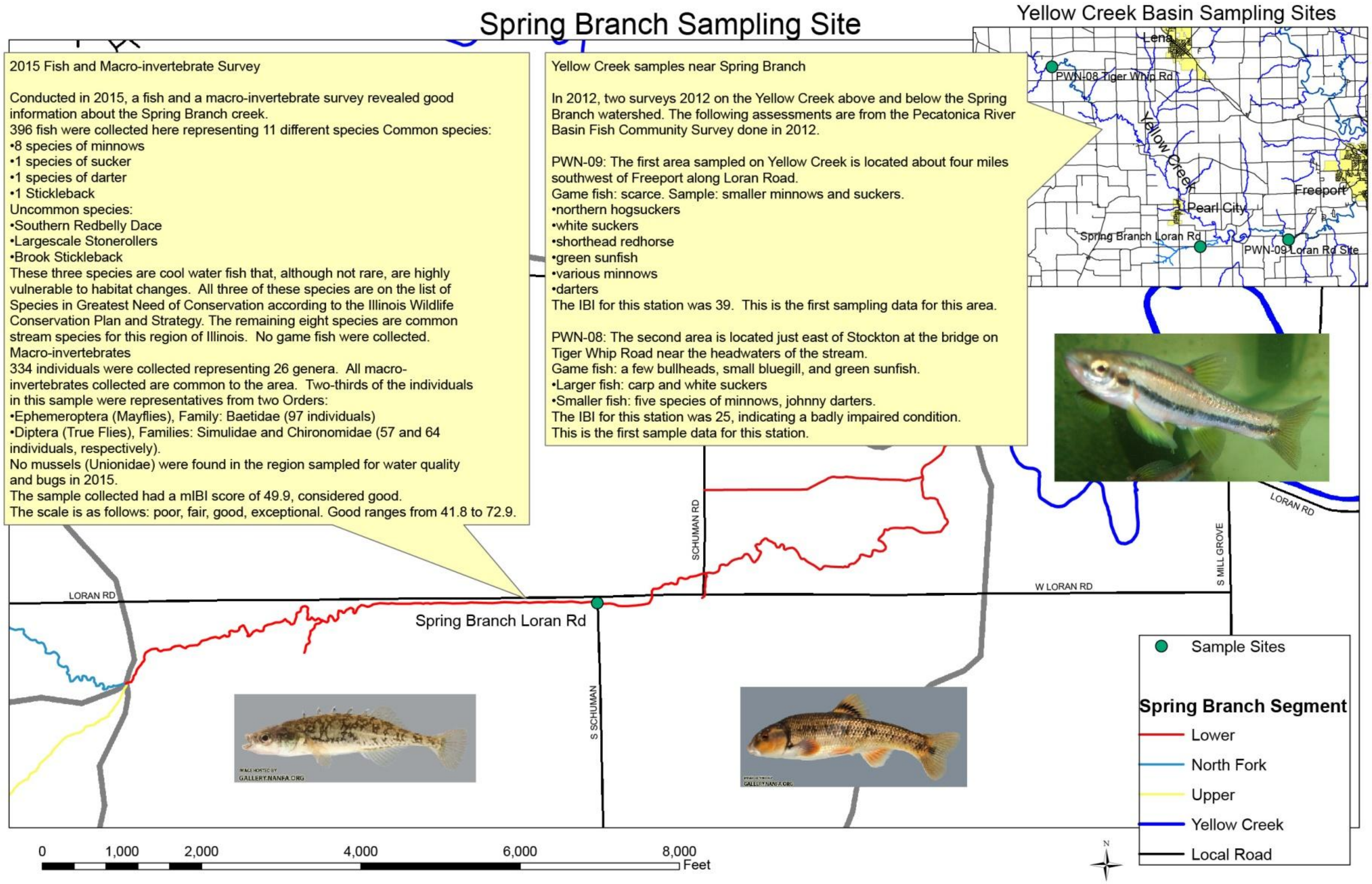


Figure 2-24 Fish and Macro-invertebrate sample sites, 2012-2015.

2.9 Water Quality Assessment

Additional water quality data is needed for the Spring Branch.

A water quality sample and hydrolab readings were collected by Illinois EPA on July 16, 2015. Following are Hydrolab readings that were collected in-situ. Water Temperature: 14^{o}C (57 degrees F), Specific Conductivity: 756 μS/cm, Dissolved Oxygen: 9.5 mg/L, and pH: 7.76. Data from the water quality sample are not yet available.

Some information from the *Illinois Integrated Water Quality Report and Section 303(d) List - Volume I: Surface Water (EPA, 2014)* is below. Other related information has been extrapolated from the *Yellow Creek Watershed Management Plan (Yellow Creek Watershed Partnership, 2013)* and *Pecatonica River Total Maximum Daily Load and Load Reduction Strategies: Stage 1 Report (Tetra Tech and Fluid Clarity, 2014) and Stage 2 Report (Tetra Tech and Fluid Clarity, 2015).*

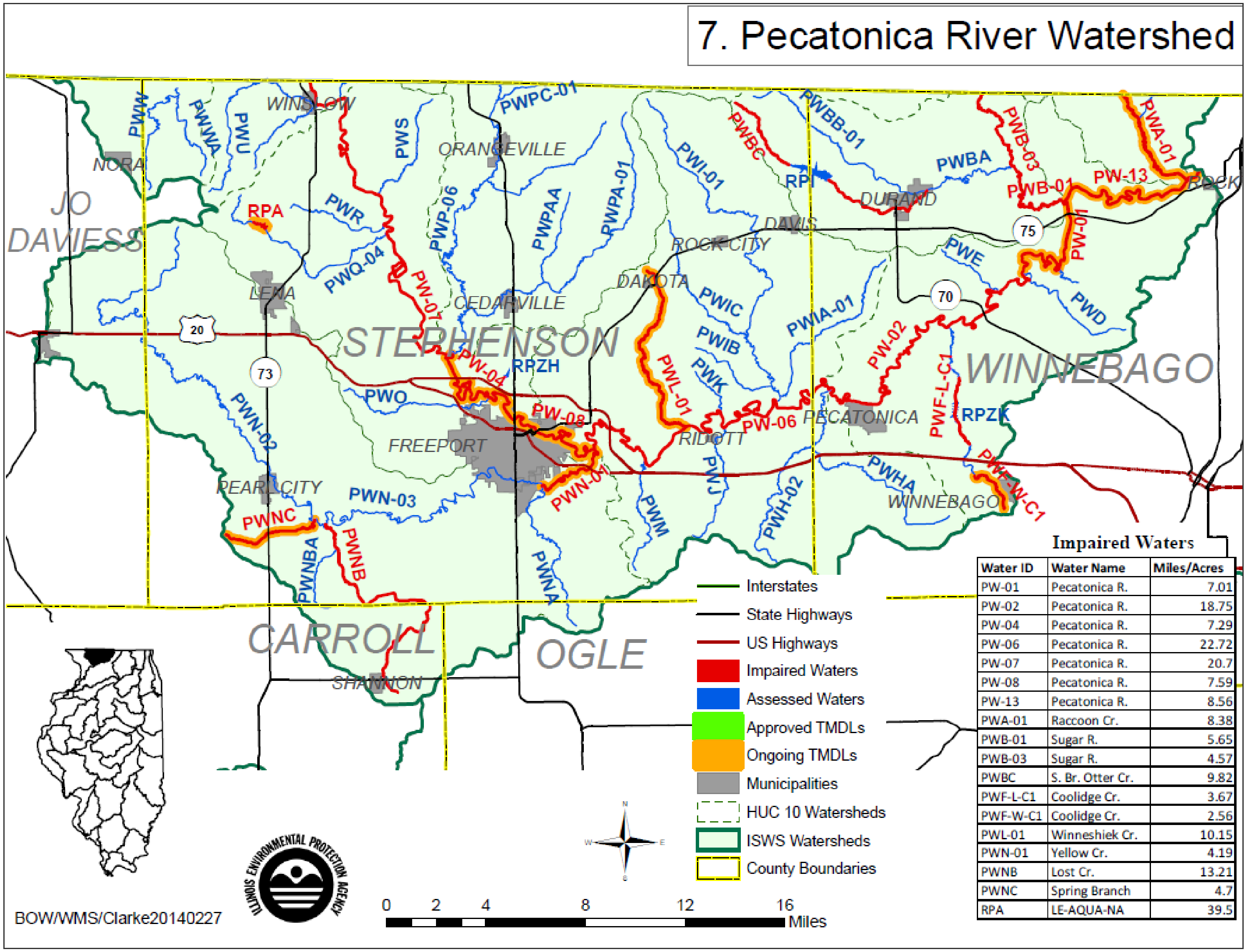
2.9.1 Illinois Integrated Water Quality and Section 303(d) List – Volume I: Surface Water

The Spring Branch is an impaired waterway according to the *Illinois Integrated Water Quality Report and Section 303(d) List (2014).* Through this resource, the Environmental Protection Agency provides the following information about the Spring Branch Watershed:

AUID:	IL_PWNC
Basin:	7, Pecatonica River
Stream Length:	4.7 miles
TMDL:	Ongoing
Status of Designated Use Support:	Not supporting aquatic life Not assessed for fish consumption, primary contact, secondary contact, aesthetic quality
Causes of Impairment:	Ammonia (total) and phosphorous (total)
Sources of Impairment:	Agriculture and unknown sources
Category:	5
Priority:	Low, ranked 1129 and 1130 on the list of prioritized streams. Ranked 1,129th of 1,568 prioritized streams caused by total ammonia and total phosphorous. Ranking 1,130th of 1,568 prioritized streams caused by total phosphorous.

Figure 2-25, transposed from the integrated report, depicts impaired waterways within the Pecatonica River Basin, including the Spring Branch.

Figure 2-25 Impaired waters in Basin 7, Pecatonica River Watershed, including Spring Branch, PWNC.



Water ID	Water Name	Miles/Acres
PW-01	Pecatonica R.	7.01
PW-02	Pecatonica R.	18.75
PW-04	Pecatonica R.	7.29
PW-06	Pecatonica R.	22.72
PW-07	Pecatonica R.	20.7
PW-08	Pecatonica R.	7.59
PW-13	Pecatonica R.	8.56
PWA-01	Raccoon Cr.	8.38
PWB-01	Sugar R.	5.65
PWB-03	Sugar R.	4.57
PWBC	S. Br. Otter Cr.	9.82
PWF-L-C1	Coolidge Cr.	3.67
PWF-W-C1	Coolidge Cr.	2.56
PWL-01	Winneshiek Cr.	10.15
PWN-01	Yellow Cr.	4.19
PWNB	Lost Cr.	13.21
PWNC	Spring Branch	4.7
RPA	LE-AQUA-NA	39.5

2.9.2 Pecatonica River Total Maximum Daily Load and Load Reduction Strategies Report STAGE 1 AND STAGE 2

Because of the Pecatonica River impaired listing, the EPA requires a Total Maximum Daily Load (TMDL) and Load Reduction Strategies (LRS) Report. A TMDL and LRS are basically "pollution budgets" for impaired water. The Pecatonica River Watershed (in Illinois) is divided into 12 segments, four were determined to need more data collection in the Stage 1 TMDL Report. One of the four, is Spring Branch. At the time of this inventory the TMDL had completed Stage 1 and Stage 2 reports. Stage 3 has not yet been completed. The Stage 2 report shows that Spring Branch can be recommended for delisting for total ammonia and an LRS should be conducted for total phosphorus (Tetra Tech 2014). The following pages give detailed information about the results from Stage 1 and Stage 2 Reports.

STAGE ONE

The *Pecatonica River Total Maximum Daily Load and Load Reduction Strategies: Stage 1 Report* by Tetra Tech and Fluid Clarity (2014) offers the following information about Spring Branch, and recognizes that additional data is needed

NPDES Permitted Facilities:	None
MS4s:	None
USGS Stations:	None
USGS Stream Gages:	None
CAFOs:	Ronald Bremmer Cattle, IL Permit ID #ILA00057 Located on Loran Road between IL 73 and Lott Road
Septic Systems:	57 septic systems
Septic Systems/ Sq. Mi.:	9.4septic systems per square mile

Livestock:

Cattle:	987 animal units
Poultry:	0
Horses:	12 animal units
Sheep:	24 animal units
Hogs:	652 animal units

* Note: Livestock information was sourced at a Stakeholder Meeting in the Spring of 2016.

This TMDL report recommends establishing a new monitoring station on Spring Branch in order to collect water quality data. Existing data is from an EPA 1988 biological and chemical survey taken near the Pearl City Stormwater Treatment Plant (AWQMN Site PWNC-PC-D1) that includes one sample from the Spring Branch. This survey reports a high total phosphorous concentration (1.34 mg/L), but it does not indicate an ammonia impairment at the Spring Branch site. Nitrogen was not measured in this report. We need new data to verify the stream impairments. The report recommends taking a minimum of three samples to verify the phosphorous impairment and five samples to verify the ammonia impairment during varying flow conditions.

The TMDL report also summarizes water quality standards of the Illinois Pollution Control Board applicable to impairments within the Pecatonica River Watershed, including the Spring Branch Watershed. These standards are in the Illinois Administration Code, Title 35 Part 302. The following tables are from the TMDL study. Table numbers correlate with the TMDL study as copied and are presented as Table 2-16.

Table 2-16. Two tables summarizing water quality standards transposed from Pecatonica River TMDL Report.

Table 4-2. TMDL endpoints

Parameter	TMDL Endpoint
Fecal Coliform (#cfu/100 mL)	400 in <10% of samples [a] or geometric mean < 200 [b]
Ammonia, Total (mg/L)	15
Phosphorus, Total (mg//L) [c]	0.05

a. Standard shall not be exceeded by more than 10% of the samples collected during a 30 day period.
b. Geometric mean based on minimum of 5 samples taken over not more than a 30 day period.
c. Standard only applies in lakes/reservoirs that are greater than 20 acres in surface area and in any stream at the point where it enters such a lake / reservoir. There is no numeric standard for streams.

Table 4-3. Load reduction strategies targets

LRS Parameter	Stream Water Quality Targets	Lake Water Quality Targets
Phosphorus, Total (mg/L)	0.0725 (Level III Ecoregion 54) or 0.080 (Level III Ecoregion 53)	0.05 [a]
Total Suspended Solids (mg/L) [b]	28.7 (Zone 3) or 59.3 (Zone 4) or 50.4 (Zone 5)	Median surface concentration of <3 mg/L nonvolatile suspended solids [c]

a. See Table 4-2; standard only applies in lakes/reservoirs that are greater than 20 acres in surface area and in any stream at the point where it enters such a lake / reservoir.
b. The most restrictive TSS target is used when a stream reach includes more than one zone.
c. From the 2010 Integrated Report Table C-25 to address aesthetic quality impairment in lakes.

Currently there is no Illinois numeric standard for Total Phosphorus in streams. There is a Current nutrient standards under 35 Ill. Adm. Code 302-304 where a stream enters a lake, which is .05 mg/L. (NLRS,2015)

The *Stream Water Quality Targets* for Total Phosphorus in Table 2-16 above (0.0725 for Level III Ecoregion 54 and 0.080 for Level III Ecoregion 53) are derived from the North American Agreement on Environmental Cooperation(NAAEC). This is the side treaty from the North American Free Trade Agreement (NAFTA). Spring Branch is in *Ecoregion 54*, called the Central Corn Belt Plains. U.S. EPA's Ecoregion criteria are intended to address cultural eutrophication. Cultural eutrophication is excessive nutrient richness in a water body caused by human activity. The target values " were derived to represent conditions of surface waters that are minimally impacted by human activities and protective of aquatic life and recreational uses (U.S. EPA 2000)." (Tetra Tech 2014)

Spring Branch's target phosphorus level is .0725 mg/L. The TMDL Stage 1 recorded result for Spring Branch of 1.34 mg/L. Given the modeling we have done (see Table 2-17 and 2-18) this would have required an almost 95% reduction in phosphorus. However, the farmers in the watershed have already made significant strides in reducing nutrient loading. In the Stage two report Total Phosphorus results range from .078-.63 mg/L. See the table below taken from the Stage 2 Report (Table 3-2).

STAGE TWO

The Pecatonica River Total Maximum Daily Load and Load Reduction Strategies Stage 2 Report, was published in October 2015. The purpose of the document, in conjunction with the Stage 1 Report is to support the development of ways to measure and reduce pollutants in the Pecatonica Watershed and specifically has data results for the Spring Branch.

The following information on this section is taken directly from the Stage 2 Report

> "At each of the sampling site along Spring Branch, field measurements were made for the following water quality parameters: temperature, DO, pH, and conductivity. Flow information including depth, velocity, and stream geometry was also measured. Water samples were collected for laboratory analysis for concentrations of total Kjeldahl nitrogen (TKN), total ammonia (T-ammonia), and total nitrite (NO_2) plus nitrate (NO_3). Only the sample collected at the most downstream sampling location (SB-01) was analyzed for total phosphorus. The results of these analyses are presented in Table 3-2.

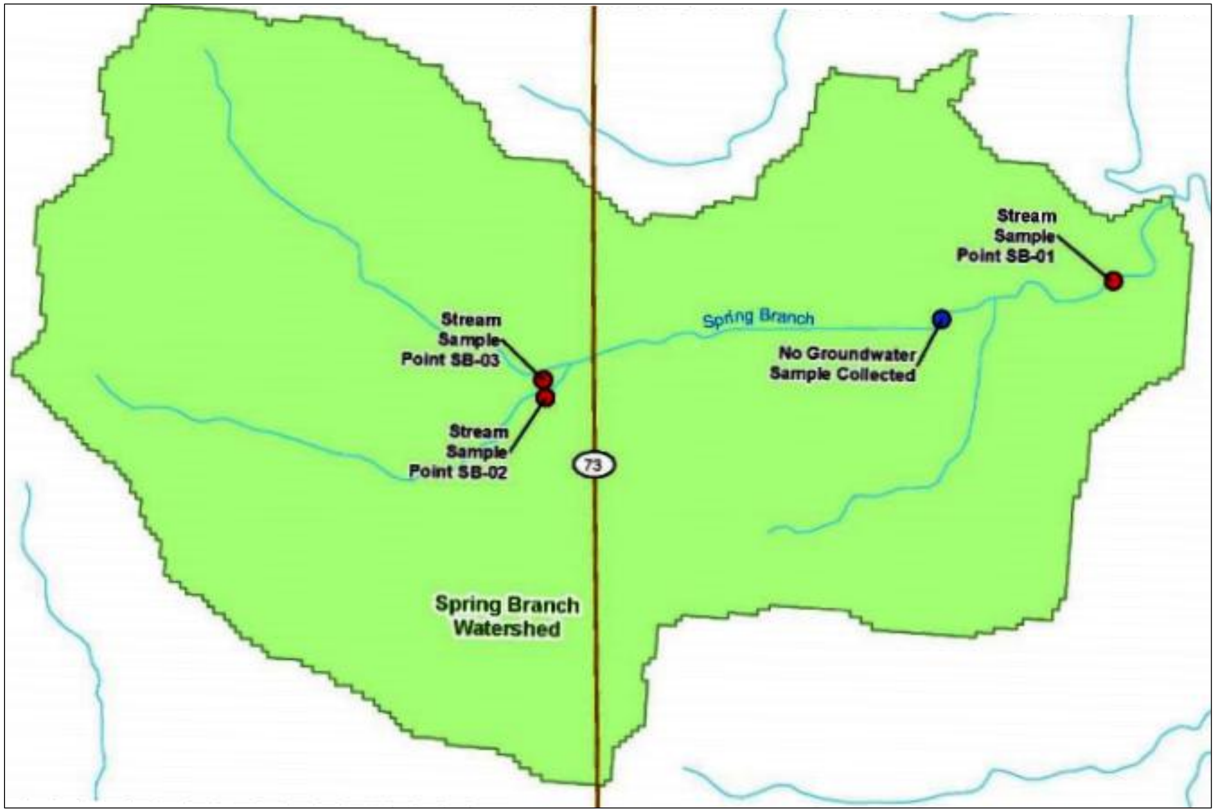


Figure 2-27 TMDL Stage 2 Spring Branch Sample Sites

Table 3-2. Sample Results from Spring Branch

Sample Number	Date Collected	Nitrogen, Ammonia (mg/L)	Nitrogen, Nitrate-Nitrite (mg/L)	Total Kjedlahl Nitrogen (mg/L)	Phosphorus (mg/L)
SB-01	12/11/2014	0.12	11	< 1.0 K,S	0.16
SB-01-FD	12/11/2014	0.10	10	< 1.0 K,S	0.63
SB-02	12/11/2014	0.071	9.5	< 1.0 K,S	NA
SB-03	12/11/2014	0.10	14	< 1.0 K,S	NA
SB-01	3/24/2015	0.15	11	< 1.0 K,S	0.12
SB-02	3/24/2015	0.17	9.6	1.0 S	NA
SB-03	3/24/2015	0.26	12	< 1.0 K,S	NA
SB-01	4/17/2015	0.25	9.3	< 1.0 K,S	0.078
SB-01-FD	4/17/2015	0.14	9.2	< 1.0 K,S	0.19
SB-02	4/17/2015	0.21	8.7	< 1.0 K,S	NA
SB-03	4/17/2015	0.25	13	< 1.0 K,S	NA

Notes:

FD "FD" appended to sample number indicates that the specified sample is a field duplicate sample.
K The reported result is greater than the actual concentration of the analyte in the sample. The reported result is the minimum practical quantitation limit of the analysis.
NA Sample not analyzed for specified analytical parameter.
S The reported result was generated by a laboratory other than the one that reported the result. The reporting laboratory assures the validity of the reported result and its corresponding qualifiers.

All sample results may be used, as qualified, for any purposes.

In Spring Branch, channel substrate, percent cloud cover, percent shading, and coarse streamside vegetative summary were observed at the surface to help evaluate the streambed material composition. Stream shading observations were recorded at each specific sampling location, and general observations on stream shading were made while traveling between sampling locations. Percent shading was determined through field observations, and confirmed by taking a photo of the stream and estimating the amount of shade on the water.

Groundwater

Due to slow recharge rates two attempts to install temporary piezometers was abandoned.

Ammonia Source Assessment

Tetra Tech performed field reconnaissance in an attempt to determine potential sources of ammonia in the Spring Branch watershed. This reconnaissance was performed through general observations during each sampling event, with a focus on the ammonia source assessment during the March 2015 sampling event.

The primary potential source of ammonia observed during field reconnaissance was the agricultural fields that dominate land use in the watershed. During the December 2014 field event, Tetra Tech observed manure being spread in an agricultural field located near sampling locations SB-02 and SB-03. Tetra Tech did not observe any notable evidence of cattle use or access to Spring Branch. Tetra Tech did observe apparent livestock farming operations in the watershed. The waste management practices of these facilities are not known, but these operations could act as ammonia sources if waste is not controlled appropriately. Tetra Tech also observed drain tiles from agricultural fields draining into Spring Branch between sampling locations SB-02 and SB-01, including one drain tile located in the immediate vicinity of SB-04.

Conclusions and Recommendations for Stage 3

Additional data collection was recommended in the Pecatonica River Total Maximum Daily Load (TMDL) and Load Reduction Strategy (LRS) Stage 1 report. The additional data were necessary to confirm impairments in Spring Branch and to support TMDLs and LRSs.

Spring Branch is listed as impaired for total ammonia and total phosphorus. Data collected during 2014 and 2015 as part of this Stage 2 study show concentrations of total ammonia well below the acute water quality standard and TMDL endpoint of 15 mg/L. A source assessment conducted in the field and through the use of aerial photos also did not identify any

significant or continuous potential sources of ammonia in the watershed. The data indicate that there is not an ammonia impairment, however there is likely insufficient data to support delisting at this time. The samples were not collected during the critical condition for ammonia in a stream, which would typically occur during low flow, hot summer months.
Recommendations:
Consider collecting additional samples during critical conditions (low flow, warm temperatures) to support delisting this stream for total ammonia; no total ammonia TMDL should be included in the Stage 3 report.
Include a total phosphorus LRS in the Stage 3."

2.10 Additional Information: Ammonia and Phosphorous

Since total ammonia and total phosphorous are causes of impairment of Spring Branch documented by the Illinois Environmental Protection Agency, It is helpful to understand their processes and effects on surface waters and aquatic life. The following information has been gathered from CADDIS Volume 2: Sources, Stressors and Responses, an EPA website published in 2012. It reviews the origin, toxicity and biological effects, and evidence of ammonia and nutrients including phosphorous in surface waters.

2.10.1 Ammonia

Ammonia (NH_3) can originate from wastes, fertilizers, and natural processes. In an agricultural area like Spring Branch, possible causes include septic seepages, agricultural fertilizer runoff, manure runoff, runoff from concentrated animal feeding operations, and riparian devegetation.

Evidence of ammonia in surface waters includes:

- slow moving or stagnant water;
- low density of fish;
- presence of organic waste;

- foul odor;
- alkaline, anoxic, or warm water; and
- high plant production (e.g. algal blooms).

Ammonia is more toxic to aquatic life in an unionized form (NH_3) than an ionized form (NH_4^+). The toxicity of ammonia is higher in waters with higher pH and temperatures, and fine sediments tend to generate ammonia due to their low oxygen levels and high organic matter. Elevated concentrations of ammonia can cause fish kills, decreased or absence of ammonia-sensitive species, decreased growth and abundance of populations, or problems with fish growth, gill condition, and organ weights. These effects occur because ammonia exerts nitrogenous biochemical oxygen demand (NBOD), when oxygen dissolved in the water that is normally available to fish and other aquatic life is consumed as bacteria and other microbes use the oxygen to oxidize ammonia into nitrate and nitrite. Ammonia also provides nutrients to plants, which can lead to heavy plant growth like algal blooms.

Ammonia can be considered for elimination as a candidate cause of impairment if all life stages of ammonia-sensitive species are present.

2.10.2 Phosphorous

Phosphorous and other nutrients are commonly associated with ammonia toxicity as candidates of impairment of surface waters, along with sediments, pathogens, dissolved oxygen, temperature, and pH. Phosphorous is the major limiting nutrient in most aquatic environments along with nitrogen.

In agricultural landscapes, phosphorous can enter streams with stormwater runoff from animal feed lots or concentrated animal feeding operations, agricultural and irrigation, pasture, and septic system seepages.

In high concentrations, phosphorous can have adverse effects on aquatic communities through effects on primary production, growth and accumulation of algal biomass, and species composition of algae and other plant assemblages. This can be observed as algal mats or a proliferation of filamentous algae, phytoplankton blooms (green water), or abundant macrophytes.

Too much primary production can cause problems for macroinvertebrates and fish including alteration of food resources, alteration of habitat structure, and algal toxins. Increased primary production can also affect other physical and chemical characteristics like pH and dissolved oxygen, which can in turn cause more stress to aquatic communities. These issues can hinder recreation, fishing, hunting, and aesthetic enjoyment.

2.11 Estimated Annual Pollutant Load in the Watershed

Using the current (2014) land use data(from GIS), we estimated the pounds per year of nitrogen, phosphorous, and total suspended solids originating from each type of land use and entering Spring Branch at the watershed scale. Roads make up all of the urban land use category. Cropland uses were assessed for tillage practices, and estimates were assigned in BASINS for no-till, conventional conservation tillage, and conventional plow practices. Streambanks were assessed using the EPA pollutant load reduction worksheets, assuming that BMPs would eliminate 100 percent of the pollution. A vast majority of this pollutant loading from streambanks comes from the channelized section of stream along Loran Road (Site 14), which represents about 10 percent of the total stream length in the watershed. All other inventoried sites make up about eight percent of the stream length in the watershed, and they most likely represent the other 90 percent of the stream length in the watershed. Their results were extrapolated accordingly. Other sources included pasture and hay fields and forest and grassland, which were also assessed using land use cover in BASINS. There were no wetlands or shorelines included in the analysis, as their acreages within the watershed were minimal. Results of current pollutant loading from land uses are presented in Table 2-17.

Table 2-17: Estimated existing (2014) annual pollutant load by source at the watershed scale.

Source	N Load (lb/yr)	P Load (lb/yr)	TSS (lb/yr)	Sediment (tons/yr)
Urban/Roads	4,644	335	53,437	N/A
Cropland	8,525	3,151	107,975	N/A
Pasture/Hay	182	39	11,291	N/A
Forest & Grassland	155	31	3,094	N/A
Water/Wetland	N/A	N/A	N/A	N/A
Streambank – Site 14	4,406	2,203	N/A	2,203
Streambank – All Other Banks	7,759	2,718	N/A	2,718
Shoreline	N/A	N/A	N/A	N/A
Total	**25,671**	**8,477**	**175,797**	**4,921**

Annual pollutant load reduction targets will be determined through a watershed planning process that involves identifying and prioritizing best management practices throughout the watershed. We have conducted a preliminary computer modeling exercise to determine the potential pollutant reductions that could be achieved within the watershed.

This model assumes that all potential best management practices are implemented within the watershed. This is not a realistic expectation, yet it is helpful in estimate targets as the target can be a realistic percentage of the total possible best management practices. Potential pollutant loads in the watershed after all possible best management practices are implemented and percentage of pollutant load reductions are presented in Table 2-18. Our pollution reduction targets will be determined by a committee for watershed planning consisting of watershed stakeholders, which will most likely be reflected as a percent of the reductions in Table 2-18.

Table 2-18: Estimated potential annual (2014) pollutant load reductions possible within the watershed by source. (Targeted estimates will be reflected as a percentage of the possibilities below as determined by those involved with the watershed planning process.)

Source	N Load After BMP Implementation (lb/yr, % reduction)	P Load After BMP Implementation (lb/yr, % reduction)	TSS Load After BMP Implementation (lb/yr, % reduction)	Sediment Load After BMP Implementation (tons/yr, % reduction)
Urban/Roads	4644 (0%)	335 (0%)	53,437 (0%)	
Cropland	5458 (36%)	874 (72%)	58,945 (45%)	
Pasture/Hay	137 (25%)	29 (25%)	8,468 (25%)	
Forest & Grassland	140 (10%)	28 (10%)	2,785 (10%)	
Water/Wetland	N/A	N/A	N/A	
Streambank – Site 14	0 (100%)	0 (100%)	N/A	0 (100%)
Streambank – All Other Banks	0 (100%)	0 (100%)	N/A	0 (100%)
Shoreline	N/A	N/A	N/A	
Total	**10,379 (60%)**	**1,266 (84%)**	**123,635 (30%)**	**0 (100%)**
Target Reductions	**10%**	**25%**	**15%**	**65%**

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Chapter 3
Success Statement, Goals, and Objectives

Written by Joseph Ginger and Rebecca Olson

3.0 Introduction

Previous chapters have provided an overview of the planning process and painted a picture of the land and water surrounding Spring Branch of Yellow Creek. This chapter focuses on the success statement, goals, and objectives for the watershed, and future chapters provide guidance to meeting them.

3.1 Success Statement

The following success statement was adopted by the planning committee and technical advisors with support from planning participants.

"We envision a rural watershed with a sustainable farming community that continues to improve water quality and wildlife habitat."

Planning participants further qualified this statement by describing visions of their future watershed. They see themselves remaining an economically and environmentally sustainable farming community with controlled runoff and erosion, a functioning drainage system, and improved wildlife habitat.

This success statement suggests an ongoing way of life for the area's residents. While the ideas within this statement are being enacted, the Spring Branch Watershed Plan will be deemed active and successful. Maintenance of this success statement will be an ongoing responsibility of those who care about the area. In order to satisfy this statement, we propose the following goals and objectives.

3.2 Goals

The following goals were written and adopted by the Planning Committee. The Technical Committee reviewed, clarified, and expanded the goals. The following is the result of those many meetings and hours of refinement efforts.

Goals for Spring Branch of Yellow Creek

1. *Reduce the sediment and nutrient loading from creek banks.*
2. *Reduce sediment and nutrient loading from livestock and row crop operations.*
3. *Address volume and velocity of water runoff to enhance water quality.*
4. *Utilize practices that protect and/or enhance wildlife habitat.*
5. *Consider landowner needs with each project and practice.*
6. *Maintain and support a sustainable farming community.*

3.2.1 Goals One and Two

The first two goals relate to the simple desire to keep soil on the ground and out of our streams. They are separated by source to provide clarity to objectives and recommended projects and practices below. Once soil gets into the water, it is a pollutant itself, and it also brings with it any pollutants that were applied to the soil. Some of the creek banks are channelized and severely eroded, and there are areas of the creek that are silting in. Erosion also comes from the fields housing livestock and row crop operations, carried by runoff during rain events. When peak storm events hit, the creek eats away farm ground and floods fields, causing more erosion than the runoff produced from normal rain events. When we refer to soil as a pollutant, we call it "sediment." When suspended in water, sediment clouds the water and causes problems. Cloudy water makes it difficult for fish to catch their food. It also doesn't let sunlight in to support healthy, underwater plant growth. Other pollutants that come in with soil and storm water runoff include fertilizers from farmers' fields and residents' lawns; salt from roads; and manure from pets, livestock, geese, and other wild animals.

In the Spring Branch, we are most concerned with phosphorous and nitrogen from fertilizers and pathogens from manure. Phosphorous and nitrogen are two main nutrients that encourage plant growth, and they have the potential to limit plant growth if there isn't enough of one or the other. They are important for growing crops or have a green lawn, but too much running into streams can cause harmful algae blooms and other aquatic weed infestations. Manure also provides nutrients for plants and can be used as organic fertilizer in a garden or on crop fields. However, it causes public safety concern because water with high pathogen counts can make people and pets sick.

3.2.2 Goal Three

Goal 3 pertains to the common problem of wanting to "get rid" of water as fast as we can, treating it as a problem. When water's path is expedited through drain tile or other man-made drainage, water that used to be absorbed into the ground instead runs directly into the stream.

Therefore, during a rain storm, more water rushed into the stream faster and with more force than what naturally occurred prior to installing drainage. This causes a need for a bigger stream, which is created by water eroding the banks of the stream, thus sloughing large amounts of sediment into the stream and eating away adjacent, productive land. This process, if left alone, may eventually create a stable stream system, but it will take up more space and have greater fluctuation of water levels. We propose instead to address water at its source, infiltrative it into the ground and metering it out slowly when possible to mimic water's natural course as closely as possible in the context of productive farming operations.

3.2.3 Goal Four, Five and Six

Through Goals 4, 5, and 6, we want to enhance each project or practice geared to improve water quality so other benefits are attained. When possible, wildlife habitat will be added to water quality improvement projects. Each project and practice will be implemented with consideration of landowners' welfare as agricultural producers. Landowners are making a living while taking care of their environment. Care should be exercised to make decisions that will improve both of these needs for the people and the land. Best management practices (BMPs) that are implemented need to be profitable or at least break even for the landowner.

3.3 Objectives

In order to address each of the six goals above, the planning committee and technical advisors reviewed, revised, and adopted objectives for each goal. We propose the following objectives, which can be measured.

Objectives for Goal 1: Reduce sediment and nutrient loading from creek banks.

A. Stabilize 2210 feet of bank along the most severely eroded sections of creek along Loran Road.
B. Stabilize 5814 feet of the most severely eroded creek banks throughout the watershed.
C. Execute the maintenance plan for long-term creek bank stabilization.

Objectives for Goal 2: Reduce sediment and nutrient loading from livestock and row crop operations.

Apply appropriate Best Management Practices (BMPs) to accomplish the following.

A. Address end-row erosion on 3.4 acres (20% of the total 17 acres of end rows).
B. Buffer 7,140 feet of stream from sediment and nutrient loading (20% of 35,700 feet without existing buffer).

C. Target erosion in crop fields on 590 acres (20% of the 2,944 acres of tilled crop land).
D. Address nutrients and pathogens originating from 1 of 6 existing livestock operations.
E. Improve vegetative cover in 16 acres of existing, forested riparian areas (20% of the total 79 acres).

Objectives for Goal 3: Address volume and velocity of water runoff to enhance water quality.

A. Design whole-farm management systems for 10-year and/or 25-year storm events to be proactive in reducing flooding utilizing BMPs.
B. Incorporate a good water management system that will measurably improve downstream impacts.
C. Slow/manage water flow using BMPs, especially through channelized section along Loran Road.

Objectives for Goal 4: Utilize practices that protect and/or enhance wildlife habitat.

For each BMP focused on water quality, protect and/or enhance habitat for:

A. Pollinators (e.g. monarch butterflies and honeybees),
B. Fish,
C. Macroinvertebrates,
D. Waterfowl,
E. Turtles,
F. Amphibians,
G. Species in Greatest Need of Conservation, and
H. Threatened and Endangered Species.

Objectives for Goal 5: Consider landowner needs with each project and practice.

A. Utilize cost share opportunities when available for each BMP.
B. Provide technical assistance to landowners to plan and implement BMPs.
C. Utilize market-value crops in conservation buffer practices when practicable.

Objectives for Goal 6: Maintain and support a sustainable farming community.

A. Review and propose revisions to state and federal regulations related to farming practices that affect water quality, runoff volume, and economic viability.
B. Put ordinances into place to protect the rural farming community from the negative effects of urbanization in relation to water quality, runoff volume, and ability to continue farming.
C. Review and propose revisions to local stormwater ordinances if farmland conversion occurs.
D. Utilize water quality BMPs that keep properties within the County tax base.

The objectives can be fulfilled by following the recommended projects and practices presented in Chapter

Chapter 4
Recommended Projects and Practices

Written by Joseph Ginger, Shannon Thruman, and Rebecca Olson

4.0 Introduction

Chapter 3 addressed concerns, goals and objectives for the watershed. This chapter provides recommended projects and practices for implementation and supporting education, with a central theme of sustainable farming and stewardship for the soil. Efforts will also be directed towards bring about better local governmental regulations and support of efforts to protect family farming.

The area surrounding the Spring Branch of Yellow Creek consists of land devoted to agricultural uses. There are no urban areas, nor are there plans for future development. For each type of agricultural use, we have suggestions for conservation projects and practices, which are listed and explained below. Potential projects and practices have been discussed at length with the Planning Committee and reviewed by the Technical Advisory Committee.

As a result, four site-specific projects were volunteered by interested landowners, and watershed-wide projects and practices were collectively agreed upon to be appropriate for the watershed and likely to be implemented at specified target levels. We have correlated each project and practice to the goals and objectives addressed, and we have provided our best estimates of their cost and effectiveness in reducing pollutant loading into the stream. This information is provided below.

Planning Committee Discussing Goals

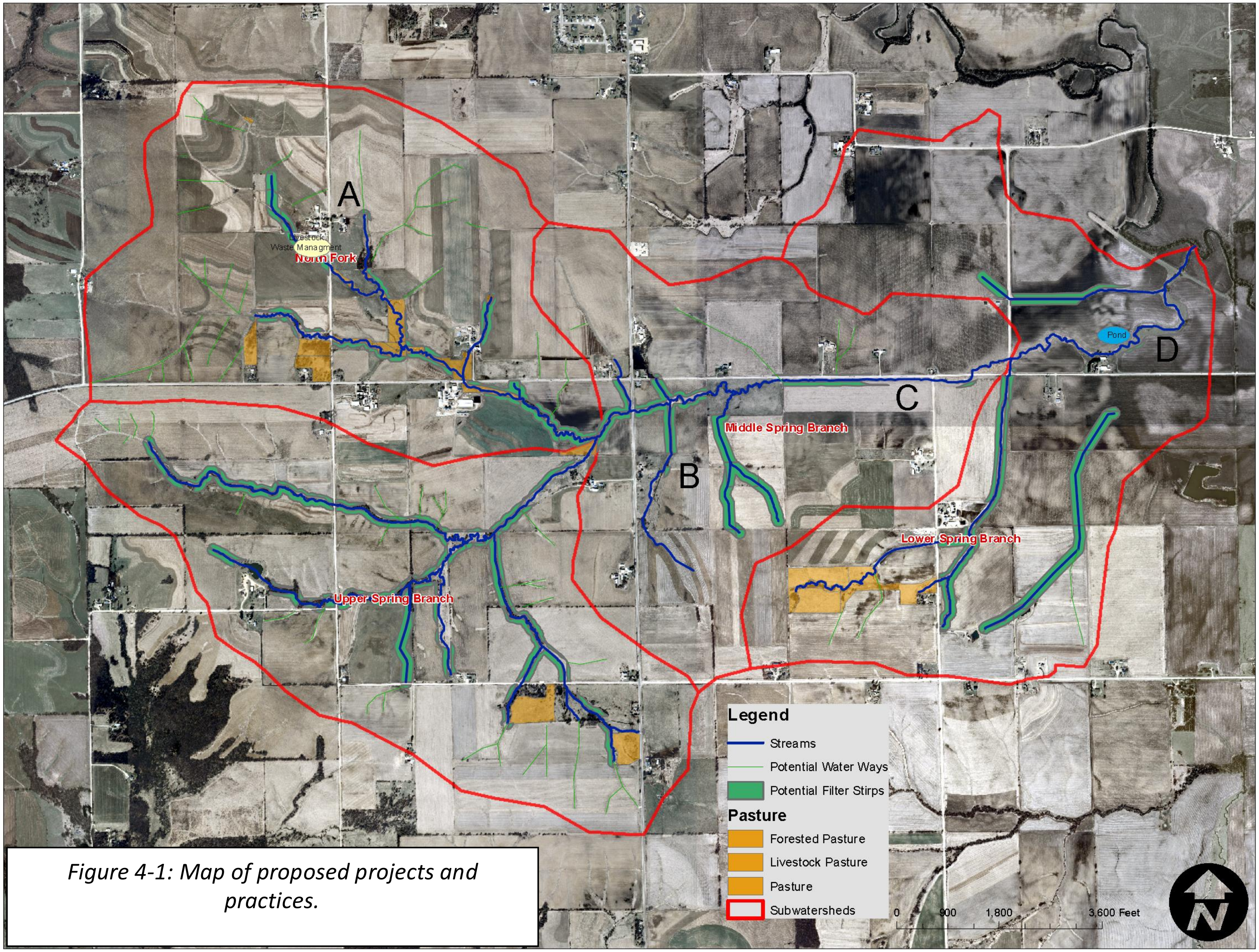


Figure 4-1: Map of proposed projects and practices.

Figure 4-2: Summary of Best Management Practices (BMP) Recommended for Implementation: Watershed-wide and Site-specific

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
1. No-Till (Convert from Conservation Till)	2,120	ac.	$ 20	$ 42,400	3,789		5,711	10,652	14.13%		18.58%	14.86%	High
2. Cover or Green Manure Crop	3,260	ac.	$ 40	$ 130,400	6,795		5,555	11,119	25.34%		18.07%	15.51%	High
3. Filter Strip	82	ac.	$ 940	$ 76,845	5,151		7,253	13,530	19.21%		23.59%	18.88%	High
4. End-Row Conversion	17	ac.	$ 920	$ 15,456	315		276	544	1.17%		0.90%	0.76%	Med
5. Field Borders	17	ac.	$ 920	$ 15,456	315		276	544	1.17%		0.90%	0.76%	Med
6. Grassed Waterway	16	ac.	$ 5,250	$ 84,000	6,641		6,641	13,282	24.77%		21.60%	18.53%	High
7. Grade Stabilization Structure	13	#	$ 5,400	$ 70,200	58		58	116	0.22%		0.19%	0.16%	Low
8. Prescribed Grazing	196	ac.	$ -	$ -	290		153	306	1.08%		0.50%	0.43%	Low
9. Stream Channel Stabilization (e.g. riffles)	600	ft.	$ 80	$ 48,000	26		26	51	0.10%		0.08%	0.07%	Low
10. Streambank Stabilization	29,073	ft.	$ 80	$ 2,325,840	3,416		3,416	6,893	12.74%		11.11%	9.62%	Med
11. Subsurface Drain	2,300	ft.	$ 5	$ 11,500	5		5	10	0.02%		0.02%	0.01%	Low
12. Water and Sediment Control Basin	1	ac.	$ 2,000	$ 2,000	13		13	27	0.05%		0.04%	0.04%	Med
13. Waste Storage Structure etc.	1	#	$1,060,000	$ 1,060,000			997	11,185			3.24%	15.61%	High
14. Pond	1	#	$ 125,000	$ 125,000		409,963	361	3,412		100.00%	1.17%	4.76%	High
Totals				**$4,007,097**	**26,814**	**409,963**	**30,741**	**71,671**	**100%**	**100%**	**100%**	**100%**	

* All of the voluntary practices and projects listed would be the responsibility of each landowner. Only streambank and stream channel stabilization has the potential to occur on both public and private lands. All other activities would need to be implemented exclusively on private lands.

** Potential areas reported represent all known possibilities within the watershed. Landowners have expressed 5-year and 10-year targets for watershed-wide implementation projects and practices. Within 5 years, landowners intend to implement 10% of the area possible for each project or practice. Within 10 years, they will strive to implement 20%.

4.1 Already Implemented Projects and Practices

Farmers in the Spring Branch watershed are proud of the conservation-minded practices that are already taking place. A drive around the watershed reveals conservation tillage, cover crops, terraces, contour farming, and more. In fact, the farmers in the watershed are practicing either conservation tillage or no-till in every single crop field in the watershed. Further evidence from page eight from the Pecatonica River TMDL Stage 2 report, reveals the farmers conservation-mindedness numerically, as phosphorus loading is greatly lowered. Results show phosphorus between .078-.63 mg/L, down from the last IEPA testing in 1988 at 1.34 mg/L.

They have and continue to prevent significant sediment and nutrient loading into the stream, as presented in Figure 4-3 below. They are also effectively protecting heavy use areas, managing pastures, and practicing pest management. Most farms have a nutrient management plan. Of the six livestock operators, two already have manure management plans.

Figure 4-3: Pollutant load reductions already occurring due to conservation tillage, no-till, and cover crop practices (as compared to conventional till).

BMP Name	Potential Area		Pollution Reduction Estimate (compared to conventional till)			
			Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)
Conservation Till	2,120	ac.	15,155		13,109	26,234
No-Till	824	ac.	7,649		6,604	13,217
Cover Crop	157	ac.	1,913		1,605	3,212
Alfalfa	274	ac.	2,646		2,188	4,380
Wheat	79	ac.	1,049		865	1,731
Total	**3,454**	**ac.**	**28,412**		**24,371**	**48,774**

When compared to the potential to further reduce sediment and nutrient loading into Spring Branch as presented in Figure 4-2, it is clear that farmers have achieved significant improvement to the stream's water quality. Now they would like to do more. Sections 4.2 and 4.3 describe the projects and practices that landowners intend to implement, both within the time frame of this plan and long-term.

4.2: Site-Specific Projects

Four landowners expressed interest in implementing large-scale projects on their properties. Each of these projects, described below, vary in scope and address different land uses, and all are of high priority. One landowner would like to apply various BMPs to the existing structures of his livestock operation. A second landowner will volunteer to deter stormwater runoff on his property and meter it out slowly while filtering out the pollutants. The third landowner would benefit Spring Branch by stabilizing the most channelized section of stream within the watershed, while a fourth landowner is willing to create a pond or water and sediment control basin near the confluence of Yellow Creek. These projects are geographically located along the entire length of Spring Branch (See Figure 4-1).

4.2.1: Project A - Waste Storage Structure Etc.

Addresses Goal 2 Objective D: Apply BMPs to address sediment, nutrients, and pathogens originating from 1 livestock operation.

A livestock producer at Site A has expressed an interest in implementing BMPs to his operation to better manage livestock waste.

Phase 1 (See Figure 4-5 below), designed and written by Wagner Consulting and Agriculture, would consist of extending freestall barn #1 to the west, removing the existing manure storage structure and remodeling of freestall barn #1 as required. The proposed expansion would be used to house approximately 120 to 140 of his existing cows. This expansion would be used to eliminate the use of the outside concrete lot. When this barn would be constructed, a manure transfer system would also be required to transfer the waste from the end of the barn to a new waste storage structure. As a rough rule of thumb, for a year of storage, we estimate about 1 million gallons per 120 cows, so the waste storage structure would be approximately 1 million gallons in size. The waste storage structure would be located to the north of the existing waste storage structure.

Other items that would be included in Phase 1 would be the construction of a hard pavement surface in the bunker area. The bunkers are currently ag-lime or compacted clay. The proposed hard pavement surface would be asphalt or concrete. This would be used to prevent any leachate from percolating thru the soil and help with soil erosion and tracking of soil and sediment when stacking the piles and mixing feed every day. Also a berm would be constructed on the west side of the bunkers to separate any potential runoff from the existing waterway. This berm could be set up with a collection system to pump the waste into the proposed waste storage structure, if required at a later date in time. The last item included in Phase 1 would be the construction of a commodity shed. This would allow for the storage and mixing of the feed sources to be under the roof. This should help with the potential of runoff from these feed sources when stored or mixed.

The estimated budgetary costs for this phase are as follows: (1) freestall barn addition and remodeling – $440,000, (2) waste transfer system - $60,000, (3) waste storage structure - $250,000, (4) commodity ched - $60,000, (5) hard surface for bunkers - $250,000. Phase 1 would contribute significant benefit to the water quality of Spring Branch as presented in Figure 4-4. A description of waste storage structures and other waste management practices is provided in Section 4.3.13.

Figure 4-4: Total sediment and nutrient load reduction estimates for Phase 1 at Site A.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
A. Waste Storage Structure etc.	1	#	$1,060,000	$ 1,060,000			997	11,185			3.24%	15.61%	High

Figure 4-5: Phase 1 of waste storage structure, etc.

The landowner would also like to incorporate BMPs to manage waste into his plans for expansion. He plans to increase his herd in two phases (Phase 2 and 3 below), which will require additional housing structures. BMPs will significantly reduce pollutant loading into the stream as these phases are implemented.

PHASE 2: The second phase would consist of the construction of a new zero discharge facility located to the north of the existing setup. This would be a 600 cow total herd size setup. The setup would include a new parlor, holding area, freestall barn, waste storage structure, bunkers, and commodity shed. Silage leachate would be captured and the milkhouse waste would go into the waste storage structure. There are a lot of specific details that would need to be determined to hone in on the exact costs for a setup similar to this, but we would estimate a budgetary cost of $7 million including the excavation.

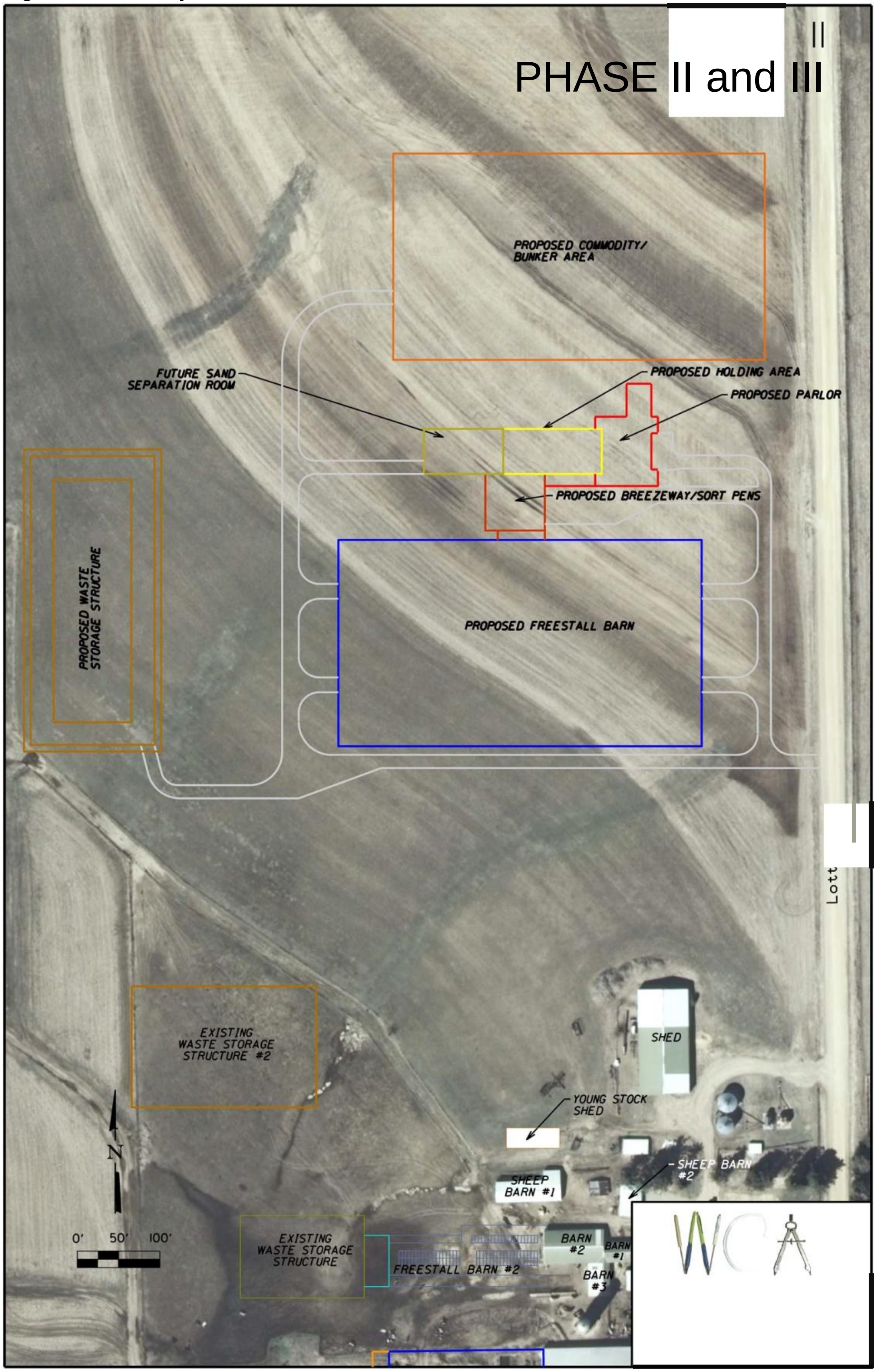
PHASE 3: Once phase 2 is completed, the last phase would be to bring the heifers that are currently raised off-site back to the farm and raise them at the old setup rather than abandoning the setup. The setup at this point in time will have the appropriate manure storage with roofs and covers to best prevent manure and wastewater runoff. The total number of animal units determined upon on the weight of all the animals would be approximately 1,240 animal units at this point in time, or based on a milk cow basis would be 840 animal units. The proposed herd distribution would be 48 calves (150 lbs), 72 calves (275 lbs), 72 calves (425 lbs), 108 heifers (575 lbs), 72 heifers (725 pounds), 228 bred heifers (1,000 lbs), and 600 cows (1,400 lbs). The cost for this phase would only include any barn modifications to accommodate the smaller size animals and facilitate use by them. We are not including any additional costs with Phase 3, as this phase could happen immediately after Phase 2 and the costs would be included in the Phase 2 improvements.

If Phases 2 and 3 were to happen, the increased operational capacity would generate increased potential for sediment and nutrient runoff. Using updated baseline pollutant loads, the potential for reduction is estimated as follows.

Figure 4-6: Potential sediment and nutrient reduction estimates for Phases 2 and 3 at Site A, based on updated baseline estimates.

BMP Name & Reference Number	Potential Area		Cost Est.	Pollution Reduction Estimate			
				Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)
A. Phase 2	16	ac.	$ 7,000,000			1,967	22,116
A. Phase 3						3,122	33,191

Figure 4-7: Plans for Phases 2 and 3 at Site A.



4.2.2: Project B - Water and Sediment Control Basin Etc.

Addresses Goal 3 Objective B: Address volume and velocity of water runoff to enhance water quality by incorporating a good water management system that will measurably improve downstream impacts.

Addresses Goal 4 Objective D: Utilizes practices that protect and/or enhance wildlife habitat for waterfowl.

At the Site B, a private landowner has expressed interest in reducing water flow, slowing water velocity, and addressing erosion. Conceptually, a water and sediment control basin or level spreader could be constructed to detain water and settle sediment and nutrients on-site. Water could then be metered out slowly through a subsurface drain or grassed waterway to the main branch of the stream. This project would significantly reduce the sediments and nutrients entering Spring Branch as estimated in Figure 4-8. Additionally, the main channel could be protected by a filter strip (see Section 4.3.3: Filter strips). A description of water and sediment control basins is provided in Section 4.3.12.

Figure 4-8: Estimated sediment and nutrient load reductions at Site B.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
B. Subsurface Drain	2,300	ft.	$ 5	$ 11,500	5		5	10	0.02%		0.02%	0.01%	Low
B. Water and Sediment Control Basin	1	ac.	$ 2,000	$ 2,000	13		13	27	0.05%		0.04%	0.04%	Med
B. TOTAL				$ 13,500	18		18	37	0.07%		0.06%	0.05%	Med & Low

Addresses Goal 1 Objective A: Reduce sediment and nutrient loading from creek banks by stabilizing 2,710 feet of bank along the most severely eroded sections of creek along Loran Road.

Addresses Goal 4 Objectives B & C: Utilize practices that enhance wildlife habitat for fish and macroinvertebrates.

4.2.3: Project C - Loran Road Streambank Stabilization

As the stream runs next to Loran Rd., it is channelized for 2,710 feet. Severe erosion occurs for most of its length. The property owner, a public entity, is interested in addressing erosion issues and slowing water velocity. Due to the narrow footprint in which to work, streambank stabilization is a likely practice. These practices would reduce sediment and nutrients entering Spring Branch, as estimated in Figure 4-9. A description of streambank stabilization is provided in Section 4.3.10.

Methods of water velocity reduction and stream channel restoration, such as weirs and riffles, could also be considered. Any project designed upstream or uphill to reduce velocity would help ensure successful stabilization practices in the long term.

Channelized creek along Loran Road

Figure 4-9: Sediment and nutrient load reduction estimates for stream stabilization at Site B.

BMP Name & Reference Number	Potential Area		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
C. Loran Rd. Streambank Stabilization	2,710	ft.	$ 80	$ 216,800	210		210	420					Med

Addresses Goal 3 Objective B: Addresses volume and velocity of water runoff to enhance water quality by incorporating a good water management system that will measurably improve downstream impacts.
Addresses Goal 4 Objectives B, C, D, and E: Utilize practices that enhance wildlife habitat for fish, macroinvertebrates, waterfowl, turtles, and amphibians.

4.2.4: Project D - Pond

Near the confluence of Spring Branch and Yellow Creek, landowners representing a family of a Centennial Farm have expressed an interest in constructing a pond to capture sediment and nutrients, while also serving as habitat for wildlife. A one to three-acre pond could be constructed if site conditions allow. The stream could possibly flow directly into the pond; or water could be routed to the pond, filtered, then routed back to the stream. A pond at this location would capture sediment and nutrients that were in the stream before they enter the Yellow Creek in the amounts estimated by Figure 4-10. A description of ponds is provided in Section 4.3.14.

Figure 4-10: Total suspended solid and nutrient reduction estimates for pond construction at Site B.

BMP Name & Reference Number	Potential Area		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
D. Pond	1	#	$ 125,000	$ 125,000		409,963	361	3,412		100%	1%	5%	High

4.3: Watershed-wide Projects

Projects and practices that can be implemented throughout the watershed are described in the following pages. For each project or practice, the potential for reducing sediment and nutrient loading to the stream throughout the watershed is repeated from Figure 4-2. Each project or practice is correlated to the goals and objectives from Chapter 3 to which it addresses. Goals 5 and 6 are relevant for all projects and practices.

Load reductions of future individual projects will need to be determined per future project using the Environmental Protection Agency's worksheets collectively called "Estimating Load Reductions for Agricultural and Urban BMPs." This information will be helpful to potential funding agencies, and it could also be used by an implementation committee to keep track of progress toward the goals and objectives of this plan. We attempted to calculate a per-acre load reduction estimate with the intention for future implementers to easily determine load reductions of future projects, but the cumulative effect of multiple acres do not directly correlate per acre.

4.3.1: Project 1 - No-till

Addresses Goal 2 Objective C: Reduce sediment and nutrient loading from row crop operations by targeting erosion in crop fields.

Photo from nrcs.gov

Currently, all of the row crops in the watershed are being cropped using soil-saving, nutrient-loss reduction through either conservation tillage, (2,120 acres) or no-till (824 acres). Conservation tillage is a broad definition which includes no-till and several other tillage methods. In this case, conservation tillage in the watershed is categorized as methods other than no-till. Conservation tillage is any tillage method that leaves crop residue of 30% or greater. No-till is a method of tillage that leaves 70% or greater crop residue. Converting conservation tillage methods to no-till would result in even greater reductions of sediment and nutrient loss to Spring Branch than already achieved by conservation till, as estimated in Figure 4-11. Leaving a residue cover of 70% reduces erosion by more than 90% when compared to a bare field whereas, while leaving only 20% to 30% after planting reduces soil erosion by approximately 50% when compared to a bare field (Simmons and Nafziger, 2012).

For more information about conservation tillage, see the following resources:
NRCS Residue and Tillage Management-No Till
https://efotg.sc.egov.usda.gov/references/public/IL/IL329FinalMarch2015.pdf
Illinois Agronomy Handbook
http://extension.cropsciences.illinois.edu/handbook

Figure 4-11: Sediment & nutrient load reduction estimates achieved by converting tillage practices to no-till throughout the watershed.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
1. No-Till (Convert from Conservation Till)	2,120	ac.	$ 20	$ 42,400	3,789		5,711	10,652	14.13%		18.58%	14.86%	High

4.3.2: Project 2 - Cover or Green Manure Crop

Addresses Goal 2 Objective C: Reduce sediment and nutrient loading from row crop operations by targeting erosion in crop fields.

Plowing green manure crop mustard under. wilcox.com, Visited 4/9/2016

Triticale cover crop. http://www.mccc.msu.edu

Large quantities of nitrate can be lost from the soil left bare over winter. To combat this problem, cover crops primarily hold the soil and improve soil structure, blanketing entire fields rather than rows. Select species have the ability to root deeply and the capacity to penetrate or prevent compacted layers. There is potential to use cover or green manure crops on 2,944 acres of cropland throughout the watershed. Cover crops and green manure are often used interchangeably but are different terms, though related. Green manure can be fresh cover crops in spring and plowed under to increase available nutrients and build organic matter. Cover crops are planted between successive production crops, or companion- planted or relay-planted into production crops. According to Dean Oswald, Cover Crop Specialist, the three best cover crops for this region are wheat, triticale, and winter cereal rye (not to be confused with annual rye grass). The window for planting is fairly small and can be tricky. Cover crops should be planted before November in this county and need some growth before winter. They can be seeded on entire fields, between rows, or just end rows (see Section 4.3.4: End-Row Conversion).

For more information about cover crops and green manure, see the following resources.

Illinois Council on Best Management Practices
http://illinoiscbmp.org/

Midwest Cover Crop Council
http://www.mccc.msu.edu/states/illinois.html

Natural Resources Conservation Service's Field Office Technical Guide for Cover Crops
https://efotg.sc.egov.usda.gov/references/public/IL/IL340FinalMarch2015.pdf

Figure 4-12: Sediment and nutrient load reduction estimates by incorporating cover crop into tilled fields.

BMP Name & Reference Number*	Potential Area**	Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
				Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
2. Cover or Green Manure Crop	3,260 ac.	$ 40	$ 130,400	6,795		5,555	11,119	25.34%		18.07%	15.51%	High

4.3.3: Project 3 - Filter strips

Addresses Goal 2 Objective B: Reduce sediment and nutrient loading from livestock and row crop operations by buffering the stream.
Addresses Goal 4 Objective A: Enhance wildlife habitat for pollinators (e.g. monarch butterflies and honeybees).

Within a 100-foot width of the stream and along a length of 72,750 feet, 167 acres of cropland could be converted to filter strips. Filter strips are permanently designated plantings to treat runoff and are not part of the adjacent cropland's rotation. They buffer the environmentally-sensitive stream from sediment, particulate organic matter, and dissolved contaminants coming off of cropland, grazing land, or other disturbed land. If 82 acres were practiced in the watershed the estimated reduction amounts are presented in Figure 4-13. Filter strips also provide permanent vegetation that enhances wildlife and beneficial insects. This practice applies when used in conjunction with other conservation practices as part of a conservation management system. This practice does not apply where runoff or subsurface water does not interact with planned vegetation.

Photo from Minnesota Environmental Partnership Buffer Initiative

For more information about filter strips, see the following resources.

Natural Resources Conservation Service Conservation Practice Standard for Filter Strips
https://efotg.sc.egov.usda.gov/references/public/IL/IL393.pdf

Minnesota Environmental Partnership Buffer Initiative
https://www.mepartnership.org/buffer-initiative-it-will-help-protect-water-is-flexible-enough-to-meet-farmer-needs/

Figure 4-13: Sediment and nutrient load reduction estimates achieved by buffering the stream with filter strips.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
3. Filter Strip	82	ac.	$ 940	$ 76,845	5,151		7,253	13,530	19.21%		23.59%	18.88%	High

4.3.4: Project 4- Conversion of End Rows

Addresses Goal 2 Objective A: Reduce sediment and nutrient loading from livestock and row crop operations by addressing end-row erosion on crop and pasture land.

Addresses Goal 4 Objective A: Utilize practices that enhance wildlife habitat for pollinators (e.g. monarch butterflies and honeybees).

At the edges of crop fields is an end-row. These areas are typically planted with row crops in the opposite direction of the rows of the field. Since rows are usually planted parallel to a slope, the end rows run up and down the slope. Thus, there is no vegetation breaking the energy of runoff traveling down the slope, and more erosion occurs. Taking extra conservation measures, such as no-till within end row only would reduce the sediment and nutrients lost with erosion in amounts estimated by Figure 4-14. There is potential to convert 17 acres of end rows in the watershed.

Figure 4-14: Sediment and nutrient loss reduction estimates achieved by converting end-rows from conventional till to no-till.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
4. End-Row Conversion	17	ac.	$ 920	$ 15,456	315		276	544	1.17%		0.90%	0.76%	Med

4.3.5: Project 5 - Field Borders

Addresses Goal 2 Objective C: Reduce sediment and nutrient loading from row crop operations by targeting erosion in crop fields.

Addresses Goal 4 Objective A: Utilize practices that enhance wildlife habitat for pollinators (e.g. monarch butterflies and honeybees).

Field borders are like filter strips, except that they are located at the edge of crop fields rather than at the edge of the stream. They provide an interruption between fields that capture sediment carrying nutrients from field to field and eventually into the stream and reduce these amounts as estimated in Figure 4-15. There is potential to install 17 acres of field borders in the watershed.

For an example photo of a field border, see the following link.
https://www.flickr.com/photos/iowanrcs/20041028284/in/album-72157656980878659/

Figure 4-15: Sediment and nutrient load reduction estimates achieved by installing field borders.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
5. Field Borders	17	ac.	$ 920	$ 15,456	315		276	544	1.17%		0.90%	0.76%	Med

4.3.6: Project 6 - Grassed Waterways

Photo from Minnesota Dept. of Ag. www.mda.state.mn.us

Addresses Goal 2 Objective C: Reduce sediment and nutrient loading from row crop operations by targeting erosion in crop fields.
Addresses Goal 4 Objective A: Utilize practices that enhance wildlife habitat for pollinators (e.g. monarch butterflies and honeybees).

There are several areas where a shaped or graded channel could be established with suitable vegetation to convey surface water at a non-erosive velocity. The purpose of a grassed waterway is to convey runoff, prevent gullies and improve water quality. This practice is applied in areas where added water conveyance capacity and vegetative protection are needed to prevent erosion and improve runoff water quality resulting from concentrated surface flow. There is potential for installing 16 acres of grassed waterways throughout the watershed to improve water quality as estimated in Figure 4-16.

For more information on grasses waterways, see the following resources.

Natural Resources Conservation Service Conservation Practice Standard for Grassed Waterways
(https://efotg.sc.egov.usda.gov/references/public/IL/IL412_Grassed_Waterway_8-21-15.pdf)

Figure 4-16: Sediment and nutrient load reduction estimates achieved by installing grassed waterways.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
6. Grassed Waterway	16	ac.	$ 5,250	$ 84,000	6,641		6,641	13,282	24.77%		21.60%	18.53%	High

Addresses Goal 1 Objective B: Reduce sediment and nutrient loading from creek banks by stabilizing the most severely eroded creek banks throughout the watershed.

4.3.7: Project 7 - Grade Stabilization Structure

Photos from Terry Kirchner, NRCS

Grade stabilization structures are for areas where water is not running continuously; they are intended to stabilize the grade and control gully erosion. Structures are typically either a drop spillway or a small dam and basin with a pipe outlet built across a gully or grassed waterway. They drop water to a lower elevation while protecting the soil from gully erosion or scouring. Structures, earth embankments, and vegetated spillways need to be protected from livestock with fencing.

Photo from NRCS Wisconsin

For further information on grade stabilization structures, see the following resources:
Natural Resources Conservation Service Conservation Practice Standard for Grade Stabilization Structures
https://efotg.sc.egov.usda.gov/references/public/IL/IL410_8-21-15.pdf

Figure 4-17: Sediment and nutrient load reduction estimates achieved by installing13 grade stabilization structures.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
7. Grade Stabilization Structure	13	#	$ 5,400	$ 70,200	58		58	116	0.22%		0.19%	0.16%	Low

4.3.8: Project 8 - Prescribed Grazing Systems

Addresses Goal 2 Objective D: Reduce sediment and nutrient loading from livestock operations.

Addresses Goal 4 Objective A: Utilize practices that enhance wildlife habitat for pollinators (e.g. monarch butterflies and honeybees).

A planned grazing system improves the grass conditions, increases livestock production, improves wildlife habitat and reduces soil erosion and conserves water.

Planned grazing systems vary. Common systems are: 1) two-pasture, one-herd; 2) Three-pasture or four-pasture; 3) one-herd system; 4) Merrill-four pasture system; 5) High-intensity; 6) low-frequency; 7) Short-duration (Management Intensive Grazing); and 8) Cell-grazing system (NRCS Grazing factsheets, 2016). There is potential for adding planned grazing systems on 196 acres, improving water quality as estimated in Figure 4-18.

Before and after cattle exclusion on a stream. Photos from NRCS

Grazing chart Photo from Cornell Small Farms Program

For more information about planned grazing systems, see the following resources:

Natural Resources Conservation Service's Grazing Management
http://www.nrcs.usda.gov/wps/portal/nrcs/main/il/technical/landuse/pasture/

Pastures for Profit
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1097378.pdf

Grazing Systems Planning Guide
http://www.extension.umn.edu/agriculture/beef/components/docs/grazing_systems_planning_guide.pdf

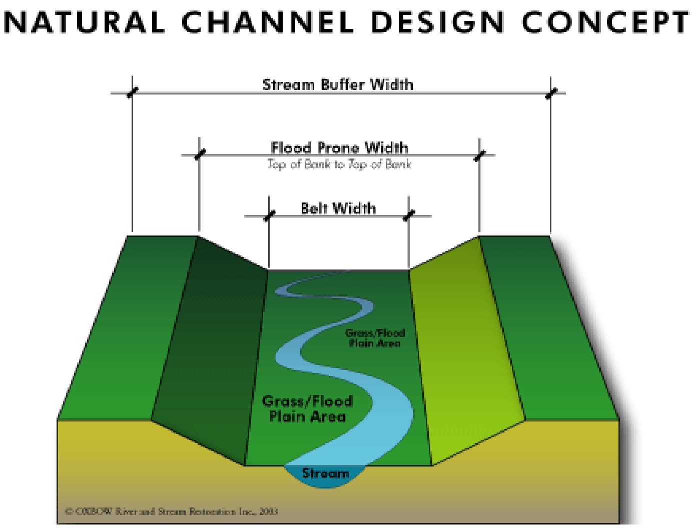
Figure 4-18: Sediment and nutrient load reduction estimates achieved by applying prescribed grazing systems.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
8. Prescribed Grazing	196	ac.	$ -	$ -	290		153	306	1.08%		0.50%	0.43%	Low

4.3.9: Project 9:- Stream Channel Stabilization

Addresses Goal 3 Objective C: Address volume and velocity of water runoff to enhance water quality by slowing/managing water flow.

Addresses Goal 4 Objectives B, C, and F: Utilize practices that enhance wildlife habitat for fish, macroinvertebrates, and turtles.



Streams are dynamic and constantly working toward a natural balance with four primary components: water, sediment, energy and vegetation. The balance of these components becomes altered when a stream is channelized. Channelization often decreases the length of the stream. This results in increased water velocity (energy), streambank slope, and stream bed and stream bank erosion (sediment); a reduction in the surrounding landscape and vegetation to assist in absorbing the increased volume of water. Stabilizing the stream channel means reducing the flow (energy) and increasing the vegetative cover.

Stream management techniques should be multi-objective, including promoting healthy stream wildlife and aiming to correct the fundamental cause if the instability. This practice can use several different techniques to accomplish a restored channel. Stream protection problems can be addressed as a restoration, which is to correct the problem or a protective measure, which compensates for the problem but does not correct the fundamental cause. Examples include lunkers, hibernaculum, enhancement riffles, and enhancing or recreating the channel.

The effectiveness of these measures is largely based on the vegetation's ability to bind the soil and moderate flow velocities. It's a long process and results are slow. There is potential to stabilize 600 feet of stream channel, resulting in estimated sediment and nutrient load reductions as presented in Figure 4-19.

For more information, see the following resources:

NRCS Field Operations Technical Guide for Stream Channel Stabilization
https://efotg.sc.egov.usda.gov/references/public/ND/584_Standard.pdf
Wisconsin Engineering Field Handbook
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_024948.pdf

Wild and Rare: Riparian Habitat Guide
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_022549.pdf
Nongame Wildlife Habitat Guide
http://www.darestoration.com/documents/2ndEd_Nongame_Wildlife.pdf

Figure 4-19: Sediment and nutrient load reduction estimates achieved by stabilizing stream channels.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
9. Stream Channel Stabilization (e.g. riffles)	600	ft.	$ 80	$ 48,000	26		26	51	0.10%		0.08%	0.07%	Low

4.3.10: Project 10 - Streambank Stabilization

Addresses Goal 1 Objective B: Reduce sediment and nutrient loading from creek banks by stabilizing the most severely eroded creek banks in the watershed.

Addresses Goal 4 Objectives B, C, and F: Utilize practices that enhance wildlife habitat for fish, macroinvertebrates, and turtles.

There are several locations in creek where the banks could be stabilized. If stream banks are inadequately protected, they can degrade. An adequate riparian zone is critical for stream bank restoration, 30 feet at minimum.

Protection includes preventative measures such as keeping travel lanes and heavy debris15 feet or more away from the edge of the streambank, keeping a riparian area, intercepting subsurface seepage, proper location of tile drainage, and restricting watering of livestock to locations where adequate streambank protection exists. Restoration of banks includes generally two catagories of restoration: soil bioengineering and structural engineering. Bioengineering includes several different techniques, most include a strong component of installing live vegetation: live stakes, a live fascine, or seeding of the streambank. Structural engineering includes: rock riffles, riprap, gabions, and bendway weirs.

For more information on streambank stabilization, see the following resources:

Illinois NRCS Engineering Standard Drawings Streambank Stabilization
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/il/technical/engineering/?cid=nrcs141p2_030565

Iowa DNR How to Control Streambank Erosion
http://www.ctre.iastate.edu/erosion/manuals/streambank_erosion.pdf

Figure 4-20: Sediment and nutrient load reduction estimates achieved by stabilizing streambank.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
10. Streambank Stabilization	29,073	ft.	$ 80	$ 2,325,840	3,416		3,416	6,893	12.74%		11.11%	9.62%	Med

Addresses Goal 2 Objectives C and D: Reduce sediment and nutrient loading from livestock and row crop operations by targeting erosion in crop fields and pastures.

<u>4.3.11: Project 11 - Subsurface Drain (or Conservation Drainage)</u>

A drainage water management system is using a water control structure in a drain to vary the depth of the drainage outlet. The water table must rise above the outlet depth for drainage to occur, as illustrated at right. The outlet depth, as determined by the control structure, is:

- Raised after harvest to limit drainage outflow and reduce the delivery of nitrate to ditches and streams during the off-season. (Figure I)
- Raised again after planting and spring field operations to create a potential to store water for the crop to use in midsummer. (Figure II)
- Lowered in early spring and again in the fall so the drain can flow freely before field operations such as planting or harvest. (Figure III)

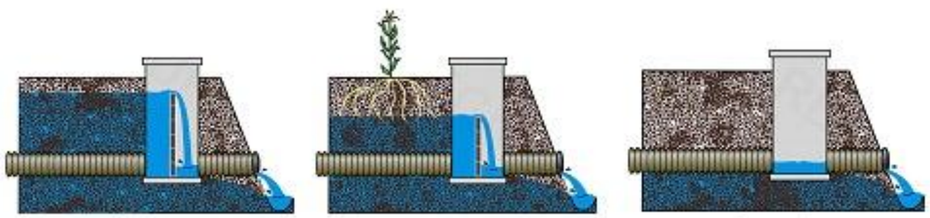


figure 1 figure 2 figure 3

The normal mode of operation in Illinois is to set the water table control height to within 6 inches of the soil surface on November 1 and to lower the control height to the level of the tile on March 15. Thus, water is held back in the field during the fallow period. In experiments in Illinois, reductions were measured of up to 45% for nitrate and 80% for phosphate. (Cooke, 2012)

(above information from University of Minnesota Extension)

For more information on subsurface drainage, see the following resources:

Illinois Agronomy Handbook Water Management
http://extension.cropsciences.illinois.edu/handbook/pdfs/chapter11.pdf

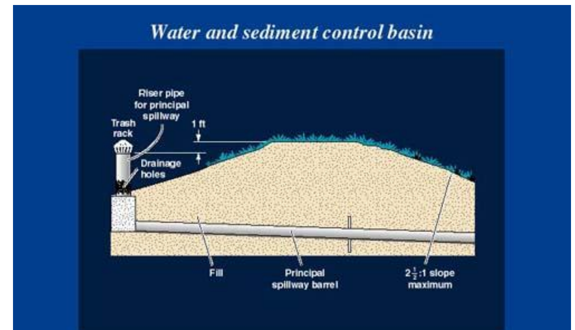
Figure 4-21: Sediment and nutrient load reduction estimates achieved by installing subsurface drain.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
B. Subsurface Drain	2,300	ft.	$ 5	$ 11,500	5		5	10	0.02%		0.02%	0.01%	Low

4.3.12: Project 12 - Water and Sediment Control Basins (WASCOB)

Addresses Goal 3 Objective B: Address volume and velocity of water runoff to enhance water quality by incorporating a good water management system that will measurably improve downstream impacts.
Addresses Goal 4 Objectives D, E, and F: Utilize practices that enhance wildlife habitat for waterfowl, turtles, and amphibians.

A water and sediment control basin is an earth embankment or a combination ridge and channel constructed across the slope of minor watercourses to form a sediment trap and water detention basin with a stable outlet. Basins help improve water quality by trapping sediment on uplands, preventing it from reaching downstream water bodies. Structures reduce gully erosion by controlling water flow within a drainage area. Basins reduce and manage on-site and downstream runoff. Grass cover may provide habitat for wildlife.



From University of Illinois Extension

For more information on water and sediment control basins, see the following resources: Iowa NRCS,Conservation ChoicesPractice Spotlight: Water and Sediment Control Basins

NRCS FOTG for Water and Sediment Control Basin
https://efotg.sc.egov.usda.gov/references/public/IL/638_1-13.pdf

Figure 4-22: Sediment and nutrient load reduction estimates achieved by installing water and sediment control basins.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
12. Water and Sediment Control Basin	1	ac.	$ 2,000	$ 2,000	13		13	27	0.05%		0.04%	0.04%	Med

4.3.13: Project 13 - Waste Storage Structure, Waste Management System, Waste Treatment Lagoon

Addresses Goal 2 Objective D: Reduce sediment and nutrient loading from livestock operations.

A 100-cow dairy herd can produce as much waste as 2,400 people. Project 13 has three sub-catagories: waste storage structure, waste management system, and waste treatment lagoon. All are interrelated but different enough to get a separate sub-practice heading and are in the next three sections.


Waste storage structure. Photo from NRCS

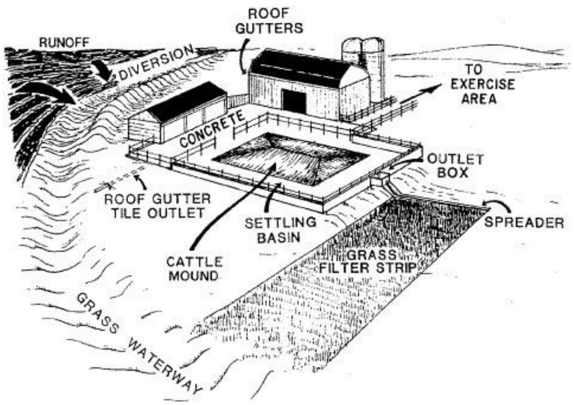
1. *Waste storage structure*

A waste storage structure a structure to temporarily store wastes such as manure, wastewater, and contaminated runoff as a storage function component of an agricultural waste management system. Estimated nutrient load reductions are presented in Figure 4-23.

Figure 4-23: Nutrient load reduction estimates achieved by installing waste storage structures.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
13. Waste Storage Structure etc.	1	#	$1,060,000	$ 1,060,000			997	11,185			3.24%	15.61%	High

2. *Waste management system*



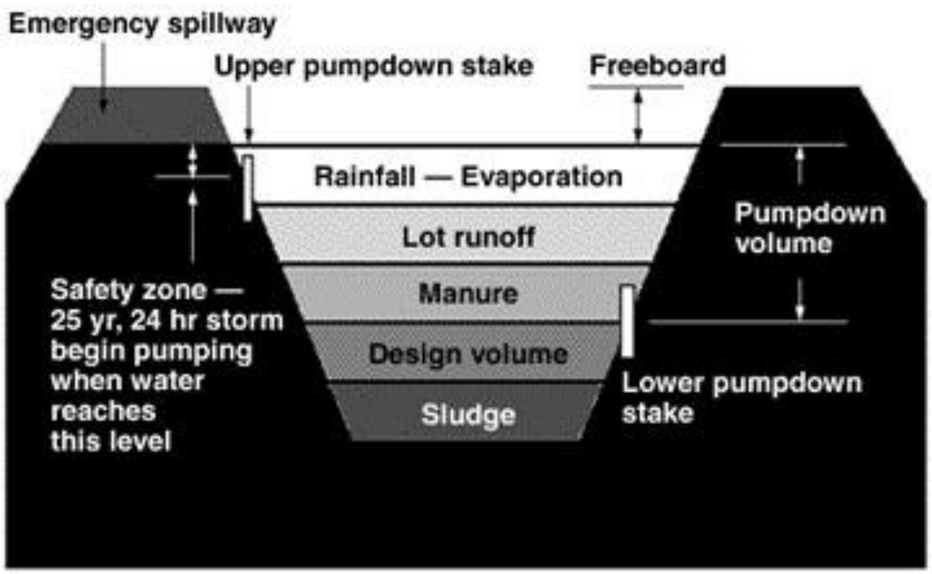
Stewarding livestock waste is critical so as not to contaminate surface or groundwater with nitrates and bacteria. Having a waste management system combines several BMPs into one system. It can include: settling basins, diversions, waste treatment lagoon, spreader, concrete area, and grass waterway.

For more information about waste management, see the following resources:
[University of Missouri Extension Reducing the Risk of Groundwater Contamination by Improving Animal Manure Management]

Waste storage structure. Photo from NRCS

3. *Waste treatment lagoon*

A waste treatment lagoon is an embankment and/or excavating a pit or dugout. It is used to biologically treat waste and reduce pollution potential by serving as a treatment component of a waste management system. Lagoon designs are required by Illinois law to be approved by a professional engineer.



4.3.14: Project 14 - Pond

A farm pond can be scenic and practical. A pond can capture runoff and provide water for livestock. It can also offer fishing, wildlife habitat, and ice skating. When installed in-line with the stream, a pond can reduce sediment and nutrient loading downstream by amounts estimated in Figure 4-24.

Figure 4-24: Sediment and nutrient load reduction estimates achieved by constructing a pond near the confluence of Yellow Creek.

BMP Name & Reference Number*	Potential Area**		Unit Cost Est.	Cumulative Cost est.	Pollution Reduction Estimate				% Pollution Reduction in Watershed				Priority
					Sediment (tons/yr)	TSS (lbs/yr)	P (lbs/yr)	N (lbs/yr)	Sediment	TSS	P	N	
14. Pond	1	#	$ 125,000	$ 125,000		409,963	361	3,412		100.00%	1.17%	4.76%	High

4.4 Other Recommendations

When choosing the site specific and watershed-wide projects and practices presented in sections 4.2 and 4.3, the Planning Committee considered numerous projects and practices appropriate for the watershed and determined those explained above to be the most appropriate. The ones that follow were determined to be unlikely to be implemented, either due to lack of interest or lack of good placement in the watershed without disrupting significantly current farming practices included:

- Critical planting area (No suitable areas for critical planting have been identified at this point.)
- Forest land erosion control system (There is very little forest within the watershed and it already has suitable grass cover.)
- Grass-lined channel (Areas where grass-lined channels would be appropriate are more stable than other target areas and are therefore lower in priority.)
- Green roof/roof runoff management
- Infiltration trench
- Level spreader
- Livestock exclusion (Pastures in this watershed are long and narrow, and they follow the creek. Fencing would render them useless, according to the local producers.)
- Permanent vegetative cover
- Rain garden
- Tree planting or woodland direct seeding
- Wetland restoration and wetland detention (Soils suitable for wetland restoration are in production and important to farmers' livelihoods.)
- Woodland improvement
- Stream channel restoration
- Nutrient management plan

After choosing projects and practices on which to focus, the Planning Committee determined a 10-year schedule for implementation. Technical advisors provided cost estimates and potential funding sources for each project and practice. This information is presented in Chapter 5.

4.5 Prioritizing Projects

The site-specific and watershed-wide projects were prioritized according to the cost per unit of pollutant load reduced and the level of opportunity within the watershed. In other words, if it was less expensive to reduce one unit of a certain pollutant via a project, then the project received a higher priority. Inversely, projects that were more expensive to reduce one unit of a pollutant ranked lower in priority. Cost per unit of pollutant reduced is reflected in Figure 4-25 below.

For each project, this cost basis was coupled with the level of opportunity to reduce pollutants throughout the watershed. Opportunity was measured by the percent of pollutant load reduction possible within the watershed. If a project had great opportunity to reduce pollutants from entering the stream, then the relative percentage of pollutant load reduction was high when compared to the total pollutant load reduction possible by completing all proposed projects. Projects with weaker opportunity reflected low percentages of pollutant load reductions as compared to the total reductions possible throughout the watershed. These percentages are reflected in Figure 4-2 above and repeated in Figures 4-7 through 4-29 below. Projects were assigned a priority of “High, Medium, or Low” depending on these two parameters as follows. A the costs and benefits of high, medium, and low priority projects are summarized below in Figure 4-26.

Fig. 4-25: Pollutant Load Reduction Cost per Unit

BMP Name & Reference Number*	Sediment ($/ton)	TSS ($/lb)	P ($/lb)	N ($/lb)	Priority
1. No-Till (Convert from Conservation Till)	$ 11.19		$ 7.42	$ 3.98	High
2. Cover or Green Manure Crop	$ 19.19		$ 23.47	$ 11.73	High
3. Filter Strip	$ 14.92		$ 10.59	$ 5.68	High
4. End-Row Conversion	$ 49.07		$ 56.00	$ 28.41	Med
5. Field Borders	$ 49.07		$ 56.00	$ 28.41	Med
6. Grassed Waterway	$ 12.65		$ 12.65	$ 6.32	High
7. Grade Stabilization Structure	$ 1,208.26		$1,208.26	$ 605.17	Low
8. Prescribed Grazing	$ -		$ -	$ -	Low
9. Stream Channel Stabilization (e.g. riffles)	$ 1,875.00		$1,875.00	$ 939.33	Low
10. Streambank Stabilization	$ 680.81		$ 680.83	$ 337.43	Med
11. Subsurface Drain	$ 2,346.94		$2,346.94	$1,173.47	Low
12. Water and Sediment Control Basin	$ 149.25		$ 149.25	$ 74.63	Med
13. Waste Storage Structure etc.			$1,063.19	$ 94.77	High
14. Pond		$ 0.30	$ 346.26	$ 36.64	High

Figure 4-26: Summary of Costs and Benefits of Priority Projects

Priority	Cost	Sediment		TSS Reductions		P Reductions		N Reductions	
	$	ton/yr	%	lb/yr	%	lb/yr	%	lb/yr	%
High	$2,040,245	22,376	83%	409,963	100%	26,518	86%	63,180	88%
Medium	$2,358,752	4,060	15%	-	-	3,982	13%	8,008	11%
Low	$ 129,700	379	1%	-	-	242	1%	483	1%
TOTALS	**$ 4,528,697**	**26,814**	**100%**	**409,963**	**100%**	**30,741**	**100%**	**71,671**	**100%**

High Priority

A project was considered to be of high priority if:

(1) for at least one pollutant, it had a cost per unit of pollution reduction ($/unit) lower than $100/ton sediment or $100/pound TSS, phosphorous, or nitrogen and
(2) it had a pollutant load reduction opportunity higher than 12% of the total opportunity in the watershed.

Highly prioritized projects included: no-till conversion from conservation tillage, cover or green manure crop, filter strip, grassed waterway, waste storage structure etc. (including Site-Specific Project A), and pond (including Site-Specific Project D). The costs and benefits of these projects are outlined below in Figure 4-27. Together, these projects have the potential to contribute to 83% of the sediment, 100% of the total suspended solids, 86% of the phosphorous, and 88% of the nitrogen load reductions identified throughout the watershed for approximately $2 million.

Figure 4-27: Costs and Benefits of High Priority Projects

BMP Name & Reference Number*	Cost	Sediment Reductions		TSS Reductions		P Reductions		N Reductions	
	$	ton/yr	%	lb/yr	%	lb/yr	%	lb/yr	%
1. No-Till (Convert from Conservation Till)	$ 42,400	3,789	14%			5,711	19%	10,652	15%
2. Cover or Green Manure Crop	$ 130,400	6,795	25%			5,555	18%	11,119	16%
3. Filter Strip	$ 76,845	5,151	19%			7,253	24%	13,530	19%
6. Grassed Waterway	$ 84,000	6,641	25%			6,641	22%	13,282	19%
13. Waste Storage Structure etc.	$ 1,060,000	-	0%			997	3%	11,185	16%
14. Pond	$ 125,000	-	0%	409,963	100%	361	1%	3,412	5%
TOTALS	**$1,518,645**	**22,376**	**83%**	**409,963**	**100%**	**26,518**	**86%**	**63,180**	**88%**

Medium Priority

A project was considered to be of medium priority if it had either of the parameters of a high priority project, but not both. Medium prioritized projects included: end-row conversion, field borders, streambank stabilization (including Site-Specific Project C), and water and sediment control basin (including Site-Specific Project B). The costs and benefits of these projects are outlined below in Figure 4-28. Together, these projects have the potential to contribute to 15% of the sediment, 13% of the phosphorous, and 11% of the nitrogen load reductions identified throughout the watershed for approximately $2.36 million.

Figure 4-28: Benefits of Medium Priority Projects

BMP Name & Reference Number*	Cost	Sediment		P Reductions		N Reductions	
	$	tons/yr	%	lb/yr	%	lb/yr	%
4. End-Row Conversion	$ 15,456	315	1.17%	276	0.90%	544	0.76%
5. Field Borders	$ 15,456	315	1.17%	276	0.90%	544	0.76%
10. Streambank Stabilization	$ 2,325,840	3,416	12.74%	3,416	11.11%	6,893	9.62%
12. Water and Sediment Control Basin	$ 2,000	13	0.05%	13	0.04%	27	0.04%
TOTALS	**$2,358,752**	**4,060**	**15%**	**3,982**	**13%**	**8,008**	**11%**

Low Priority

A project was considered to be of low priority if it did not have either of the parameters of a high priority project. These projects do have value, but do not have as much opportunity to reduce pollutant loading as the other named projects, and the reduction of each unit of pollutant comes at a higher price tag. Low prioritized projects included: grade stabilization structure, prescribed grazing, stream channel stabilization, and subsurface drain (including one proposed at Site-Specific Project B). The costs and benefits of these projects are outlined below in Figure 4-29.

Figure 4-29: Benefits of Low Priority Projects

BMP Name & Reference Number*	Cost	Sediment		P Reductions		N Reductions	
	$	tons/yr	%	lb/yr	%	lb/yr	%
7. Grade Stabilization Structure	$ 70,200	58	0.22%	58	0.19%	116	0.16%
8. Prescribed Grazing	$ -	290	1.08%	153	0.50%	306	0.43%
9. Stream Channel Stabilization (e.g. riffles)	$ 48,000	26	0.10%	26	0.08%	51	0.07%
11. Subsurface Drain	$ 11,500	5	0.02%	5	0.02%	10	0.01%
TOTALS	**$ 129,700**	**379**	**1%**	**242**	**1%**	**483**	**1%**

Chapter 5
Implementing Recommended Projects

5.0 Introduction

Written by: Rebecca Olson

Chapter 4 discussed the recommended implementation and education practices and projects and provided their pollutant load reduction estimates by grouping them according to the Environmental Protection Agency (EPA) best management practices (BMP) categories. This chapter utilizes the information learned in Chapter 4 to recommend targets, measurable milestones, schedules, cost estimates, suggested funding sources for each recommended project or practice needed to implement the plan, plus supporting education and outreach efforts to encourage plan implementation. A narrative of each element in this chapter precedes a table organizing a schedule for measurable milestones for recommended projects and practices.

It is intended that this chapter be used as a working document by the Spring Branch Watershed Plan Implementation Committee and updated at least once per year. The table of the implementation plan below (or the most updated version in future years) should be critiqued at least once per year to record progress and adjust targets and milestones as needed. We recommend that each year a plan be made specifically for the coming year, pulling out those milestones that could be accomplished during that year.

These planning elements are summarized in a ten-year implementation plan to the extent possible at the time of that this plan was written. Changes to the milestones, schedules, budgets, and sources of funding and technical assistance are likely, and they should be reviewed annually by a partnership formed to implement the plan. Chapter 6 discusses monitoring and evaluation strategies for measuring our plan's success.

In order to complete all of the recommended measurable milestones scheduled within ten years, implementation will cost about $2,062,000 , which will be supported by education in the amount of $85,000 (less than 1% of implementation costs). These costs are spread over ten years as divided below.

Figure 5-0: Cost Summary for Planning, Project Implementation, and Education and Outreach

Activity	Year 1	Years 1-5	Years 6-10	TOTAL
Planning	*$ 3,460*	*$ 44,765*	*$ 44,765*	$ 92,990
Watershed-Wide Project Implementation	-	*$ 336,860*	*$ 349,892*	$ 686,752
Site-Specific Project Implementation	-	*$ 1,375,300*	-	$ 1,375,300
Education	*$ 4,900*	*$ 42,423*	*$ 37,795*	$ 85,118
TOTAL	$ 8,360	$ 1,799,348	$ 432,452	**$ 2,240,160**

5.1 Implementation Strategy

To implement this plan, landowners would need to complete project and practices described in Chapter 4. To do so, Figure 5-1 schedules measurable milestones of our recommended implementation projects and practices and provide cost estimates. The implementation plan is designed with a ten-year life span. Projects are proposed that are scheduled for the first through fifth years, then for the sixth through tenth years.

Dates for the plan run as follows:

Years 1 through 5: July 2016 through July 2021
Years 6 through 10: July 2021 through July 2026

During the first year, landowners of site-specific projects will possibly submit grant applications. In Years 1 – 5, measurable milestones address many of the projects and practices recommended for implementation that have the highest potential for reducing pollutants from the Spring Branch. Some of these projects will be completed within this time frame, while we suggest others be implemented a little bit each year. This allows for projects and practices to be combined to form an incentive program that can be continued throughout the years. Years 6 – 10 will focus on projects that may take longer to carry out or take more planning, although some of them may have begun in prior years. Many of these projects are continued from Years 1-5, and others are initiated during Years 6-10.

We recognize that many of the recommended projects and practices initiated during this plan will need to be continued long-term. There may be opportunities to exceed targeted goals, which should be explored. It is also possible that projects will formulate with combinations of the recommended projects and practices, and therefore their timing may change.

Cost estimates were assigned to each project and practice to the best of our abilities within the scope of this plan. These cost estimates can be used for budgeting and scheduling purposes. When these projects are designed, more accurate cost estimates will be developed as the details of each project and practice are determined.

To implement this plan, continuing both planning and implementation efforts will be necessary. Measurable milestones and their schedules and cost estimates are presented in Figure 5-1 for planning, and Figures 5-2 through 5-4 for project and program implementation.

Figure 5-1: Schedule for Planning							
Year(s)	**Interim, Measurable Milestone**	**Potential Funding/Tech. Support**	**Completion Status**			**Costs**	
			Units	**% Complete**	**100% Complete (✓)**	**Estimate ($)**	**Actual ($)**
1	Set up Spring Branch Watershed Partnership (Partnership).	NLI, IDNR, EPA, Highland, Farm Bureau, SWCD/NRCS, Blackhawk Hills RC&D, Yellow Cr. Partnership, LoranTownship				$ 660	
1	Designate a watershed coordinator to increase the implementation of the education and outreach program and ensure continuation and action by the Partnership.	Blackhawk Hills RC&D, Yellow Cr. Partnership				-	
1	Submit a grant application for implementation projects.	Blackhawk Hills RC&D, EPA				$ 2,800	
1-10	Work with a designated watershed coordinator to increase the implementation of the education and outreach program and ensure continuation and action by the Partnership (estimate 20 hours/month).	Blackhawk Hills RC&D, Yellow Cr. Partnership				$ 56,544	
1-10	Conduct regular meetings of the Partnership (e.g. quarterly). Revise this plan as needed.	Blackhawk Hills RC&D				$ 26,387	
1-10	Meet annually (at least) with the Yellow Creek Watershed Partnership to collaborate efforts and financial and technical assistance.	Blackhawk Hills RC&D, Yellow Cr. Watershed Partnership				$ 6,597	
Total Costs for Planning (for 10 Years)						**$ 92,988**	
Costs for Initiating Planning During First Year (for Year 1 Start-Up Costs)						**$ 3,460**	
Average Costs for Planning per Year (for Years 1-10)						**$ 8,953**	
*Estimates reported for planning costs represent the value of volunteer time. It may be desired to hire a watershed coordinator and grant writer. Otherwise, efforts are volunteer. Value of volunteer time is based on $23.56 per hour as reported by the Independent Sector.							

Figure 5-2: Schedule for Watershed-Wide Project Implementation for Years 1-5							
Year(s)	**Interim, Measurable Milestone**	**Potential Funding/Tech. Support**	**Completion**			**Costs**	
			Units	**%**	**100% Complete (✓)**	**Estimate ($)**	**Actual ($)**
1-5	1. No-till: Convert 10% of land using conservation tillage practices to no-till practices.	SWCD/NRCS, EPA	212			$ 4,240	
1-5	2. Cover or Green Manure Crop: Start using cover or green manure crops on 10% of land in row crop production.	SWCD/NRCS, EPA	326			$ 65,200	
1-5	3. Filter Strip: Implement filter strips on 10% of fields in row crop production.	SWCD/NRCS, EPA	8.2			$ 7,708	
1-5	4. End-Row Conversion: Plant end rows in grass or prairie cover on 10% of fields in row crop production.	SWCD/NRCS, EPA	1.7			$ 1,564	
1-5	5. Field Borders: Create field borders on 10% of fields in row crop production.	SWCD/NRCS, EPA	1.7			$ 1,564	
1-5	6. Grassed Waterway: Install grassed waterways in 10% of the potential locations.	SWCD/NRCS, EPA	1.6			$ 8,400	
1-5	7. Grade Stabilization Structure: Construct grade stabilization structures in two locations within the watershed.	SWCD/NRCS, EPA	2			$ 10,800	
1-5	8. Prescribed Grazing: Practice prescribed grazing on 10% of the pastures.	SWCD/NRCS, EPA	19.6			-	
1-5	9. Stream Channel Stabilization: Install stream channel stabilization techniques (e.g. riffles) on 10% of the potential locations.	SWCD/NRCS, EPA	60			$ 4,800	
1-5	10. Streambank Stabilization: Stabilize 10% of the most severely eroded streambanks in the watershed.	SWCD/NRCS, EPA	2907			$ 232,584	
Total Costs for Watershed-Wide Project Implementation for Years 1-5						**$ 336,860**	
Average Cost of Watershed-wide Project Implementation per Year (for Years 1-5)						**$ 67,372**	

Figure 5-3: Schedule for Site-Specific Project Implementation for Years 1-5							
Year(s)	**Interim, Measurable Milestone**	**Potential Funding/Tech. Support**	**Completion**			**Costs**	
			Units	**%**	**100% Complete (✓)**	**Estimate ($)**	**Actual ($)**
1-5	A. Waste Storage Structure etc.: Install a waste storage technique at Site A.	SWCD/NRCS, EPA	1			$ 1,060,000	
1-5	B. Subsurface Drain: Install a subsurface drain at Site B (estimate 2,300 ft).	SWCD/NRCS, EPA	2300			$ 11,500	
1-5	B. Water and Sediment Control Basin etc.: Install a water and sediment control basin at Site B (estimate 1 ac.)	SWCD/NRCS, EPA	1			$ 2,000	
1-5	C. Streambank Stabilization: Stabilize the most severely eroded streambanks at Site C along Loran Road.	SWCD/NRCS, EPA	2210			$ 176,800	
1-5	D. Pond: Construct a pond near the confluence of Spring Branch and Yellow Creek that will settle and filter sediment and nutrients before it travels downstream.	SWCD/NRCS, EPA	1			$ 125,000	
Total Costs for Site-Specific Project Implementation for Years 1-5						**$1,375,300**	

Figure 5-4: Schedule for Watershed-Wide Project Implementation for Years 6-10 (Page 1 of 2)							
Year(s)	Interim, Measurable Milestone (for Implementation Efforts)	Potential Funding/Tech. Support	Completion			Costs	
			Units	%	100% Complete (✓)	Estimate ($)	Actual ($)
6-10	1. No-Till: Convert 10% of land using conservation tillage practices to no-till practices (total 20% at end of 10 years).	SWCD/NRCS, EPA	212			$ 4,240	
6-10	2. Cover or Green Manure Crop: Start using cover or green manure crops on 10% of land in row crop production (total 20% at end of 10 years).	SWCD/NRCS, EPA	326			$ 65,200	
6-10	3. Filter Strip: Implement filter strips on 10% of fields in row crop production (total 20% at end of 10 years).	SWCD/NRCS, EPA	8.2			$ 7,708	
6-10	4. End-row Conversion: Plant end rows in grass or prairie cover on 10% of fields in row crop production (total 20% at end of 10 years).	SWCD/NRCS, EPA	1.7			$ 1,564	
6-10	5. Field Borders: Create field borders on 10% of fields in row crop production (total 20% at end of 10 years).	SWCD/NRCS, EPA	1.7			$ 1,564	
6-10	6. Grassed Waterway: Install grassed waterways in 10% of the potential locations (total 20% at end of 10 years).	SWCD/NRCS, EPA	1.6			$ 4,032	
6-10	7. Grade Stabilization Structure: Construct grade stabilization structures in three locations within the watershed.	SWCD/NRCS, EPA	3			$ 16,200	

Figure 5-4: Schedule for Watershed-Wide Project Implementation for Years 6-10 (Page 2 of 2)							
Year(s)	Interim, Measurable Milestone (for Implementation Efforts)	Potential Funding/Tech. Support	Completion			Costs	
			Units	%	100% Complete (✓)	Estimate ($)	Actual ($)
6-10	8. Prescribed Grazing: Practice prescribed grazing on 10% of the pastures (total 20% at end of 10 years).	SWCD/NRCS, EPA	19.6			-	
6-10	9. Stream Channel Stabilization: Install stream channel stabilization techniques (e.g. riffles) on 10% of the potential locations (total 20% at end of 10 years).	SWCD/NRCS, EPA	60			$ 4,800	
6-10	10. Streambank Stabilization: Stabilize 10% of the most severely eroded streambanks in the watershed.	SWCD/NRCS, EPA	2907			$ 232,584	
6-10	11. Subsurface Drain: Identify a location and install a subsurface drain in one location (estimate 2,000 ft).	SWCD/NRCS, EPA	2000			$ 10,000	
6-10	12. Water and Sediment Control Basin etc.: Install a water and sediment control basin in one location (estimate 1 ac.)	SWCD/NRCS, EPA	1			$ 2,000	
Total Costs for Watesrhed-Wide Project Implementation for Years 6-10						**$ 349,892**	
Average Costs for Watershed-Wide Project Implementaion per Year (for Years 1-10)						**$ 69,978**	

5.2 Education and Outreach

There has already been a lot of education and outreach to encourage watershed involvement. The education and outreach is the continuation, in written steps (see Figures 5-6 through 5-8) to encourage public involvement in the implementation of the plan. If we are not careful, we could mistake results of this watershed plan as only nutrient and sediment reductions.

Education and outreach efforts for this plan are focused on encouraging implementation of the plan. They are geared toward landowners and farm managers within the watershed and the supporting community. During the first year, the Partnership will begin education efforts, as it will be necessary to educate watershed residents about this plan, the existing problems within the watershed, and potential benefits of implementing the suggested projects before asking them if they would like to implement any projects on their private properties. Education and outreach efforts will continue throughout the life of the plan. Measurable milestones and specific tasks are schedule in Figure 5-5, and the value of volunteer time needed is estimated. Figure 5-2 can be used

Jim Rohn, American entrepreneur famously said, “With people, fast is slow.” Education and outreach, planning guides, monitoring, meetings, assistance, investigating, all of these are requirements for the plan. Correcting impairments is the point of the plan. The human aspect of this plan is fundamental. The reason to do any of this, to wax poetic, is for humanity’s greater good.

Figure 5-5- Illinois Nutrient Loss Reduction Strategy

The Nutrient Loss Reduction Strategy Strategy outlines best management practices to reduce nutrient losses. It uses scientific assessments to target the most critical watersheds and to build upon existing state and industry programs. The goal is to reduce the amount of total phosphorus and nitrate-nitrogen reaching Illinois waters by 45 percent. Illinois is one of 12 states in the Mississippi River Basin included in U.S. EPA’s 2008 Gulf Hypoxia Action Plan. The plan calls on the 12 states to develop plans to reduce the amount of phosphorus and nitrogen carried to the Gulf of Mexico. Excess nutrients have led to an aquatic life “dead zone” that stretches for thousands of miles.

“The Illinois Farm Bureau supports the NLRS because it relies on education, outreach and voluntary incentive-based practices to fulfill agriculture’s role in reducing nutrient losses,” said Lauren Lurkins, Director of Natural and Environmental Resources – Illinois Farm Bureau.

http://www.epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy/index

There is a dead zone in the Gulf of Mexico that is 6,400 square miles caused by nutrient overload and sedimentation. Through a statewide effort there is gathering momentum for implementing the Nutrient Load Reduction Strategy (see sidebar). The Nutrient Loss Reduction Strategy is a cooperative agreement between all the 13 states in the Mississippi River watershed. Many states have programs similar to this plan funded by federal dollars. There is an education and outreach component to the plan as well as early and continued encouragement of public involvement in the implementation of the plan.

Figure 5-6: Schedule for Education and Outreach Start-Up for Year 1 (1 of 3 charts)							
Year(s)	**Interim, Measurable Milestone**	**Potential Funding/Tech. Support**	**Completion Status**			**Value of Volunteer Time***	
			Units	**% Complete**	**100% Complete (✓)**	**Estimate ($)**	**Actual ($)**
1	Develop a logo for the Spring Creek Watershed Partnership (Partnership).	N/A	1	100%	✓	$ 94	
1	Publicize this plan on the Blackhawk Hills RC&D website and distribute link.	Blackhawk Hills RC&D				$ 94	
1	Hold a public meeting to present the final plan.	Blackhawk Hills RC&D				$ 2,022	
1	Distribute an executive summary and link to this plan to all watershed residences.	Blackhawk Hills RC&D, Freeport Park Dist., Yellow Cr. Watershed Partnership				$ 1,885	
1	Create a webpage to gather and keep data current and to display progress.	Blackhawk Hills RC&D				$ 471	
1	Provide educational materials to watershed landowners and farm managers regarding the Illinois Nutrient Loss Reduction Strategy.	Blackhawk Hills RC&D, Yellow Cr. Watershed Partnership				$ 168	
1	Provide educational materials to watershed landowners and farm managers regarding opportunities for BMP implementation and funding.	Blackhawk Hills RC&D, Yellow Cr. Watershed Partnership				$ 168	
Total Value for Education and Outreach Start-Up for Year 1						**$ 4,902**	

Figure 5-7: Schedule for Education and Outreach for Years 1-5 (see also Figure 5-8)							
Year(s)	**Interim, Measurable Milestone**	**Potential Funding/Tech. Support**	**Completion**			**Value of Volunteer Time***	
			Units	**%**	**100% Complete (✓)**	**Estimate ($)**	**Actual ($)**
1-5	Have a representative of the Partnership individually contact the County SWCD/NRCS to discuss the watershed plan.	SWCD/NRCS				$ 283	
1-5	Have a representative of the Partnership individually contact the Farm Bureau to discuss the watershed plan.	Farm Bureau				$ 212	
1-5	Have a representative of the Partnership individually contact the Conservation and Ag Partner Foundation to discuss the watershed plan.	Farm Bureau				$ 212	
1-5	Have a representative of the Partnership individually contact Highland Community College to discuss the watershed plan.	Highland Community College				$ 283	
1-5	Have a representative of the Partnership individually contact the local school district to discuss the watershed plan.	Local school district				$ 283	
1-5	Have a representative of the Partnership individually contact Loran Township to discuss the watershed plan.	Loran Township				$ 283	
1-5	Have a representative of the Partnership individually contact the Stephenson County Board to discuss the watershed plan.	Stephenson County				$ 283	
1-5	Have a representative of the Partnership individually contact the Yellow Creek Watershed Partnership to discuss the watershed plan.	Yellow Creek Watershed Partnership				$ 848	
1-5	SWCD offer a public event to demonstrate cover crop application on private land during the fall of 2017 and returning for another look in the spring of 2018.	SWCD/NRCS				$ 1,942	
Total Value for Start-Up Education and Outreach for Years 1-5						**$ 4,628**	
Average Value for Start-Up Education and Outreach per Year (for Years 1-5)						**$ 926**	
*Match reported for education costs represents the value of volunteer time, as no cash input is required. Value of volunteer time is based on $23.56 per hour as reported by the Independent Sector and includes everyone involved (hosts and audiences).							

Figure 5-8: Schedule for Education and Outreach for Years 1-10							
Year(s)	Interim, Measurable Milestone	Potential Funding/Tech. Support	Completion			Value of Volunteer Time*	
			Units	%	100% Complete (✓)	Estimate ($)	Actual ($)
1-10 (Annually)	Launch and maintain an annual incentive and recognition program for private landowners to install BMPs.	NRCS				$ 23,560	
1-10 (Annually)	Engage the community conservation projects and programs including one local high school club or class. These can be volunteer work days or "Show Me, Help Me" events.	EPA (LEAP)				$ 22,550	
1-10 (Annually)	Provide a training session for managing native plantings for landowners with installed BMPs.	Natural Land Institute				$ 9,424	
1-10 (Annually)	Keep webpage updated with data and progress.	Blackhawk Hills RC&D				$ 4,241	
1-10 (Biannually)	Create displays (static or live) that can be set up at events and make appearances at events each year (estimate 2 events per year)					$ 4,712	
1-10 (Annually)	SWCD offer a public event to demonstrate BMPs on private land each year.	SWCD/NRCS				$ 4,712	
1-10 (Annually)	Farm Bureau offer a showcase involving a tool applicable to implementing this plan each year.	Farm Bureau				$ 4,712	
1-10 (At Least Annually)	Provide minutes of Implementation Committee meetings or a mailing to landowners and farm managers within the watershed to keep them abreast of the group's efforts.	Blackhawk Hills RC&D, Yellow Cr. Watershed Partnership				$ 1,678	
Total Value for Education and Outreach (for 10 Years)						**$ 75,589**	
Average Value for Education and Outreach per Year (for Years 1-10)						**$ 7,559**	
*Match reported for education costs represents the value of volunteer time, as no cash input is required. Value of volunteer time is based on $23.56 per hour as reported by the Independent Sector and includes everyone involved (hosts and audiences).							

5.3 Financial Support, Technical Support, and Matching Funds

Potential funding and technical assistance is available through various grant agencies and local environmental organizations suggested in this chapter. Costs can be deferred by organizing volunteer efforts, as grant agencies recognize the value of volunteer time and allow that value to provide matching funds for their grant dollars. For example, if a grant is secured to support 60% of the cost of implementing a $100,000 project, then the financial assistance would be $60,000 from the grant agency and the local community would need to budget $40,000 in cash and value of volunteer time to match the other 40%.

Local sources of matching funds are recommended and usually required to qualify for grant funding. Local match can come from several sources, including local environmental organizations and associations, businesses, developers, municipalities, and private citizens. Funds can be in the form of cash or the value of volunteer time. The national average for the estimated value of volunteer time in 2013 was $22.55 per hour according to the Independent Sector. It is important to recognize this value, as many projects that benefit water quality rely on dedication and many hours spent by volunteers.

5.3.1 Natural Resource Conservation Services

Additionally there are conservation programs and funding sources for the recommended BMPs (Best Management Practices) watershed-wide. Current and reliable funding and technical resources are available through the SWCD (Soil and Water Conservation District) and NRCS (Natural Resource Conservation Services) offices. Implementation of each BMP, the work of seeking out the funds, assistance and organizing the coordinating workload (on the ground and the paperwork) falls to the willingness of the farmer to complete. NRCS has at least 118 different conservation practices, with detailed information on each. These practices, with job sheets, standards, etc. are in the NRCS Field Office Technical Guide. The practice, as described in each job sheet, is eligible for funding through programs offered by the NRCS and SWCD. These include: Environmental Qualities Incentive Program (EQIP), Conservation Stewardship Program (CSP), and Streambank Stabilization (SSRP).

Natural Resource Conservation Services (NRCS)

Soil and Water Conservation District(SWCD)

Agencies and organizations that would potentially provide funding support for the priority projects and management practices recommended in this plan would be those with missions that address our success statement. There are several agencies that are active in improving water quality in northern Illinois through various programs. Some of the agencies and programs that are active in improving water quality are:

5.3.2 Illinois Environmental Protection Agency (IEPA)

Section 319 Program

The Environmental Protection Agency provided funding support for this plan through Section 319 of the Clean Water Act. The Section 319 Program also funds 60% of implementation of management practices and projects that address nonpoint sources of water pollution, with priority given to areas with a watershed-based plan such as this one. The other 40% of the project cost must come from another source and can be cash, the value of volunteer time, or a combination. Grant applications are due August 1st annually. Any entity is eligible to receive funds from the state, and the typical range for project funding is $50,000 - $1.2M.

This grant funds implementation of a Watershed Based Plan or Total Maximum Daily Load (TMDL) Implementation Plan; Development of a Watershed Based Plan, TMDL or TMDL Implementation Plan; Best Management Practice Implementation; Information/Education/Outreach; Monitoring; and Research.

http://www.epa.state.il.us/water/watershed/forms/319-rfp.pdf

http://water.epa.gov/grants_funding/cwa319/319Guide.cfm.

State Revolving Fund (SRF)/Clean Water Initiative

Units of government including Sanitary Districts are eligible. Water Pollution Control Loan Program for wastewater projects and the Public Water Supply Loan Program for drinking water projects. These SRF programs will be the funding conduit for theGovernor's recently announced Clean Water Initiative, an initiative that will utilize the existing program capacity of the well-developed SRF programs to leverage funding available for water infrastructure over at least the next three fiscal years. Funds infrastructure projects such as replacing aging water mains, upgrading water towers, or bringing waste water treatment facilities in line with federal standards. NOTE: this is a low interest loan program not a grant program. www.epa.state.il.us/water/financial-assistance/state-revolving-fund.html

5.3.3 McKnight Foundation

The McKnight Foundation uses their resources to "restore the water quality and resilience of the Mississippi River." It provides funding support for projects and management practices that restore and protect floodplains and wetlands and reduce agricultural pollution within the Mississippi River Basin including Illinois. They have four deadlines for initial inquiries throughout the year: February 1, May 1, August 1, and November 1. For more information, visit their website at:

http://www.mcknight.org/grant-programs/mississippi-river/.

5.3.4 State of Illinois– Illinois Department of Natural Resources (IDNR)-

Illinois Wildlife Preservation Fund Grant Program

Individuals, groups, and organizations are eligible.

$2,000-$20,000 per granting year, depending on the size and scope of the project. Grants are given priority if they address Species of Greatest Need of Conservation from the Illinois Wildlife Action Plan.

The DNR grants funds for projects which include those that preserve, protect perpetuate and enhance non-game wildlife and native plant resources of Illinois. These projects focus on management, site inventories or education.

www.dnr.state.il.us/grants/Special_Funds/WildGrant.htm

5.3.5 U.S. Fish and Wildlife Service (FWS)

The U.S. Fish and Wildlife Service has two programs that may be supportive of some of our implementation projects: Partners for Fish and Wildlife and the Wildlife and Sport Fish Restoration Program.

Partners for Fish and Wildlife

The U.S. Fish and Wildlife Service provides small grants to purchase native seed mixes for prairie, wetland, and woodland restoration that provides wildlife habitat. Some of the recommended projects may qualify, such as constructed wetlands, because they will provide dual purposes of improving water quality and creating wildlife habitat. For more information, visit their website at:

http://www.fws.gov/partners/.

Wildlife and Sport Fish Restoration Program

The U.S. Fish and Wildlife Service funds 75% of the total cost of sport fish habitat restoration, land acquisition for sport fish habitat, aquatic education, and outreach projects. For more information, visit their website at:

http://wsfrprograms.fws.gov/.

5.3.6 Monarch Butterfly Conservation Fund

Not for profit organizations and governmental bodies are eligible.

The grant award is a 1:1 match with funding from $50,000-$250,000 for a two year cycle.

The Monarch Butterfly Conservation Fund focuses on three priority conservation needs to restore the monarch butterfly to a more robust and healthy population:

- Habitat restoration
- Increasing organizational capacity
- Native seed production and distribution.

http://www.nfwf.org/monarch/Pages/2016rfp.aspx

5.3.6 Farm Bill Butterfly Program

TBD

The implementation plan for the priority projects and the area-wide recommendations presented in this Chapter provide a clear path to reaching the goals and success statement of this plan. In Chapter 6, we will discuss methods to measure our success.

5.4 Resources

The following is a directory of organizations that serve landowners in the Spring Branch Watershed.

American Farmland Trust
148 North Third Street
DeKalb, IL 60115
815/753-9347
www.farmland.org

Ducks Unlimited
www.ducks.org

Four Rivers Environmental Coalition
5500 Northrock Drive
Rockford, IL 61103
815/877-6100
www.fourriver.org

Illinois Council of Best Management Practices
100 East Washington Street
Springfield, IL 62701
217/528-3434
www.illinoisscbmp.org

Illinois Department of Natural Resources
1 Natural Resources Way
Springfield, IL 62702
217/782-6302
www.dnr.illinois.gov

Illinois Environmental Council
230 Broadway, Suite 150
Springfield, IL 62701
217/544-5954
www.ilenviro.org

Illinois Environmental Protection Agency
4302 North Main Street
Rockford, IL 61103
815/987-7760
www.epa.illinois.gov

Land Trust Alliance
1660 LL Street, Suite 1100
Washington, DC 20036
202/638-4725
www.landtrustalliance.org

National Wild Turkey Federation Illinois
www.illinoisnwtf.org

Natural Land Institute
320 South Third Street
Rockford, IL 61104
815/964-6666
www.naturalland.org

Northwest Illinois Audubon Society
P.O. Box 771
Freeport, IL 61032-0771
815.235.9530
www.nwilaudubon.org

Northwest Illinois Forestry Association
2303 West Cording Road
Galena, IL 61036
www.nifatrees.org

Northwest Illinois Prairie Enthusiasts
11219 East Stockton Road
Stockton, IL 61085
815/947-2695
www.theprairieenthusiasts.org

Pheasants Forever
Highland Chapter (Stephenson County)
547 West Empire Street
Freeport, IL 61032
815/232-3456
www.highlandpheasantsforever.org

Stephenson County Farm Bureau
210 West Spring Street
815/232-3186
www.stephensoncfb.org

Stephenson County Soil and Water Conservation District
1620 South Galena Avenue
Freeport, IL 61032
815/235-2161
www.stephensonswcd.org

The Nature Conservancy
4245 North Fairfax Drive, Suite 100
Arlington, VA 22203-1606
703/841-5300
www.nature.org

United States Department of Agriculture
Natural Resources Conservation Service
1620 South Galena Avenue
Freeport, IL 61032
815/235-2161 ext. 3
www.nrcs.usda.gov

United States Fish and Wildlife Service
Rock Island Ecological Services Field Office
1511 47th Avenue
Moline, IL 61265-7022
309/757-5800
www.fws.gov

Wild Ones Rock River Valley
1643 North Alpine Road, Suite 104
PMB 233
Rockford, IL 61107
815/627-0344
www.wildonesrrvc.org

Chapter 6
Environmental Monitoring and Evaluation of Plan

Written by: Joseph Ginger, Shannon Thruman and the Planning Committee

6.0 Monitoring

Once the watershed plan is complete, it is important to have a realistic system for monitoring improvements and evaluating effectiveness over a long span of time. That system should track maintenance, and easily quantify Best Management Practices in the watershed to make sure the goals are on track.

From the intensive year-long planning process comes the written plan. As important, is adoption and implementation. This chapter addresses how monitoring and evaluation of the plan will unfold. Monitoring and evaluation are to show the positive results of the adoption and implementation of the plan, and to promote the watershed goals.

6.1 Criteria to Measure Success

6.1.1 Implementation Committee

To ensure progress, the Planning Committee will stay intact, and become the Implementation Committee. They will meet semi-annually and measure milestones.

Annual milestones to be measured and recorded by Planning Committee:

1. Communication to stakeholders.
2. Grant applications submitted to funding agencies.
3. Presentations by funding agencies (like NRCS) to stakeholders.
4. Evaluations of completed projects (see Figure 7-1), education/outreach activities, and monitoring recommendations .
5. Information gathered about nutrients and sediments in Spring Branch.
6. Evaluations of nutrients and sediment reductions (phosphorous, nitrogen, and sediment).
7. Report on new funding sources available to the stakeholders.

8. Report on new programs available to the stakeholders
9. Evaluate Watershed Plan.

6.1.2 Monitoring Worksheets

To measure BMPs, the committee decided to create a worksheet for landowners to annually record and evaluate their own BMPs. It will be the Planning Committees charge to distribute, retrieve and compile the worksheet data. These worksheets (even if not completely filled out) will: quantify BMPs over time, track maintenance, ensure follow-up and put the watershed goals in the hands of the farmers annually. It will also keep the watershed's progress centrally located, online, and on paper. When kept in a central location, the worksheets gather momentum when added to the congregate. This information gives funding agencies a quick snapshot of the whole, which includes the seriousness of the landowners towards making improvements in the watershed. Having the information at hand would mean better chances of obtaining funding dollars for watershed BMPs, monitoring, and most importantly less nutrient and sediment loss without additional regulatory mandates. (See Figure 6-1).

6.1.3 Additional Monitoring

Adding and maintaining BMPs relates directly to farming. Collecting scientific information watershed-wide involves monitoring nutrients, sediment, the creek and life in the creek, which is not farming per say. It also means measuring the land use changes, in acres and measuring practice adoption, again in acres. This monitoring would be well suited for a suite of volunteers/citizen scientists yet-to-be-named. There are different organizations, people and volunteers (listed in Chapter 6), that have an interest in watershed monitoring. Some have been very involved in the larger watersheds that Spring Branch feeds into: the Yellow Creek, the Pecatonica River, the Rock, the Mississippi, and finally the Gulf of Mexico. Those entities and people listed in Chapter 6 need direction and a welcoming hand from the Planning Committee to increase voluntary monitoring efforts. The following would be directly involved in the biological monitoring and data evaluation of the creek itself.

These interested parties include the following:

1. The Yellow Creek Watershed Partnership, this group secured the funding for the watershed to gather the information, helped write this plan, and is a group to assist in achieving successful monitoring with something like RiverWatch. RiverWatch was initiated in 1995 as part of the Critical Trends Assessment Project (CTAP), an Illinois Department of Natural Resources (IDNR) project designed to conduct a long-term, comprehensive assessment of the environment in Illinois. RiverWatch utilizes trained volunteers to collect quality assured data on streams and fosters coordination among groups involved in similar monitoring efforts. There is an interest in starting a

Riverwatch group. The Planning Committee would need to initiate this. More info: Yellow Creek Watershed Partnership http://www.ycwp.org/ and RiverWatch http://www.ngrrec.org/Riverwatch/

2. Department of Natural Resources, Fisheries Biologist. Currently the contact is Karen Rivera. She has been instrumental in starting this watershed planning process and others in the area. She conducted the only fish survey in the Spring Branch. Her contact information is Karen.D.Rivera@illinois.gov.
3. Illinois Environmental Protection Agency, Bureau of Water, Environmental Protection Specialist. Currently the contact is Nicole Vidales. She conducted the macro-invertebrate on the Spring Branch. Her contact information is Nicole.Vidales@Illinois.gov.

If the subsequent data collection in the *Pecatonica River Total Maximum Daily Load and Load Reduction Strategies* (TMDL) does not monitor the data they recommended in the Stage 2 plan, we recommend the Planning Committee conduct their own monitoring, following the TMDL study's protocol as closely as possible. The protocol is written in enough detail in the Stage 2 TMDL report that repeating it in this chapter is unwarranted other than the reference that it should be done. The TMDL is regulatory and monitoring is rigorous. The monitoring for this plan is voluntary for the watershed's own purposes. Grants are available (see Chapter 5) .

In the event that the Planning Committee collects their own data, the Stephenson County Farm Bureau could be an important resource as they conduct nitrate/nitrite testing on water as a free service and test results are confidential.

Figure 6-1: Schedule for Monitoring

Year(s)	Interim, Measurable Milestones	Potential Funding/Tech. Support	Completion			Costs	
			Units	%	100% Complete (✓)	Estimate ($)	Actual ($)
1-10	Pull out data relevant to Spring Branch collected for Pecatonica River TMDL study and keep in records published on webpage.	Yellow Creek Watershed Partnership, EPA				$ 471	
1-10	Implement a River Watch program to monitor Spring Branch water quality and conduct data collection each year.	Blackhawk Hills RC&D, Yellow Cr. Watershed Partnership, EPA, IDNR, Highland College				$ 11,780	
1-10	Collect water samples, test for nitrogen each year, & record the data (estimate 5 collection times in multiple locations).	Farm Bureau				$ 5,890	
Total Costs for Monitoring						**$ 18,141**	
Average Costs for Monitoring per Year (for Years 1-10)						**$ 1,814**	

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Yellow Creek Watershed Partnership. 2013. *Yellow Creek Watershed Management Plan.* Stephenson County, IL.

Carpenter, S.R. et al. 1998 NONPOINT POLLUTION OF SURFACE WATERS WITH PHOSPHORUS AND NITROGEN Ecological Applications, pp. 559–568

Illinois Nutrient Load Reduction Strategy July 2015 Illinois Environmental Protection Agency

Richard H. Stasiak (2007), "Southern Redbelly Dace (Phoxinus erythrogaster): a technical conservation assessment", p. 11, USDA Forest Service, Rocky Mountain Region.

Monitoring Worksheet

Please check the Spring Branch Watershed Plan out by clicking here.

Spring Branch watershed (see below for map of watershed) landowners have created a worksheet to record and evaluate BMPs in the watershed. The worksheets gather momentum when added to the congregate and this information gives funding agencies a quick snapshot of the whole watershed, which includes the seriousness of the landowners towards making improvements. Having the information at hand would mean greater chances for successful funding dollars for you!

1. Project name or NRCS project name or code #:(there are over projects the NRCS has available which you could do with financial and technical backing click here to check it out or go to: https://efotg.sc.egov.usda.gov/treemenuFS.aspx

2. When did you start or when would you like to start this project:

3. Completed:

4. Approximate cost:

5. Attach before and after photos:

6. Why did you do this project?

7. Is it working ?

8. What unexpected costs or frustrations came up?

9. What was the scope of the project?

10. How many feet / acres?

11. What are your expected benefits?

12. Have you seen a change in wildlife using the area after the project?

13. Did you receive any technical assistance for this project?

14. Do you have any projects you would like to be doing in the near future?

15. Would you like financial or technical backing for any of these projects?

16. Which goals do you think you project applies to (circle all that you think apply):

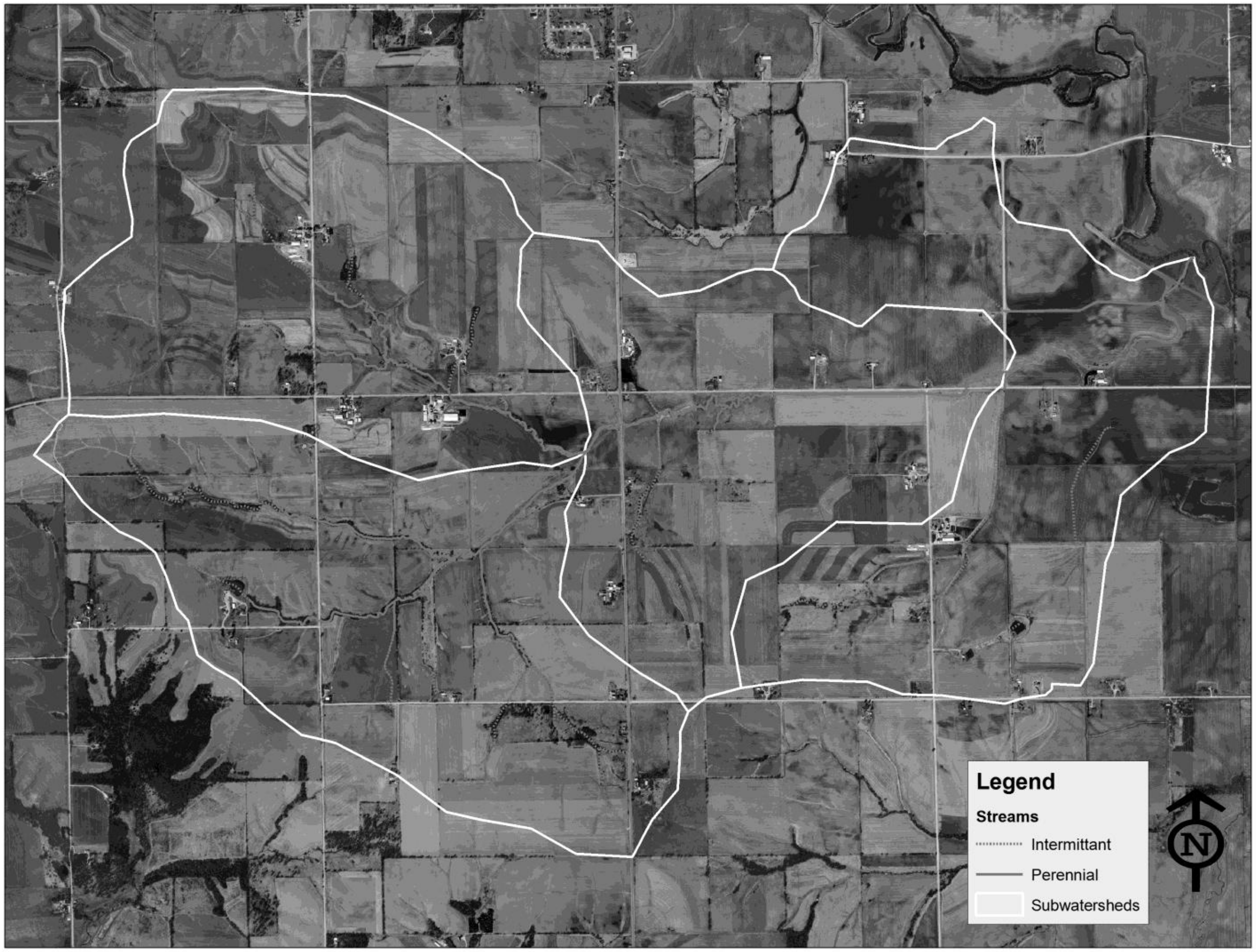
- Reduce the sediment and nutrient loading from creek banks.
- Reduce sediment and nutrient loading from livestock and row crop operations.
- Address volume and velocity of water runoff to enhance water quality.
- Utilize practices that protect and/or enhance wildlife habitat.
- Consider landowner needs with each project and practice.
- Maintain and support a sustainable farming community.

17. Are you interested in becoming more involved in the Spring Branch Watershed?

18. Name:

Return to:

Location of project:



Goals for Spring Branch of Yellow Creek

The following goals were written and adopted by the Planning Committee - those who live and work in the watershed - and are the result many meetings and hours of refinement efforts.

1. *Reduce the sediment and nutrient loading from creek banks.*
2. *Reduce sediment and nutrient loading from livestock and row crop operations.*
3. *Address volume and velocity of water runoff to enhance water quality.*
4. *Utilize practices that protect and/or enhance wildlife habitat.*
5. *Consider landowner needs with each project and practice.*
6. *Maintain and support a sustainable farming community.*

A ***The livestock producer at Site A*** *has expressed an interest in implementing BMPs to his operation to better manage livestock waste. Phase 1 would extend the freestall barn #1 to the west, removing the existing manure storage structure and remodeling of freestall barn #1 as required. The proposed expansion will house approximately 120 to 140 of the existing cows. A manure transfer system would also be required to transfer the waste from the end of the barn to a new waste storage structure. Needed storage is estimated to be approximately one million gallons. Also included in Phase 1 is construction of a hard pavement surface, a berm, and a commodity shed -- practices that address runoff.*

B ***At Site B, a private landowner*** *has expressed interest in reducing water flow, slowing water velocity, and addressing erosion. A water and sediment control basin or level spreader could be constructed to detain water and settle sediment and nutrients on-site and then meter water out slowly through a subsurface drain or grassed waterway to the main branch of the stream.*

Spring Branch Watershed and Site Specific Projects

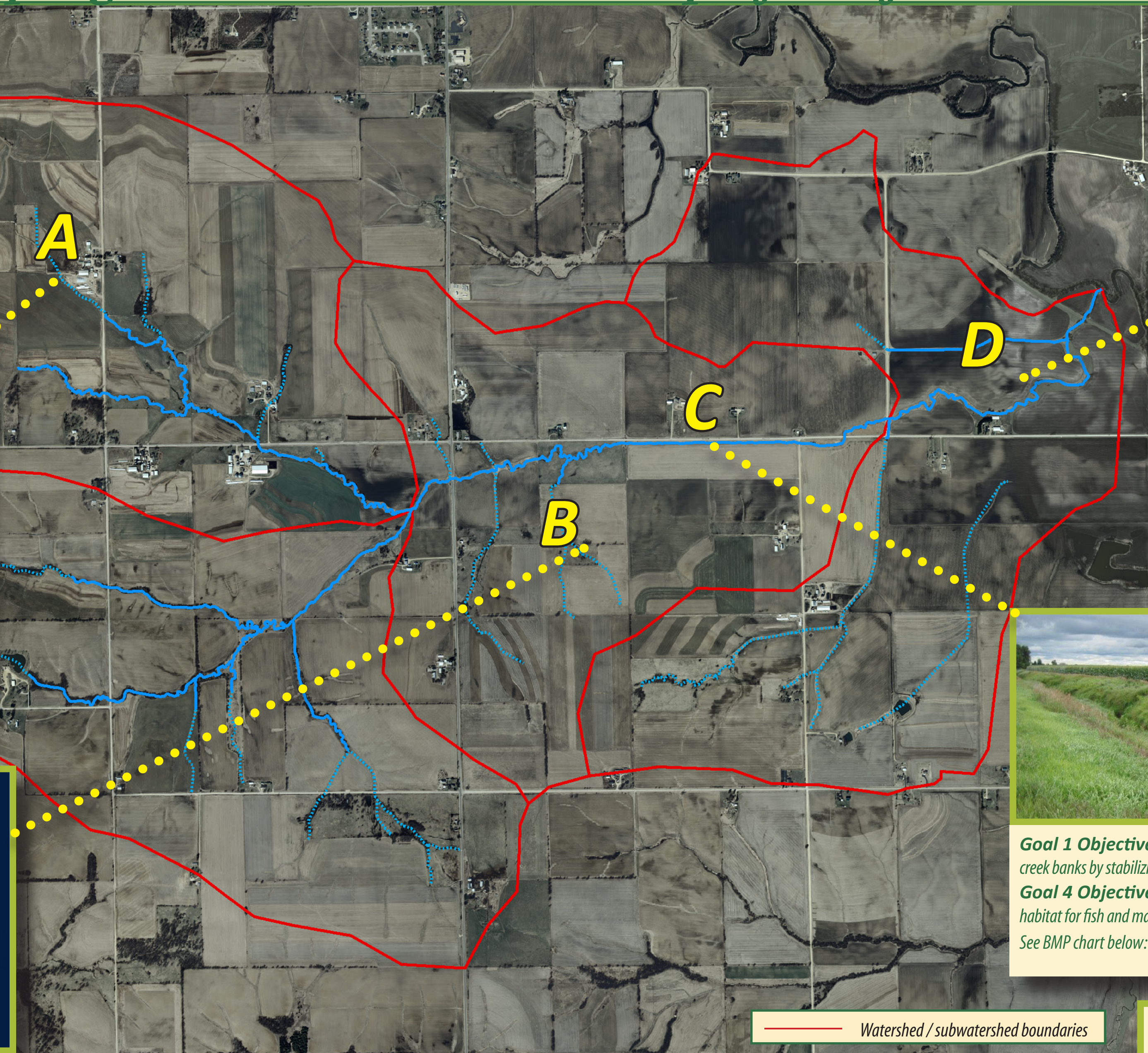
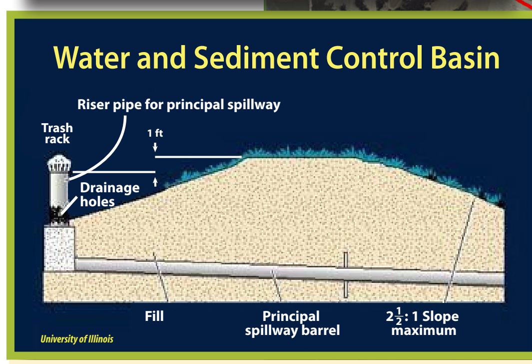


Photo: Wagner Consulting

Goal 2 Objective D: *Apply BMPs to address sediment, nutrients, and pathogens originating from livestock operation.*
See BMP chart below: 12. Waste Storage Structure, etc.



Goal 3 Objective B: *Address volume and velocity of water runoff*
Goal 4 Objective D: *Utilizes practices that protect and/or enhance wildlife habitat for waterfowl.*
See BMP chart below: 13. Water and Sediment Control Basin

D ***Near the confluence of Spring Branch and Yellow Creek,*** *landowners representing a family of a Centennial Farm have expressed an interest in constructing a pond to capture sediment and nutrients, while also serving as habitat for wildlife. A one to three-acre pond could be constructed if site conditions allow. The stream could possibly flow directly into the pond; or water could be routed to the pond, filtered, then routed back to the stream. A pond at this location would capture sediment and nutrients that were in the stream before they enter the Yellow Creek.*


Photo: Larry Million

Goal 3 Objective B: *Addresses volume and velocity of water runoff*
Goal 4 Objectives B, C, D, and E: *Utilize practices that enhance wildlife habitat for aquatic life.*
See BMP chart below: 14. Pond

Goal 1 Objective A: *Reduce sediment and nutrient loading from creek banks by stabilizing severely eroded sections.*
Goal 4 Objectives B & C: *Utilize practices that enhance wildlife habitat for fish and macroinvertebrates.*
See BMP chart below: 10. Streambank Stabilization

C ***The property owner, a public entity,*** *is interested in addressing erosion issues and slowing water velocity. The narrow footprint in which to work makes streambank stabilization is a likely practice. Methods of water velocity reduction and stream channel restoration, such as weirs and riffles, could also be considered.*

At the time of this printing, four site-specific projects *were volunteered by interested landowners in the watershed. On the map above are those projects and the goals they target. Below are watershed-wide projects and practices collectively agreed upon to be appropriate by the landowners involved with the beginning of this process.*

Goals 5 & 6 have been adopted by the watershed community. *Stakeholders have agreed that they will work collectively with local and state officials to address their desire to maintain the farming heritage and community:*

5. *Consider landowner needs with each project and practice.*
6. *Maintain and support a sustainable farming community.*

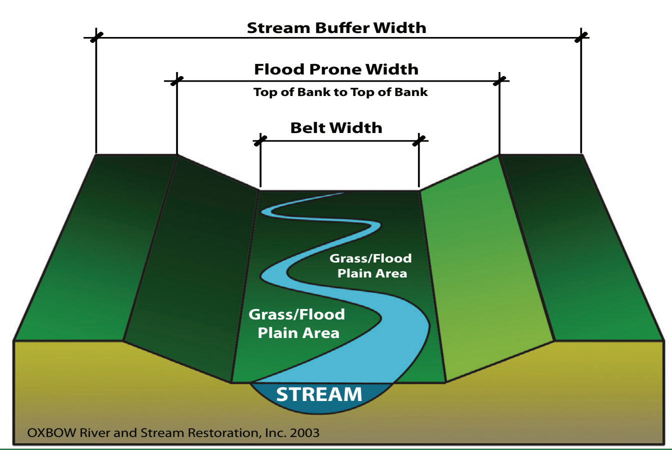
Summary of Best Management Practices (BMP) Recommended for Implementation: Watershed-wide and Site-specific (see full plan at blackhawkhills.org or olsonecosolutions.com)

Ref #	Best Management Practice Name	Potential Acres/ # of Practices	Unit Cost Est	Pollution/Nutrients Addressed	EPA Priority
1.	*No-Till (Convert from Conservation Till)*	2,120 ac.	$20	Sediment, Phosphorous, Nitrogen	High
2.	*Cover or Green Manure Crop*	3,260 ac.	$40	Sediment, Phosphorous, Nitrogen	High
3.	*Filter Strip*	82 ac.	$940	Sediment, Phosphorous, Nitrogen	Medium
4.	*End-Row Conversion*	17 ac.	$920	Sediment, Phosphorous, Nitrogen	Medium
5.	*Field Borders*	17 ac.	$920	Sediment, Phosphorous, Nitrogen	Medium
6.	*Grassed Waterway*	16 ac.	$5,250	Sediment, Phosphorous, Nitrogen	High
7.	*Grade Stabilization Structure*	13 #	$ 5,400	Sediment, Phosphorous, Nitrogen	Low

Ref #	Best Management Practice Name	Potential Acres/ Feet /# of Practices	Unit Cost Est	Pollution/Nutrients Addressed	EPA Priority
8.	*Prescribed Grazing*	196 ac.	$ -	Sediment, Phosphorous, Nitrogen	Low
9.	*Stream Channel Stabilization (e.g. riffles)*	600 ft.	$80	Sediment, Phosphorus, Nitrogen	Low
10.	*Streambank Stabilization*	29,073 ft.	$2,325,840	Sediment, Phosphorus, Nitrogen	Med
11.	*Subsurface Drain*	2,300 ft.	$ 5	Sediment, Phosphorus, Nitrogen	Low
12.	*Water and Sediment Control Basin*	1 ac.	$ 2,000	Sediment, Phosphorus, Nitrogen	Med
13.	*Waste Storage Structure, etc.*	1 #	$1,060,000	Phosphorus, Nitrogen	High
14.	*Pond*	1 #	$ 125,000	Total Suspended Solids	High

Spring Branch Watershed BMPs

NATURAL CHANNEL DESIGN CONCEPT



There are well over 100 Best Management Practices (BMPs) listed in the Natural Resources Conservation Technical Field Guide. The stakeholders have chosen 14 they feel are achievable in this watershed. Four of those (see other side) will be boots-on-the-ground soon. Below are 10 additional BMPs the farmers plan on continuing to implement in the years to come and have the goal of implementing 20% of the areas possible for each BMP.

Watershed-wide Projects Selected by Stakeholders to Further Reduce Nutrient and Sediment in Spring Branch *

Best Management Practice	Description
No-Till (Convert from Conservation Till)	*Currently, all of the row crops in the watershed are being cropped using either conservation tillage, (2,120 acres) or no-till (824 acres). Conservation tillage is a broad definition which includes no-till and several other tillage methods. In this case, conservation tillage in the watershed is categorized as methods other than no-till. Conservation tillage is any tillage method that leaves crop residue of 30% or greater. No-till is a method of tillage that leaves 70% or greater crop residue. Converting conservation tillage methods to no-till would result in even greater reductions of sediment and nutrient loss. Leaving a residue cover of 70% reduces erosion by more than 90% when compared to a bare field whereas, while leaving only 20% to 30% after planting reduces soil erosion by approximately 50%.*
Cover or Green Manure Crop	*To combat soil and nutrient loss, cover crops primarily hold the soil and improve soil structure, blanketing entire fields rather than rows. There is potential to use cover or green manure crops on 2,944 acres of cropland throughout the watershed. Cover crops and green manure are often used interchangeably but are different terms, though related. Green manure can be fresh cover crops in spring and plowed under to increase available nutrients and build organic matter. Cover crops are planted between successive production crops, or companion- planted or relay-planted into production crops. The three best cover crops for this region are wheat, triticale, and winter cereal rye. The window for planting is fairly small and can be tricky. Cover crops should be planted before November in this county and need some growth before winter. They can be seeded on entire fields, between rows, or just end rows.*
Filter Strip	*Within a 100-foot width of the stream and along a length of 72,750 feet, or 167 acres of cropland could be converted to filter strips. Filter strips are permanently designated plantings to treat runoff and are not part of the adjacent cropland's rotation. They buffer the environmentally-sensitive stream from sediment, particulate organic matter, and dissolved contaminants.*
Grassed Waterway	*There are several areas where a shaped or graded channel could be established with suitable vegetation to convey surface water at a non-erosive velocity. The purpose of a grassed waterway is to convey runoff, prevent gullies and improve water quality. This practice is applied in areas where added water conveyance capacity and vegetative protection are needed to prevent erosion and improve runoff water quality resulting from concentrated surface flow. There is potential for installing 16 acres of grassed waterways throughout the watershed to improve water quality.*
Conversions of End Rows	*At the edges of crop fields is an end-row. These areas are row crops in the opposite direction of the rows of the field. Since rows are usually planted parallel to a slope, the end rows run up and down the slope. Thus, there is no vegetation breaking the energy of runoff traveling down the slope, and more erosion occurs. Taking extra conservation measures, such as no-till within end row only would reduce the sediment and nutrients lost with erosion. There is potential to convert 17 acres of end rows in the watershed.*
Field Borders	*Field borders are like filter strips, except that they are located at the edge of crop fields rather than at the edge of the stream. They provide an interruption between fields that capture sediment carrying nutrients from field to field and eventually into the stream. There is potential to install 17 acres of field borders in the watershed.*
Grade Stabilization Structure	*Grade stabilization structures are for areas where water is not running continuously; they are intended to stabilize the grade and control gully erosion. Structures are typically either a drop spillway or a small dam and basin with a pipe outlet built across a gully or grassed waterway. They drop water to a lower elevation while protecting the soil from gully erosion or scouring. Structures, earth embankments, and vegetated spillways need to be protected from livestock with fencing.*
Prescribed Grazing	*A planned grazing system improves the grass conditions, increases livestock production, improves wildlife habitat and reduces soil erosion and conserves water. Planned grazing systems vary. Common systems are: 1) two-pasture, one-herd; 2) Three-pasture or four-pasture; 3) one-herd system; 4) Merrill-four pasture system; 5) High-intensity; 6) low-frequency; 7) Short-duration (Management Intensive Grazing); and 8) Cell-grazing system.*
Stream Channel Stabilization (e.g. riffles)	*Streams are dynamic and constantly working toward a natural balance with four primary components: water, sediment, energy and vegetation. The balance of these components becomes altered when a stream is channelized. Channelization often decreases the length of the stream. This results in increased water velocity (energy), streambank slope, and stream bed and stream bank erosion (sediment); a reduction in the surrounding landscape and vegetation to assist in absorbing the increased volume of water. Stabilizing the stream channel means reducing the flow (energy) and increasing the vegetative cover.*
Subsurface Drain	*A drainage water management system is using a water control structure in a drain to vary the depth of the drainage outlet. The water table must rise above the outlet depth for drainage to occur. The normal mode of operation in Illinois is to set the water table control height to within 6 inches of the soil surface on November 1 and to lower the control height to the level of the tile on March 15. Thus, water is held back in the field during the fallow period. In experiments in Illinois, reductions were measured of up to 45% for nitrate and 80% for phosphate.*

***to see a list of other BMPs not selected by the stakeholders see 4.4 Other Recommendations in Chapter 4 in the watershed plan**

Acknowledgements - Watershed Planning Participants

Many people participated in the watershed planning effort, including landowners and working farmers; and representatives from federal, state, and local environmental and planning organizations. We would like to acknowledge the following individuals for their dedication to the planning effort.

Planning Committee Members:
Jim Endress, Chairman Spring Branch Watershed, Landowner
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Chad Bremmer, Landowner
Ross Bremmer, Landowner
Marvin Edler, Loran Township Supervisor
Vince Edler, Landowner
William Kloepping, Landowner
Mike Plager, Landowner

Yellow Creek Watershed Partnership Members:
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Nancy Williamson, Illinois Department of Natural Resources
Kerry Leigh, Natural Land Institute
Bruce Johnson, Stephenson County Farm Bureau
Jim Ritterbusch, USDA-Natural Resources Conservation Service
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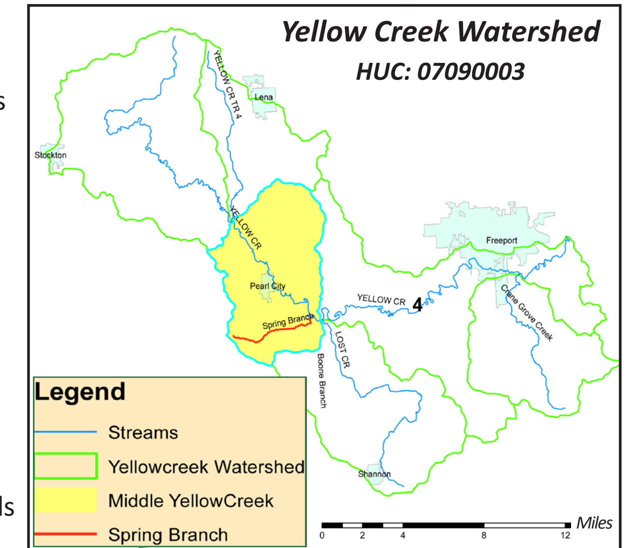
To read the full plan: blackhawkhills.org or olsonecosolutions.com

Spring Branch Watershed Plan
Executive Summary

Spring Branch is a small watershed. It is a 6-mile stream that runs through 37 farms and then into the Middle Yellow Creek. It's located in the western edge Stephenson County, Illinois, and south of Pearl City. It is the headwaters of Yellow Creek and empties into the Pecatonica River.



Farmers of the Spring Branch Watershed are proud of the conservation-minded practices that are already taking place. A drive around the watershed reveals conservation tillage, cover crops, terraces, contour farming, and more. ***In fact, the farmers in the watershed are practicing either conservation tillage or no-till in every single crop field in the watershed, helping reduce sediment and nutrient loading into Spring Branch.*** They are also effectively protecting heavy use areas, managing pastures, and practicing pest management. Most farms have a nutrient management plan. Of the six livestock operators, two already have manure management plans. It is clear Spring Branch farmers have achieved significant improvement to the stream's water quality. Now they would like to do more.

> "My affinity for soil and water conservation has been developed through a lifetime of education and farm management experiences. Getting involved with the Spring Branch watershed project was a natural fit as part of a proactive approach to preserving and improving the resources within the watershed. Kuhlmyer/Endress land ownership within the watershed goes back 149 years. Preserving precious natural resources and sharing the story of how and why it is done is a legacy for generations to come."
>
> ***Jim Endress, landowner***

In 2015 a handful of landowners came together in public meetings to collectively create a plan with goals and action steps to improve water quality in their watershed. The Plan's basic outline, as well as the structure for group involvement, followed the Illinois Environmental Protection Agency's watershed planning process. The process included watershed residents, volunteers, and technical experts in the development of a comprehensive plan that identified locally-driven watershed actions based on in put from participating landowners. The plan contains a detailed inventory of the watershed's natural resources and demographics, and actions designed to address the stakeholder's missions and goals. *(Download Plan at: blackhawkhills.org or olsonecosolutions.com)*

Local stakeholders adopted this mission statement:
"We envision a rural watershed with a sustainable farming community that continues to improve water quality and wildlife habitat."

Six Goals for Spring Branch of Yellow Creek were also developed by the watershed community. *(See inside spread for details)*. The Goals focused on; keeping soil and nutrients where they belong to improve water quality; encouraging wildlife; and protecting an agrarian way of life. The full Plan contains a detailed inventory and precursory assessment on the Spring Branch watershed that includes: soil characteristics, topography, geology, climate information, and demographics, stream bank characteristics and assessment, past reports on the streams, and general information on phosphorus and ammonia in the waterways.

Stakeholders applied the watershed inventory knowledge to identify specific actions. Several volunteer projects in Chapter 4 implement chosen best management practices (BMPs) to reduce nutrient and sediment loading in the water. Chapter 5 details the targets, measurable milestones, schedules, cost estimates, and suggested funding sources for each recommended project and education and outreach efforts to encourage plan implementation. Chapter 6 addresses how monitoring and evaluation of the plan will unfold and includes a monitoring worksheet for landowners to annually record and evaluate their own best management practices.