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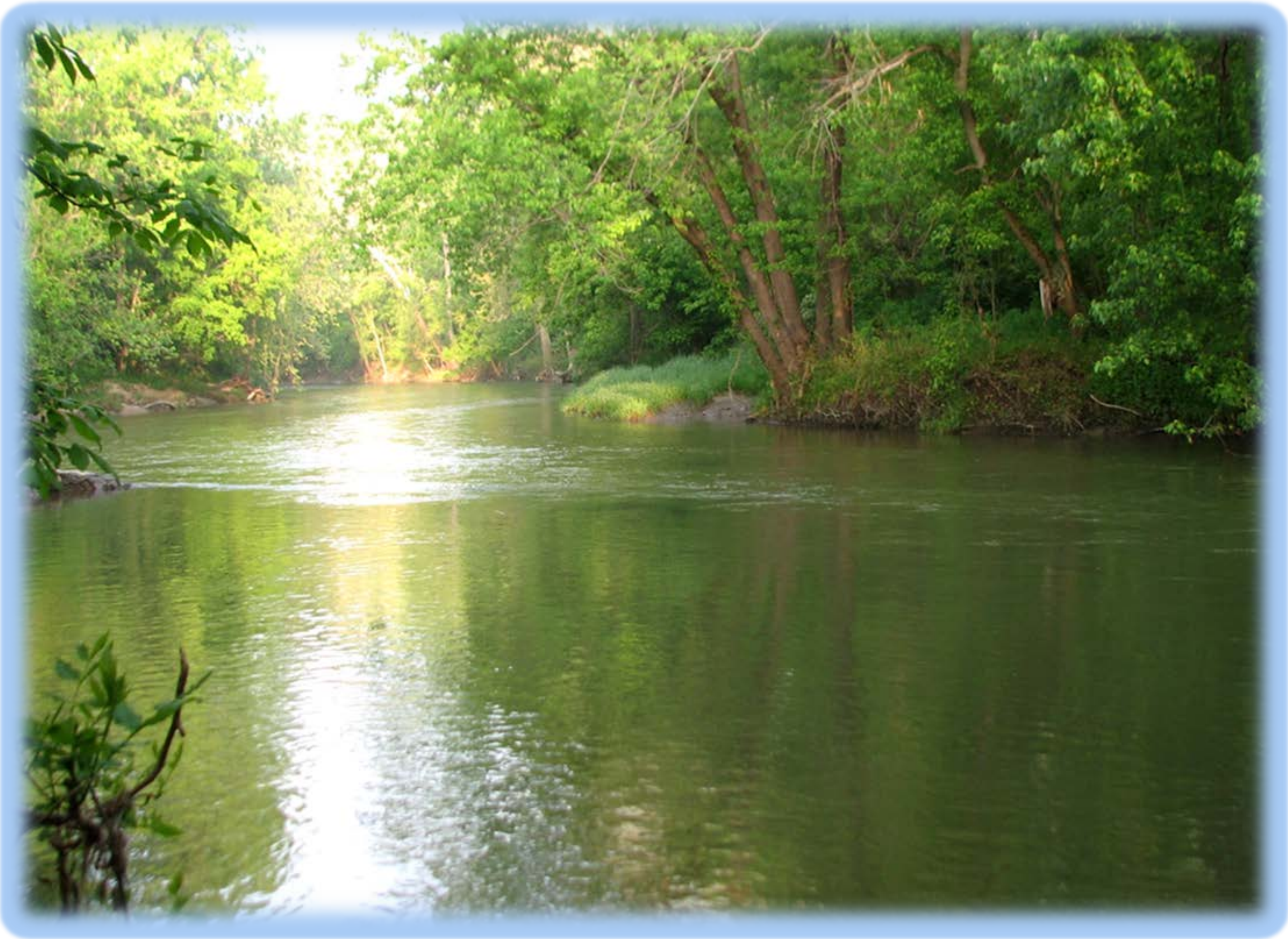
South Fork Wildcat Creek Watershed Management Plan

A Project of the Clinton Co. Soil & Water Conservation District

Ben Reinhart, Resource Conservation Specialist
10/26/2012



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This plan is the result of a three year watershed planning effort to identify causes of water quality impairments within the South Fork Wildcat Creek Watershed, potential sources of pollutants, and to develop a strategy to restore our local waters. A number of public agencies, private organizations, and citizens were involved as part of this planning process. A special thank you goes out to Leah Harden, Cindy Muffett, Doug Scircle, and Sandy Smith who all made contributions to the South Fork Wildcat Creek Watershed Management Plan. Also recognition should be given to the members of the Steering Committee and the numerous volunteers who helped with windshield inventories and various outreach activities. This project has been funded in part by the United States Environmental Protection Agency under assistance agreement C600E720-01 to the Indiana Department of Environmental Management. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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1.0 COMMUNITY WATERSHED INITIATIVE

The South Fork Wildcat Creek Watershed was chosen as a high priority area for the creation of a Watershed Management Plan (WMP) due to the large amount of stakeholder interest in water quality improvement, the high levels of agricultural activity, and known water quality problems such as impaired biotic communities and high levels of Escherichia *coli (E. coli) bacteria*. According to the U.S. Environmental Protection Agency (EPA), over 44% of all stream miles within the South Fork Wildcat Creek Watershed are defined as impaired (Figure 1). The majority of these segments can attribute their impairment to high levels of *E. coli* or degraded biotic communities. Other segments are listed as impaired due to the discovery of polychlorinated biphenyls (PCB's) in fish tissues and/or low levels of dissolved oxygen (DO).

Further proof of the need for a watershed management plan to address these impairments was indicated when the Indiana Dept. of Environmental Management (IDEM) Watershed Planning Branch conducted a Total Maximum Daily Load (TMDL) study for the South Fork Wildcat Creek Watershed. This study was completed in 2008 and indicated a need for significant load reductions of *E. coli*, Nitrate-

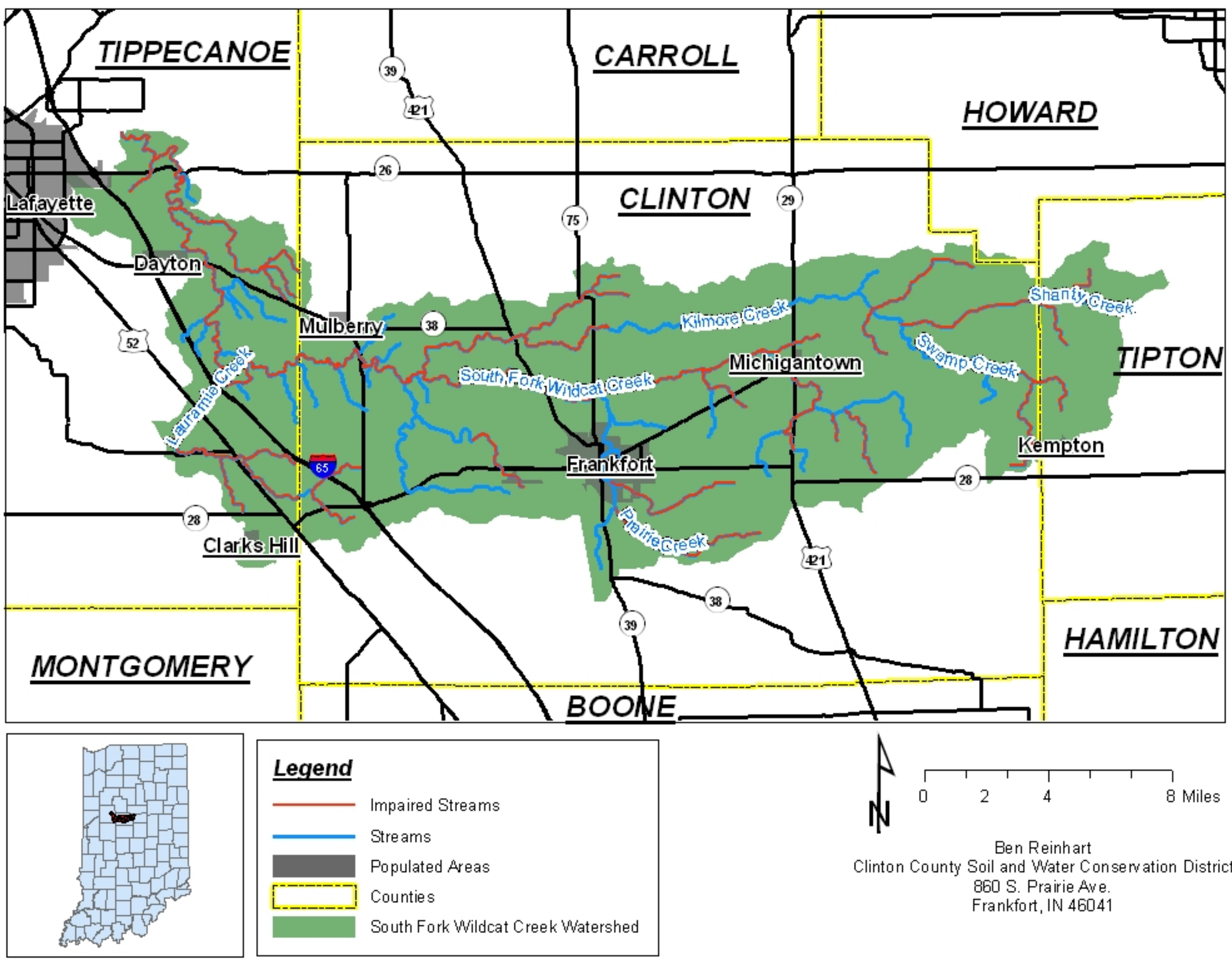


Figure 1. Impaired Waterways of the South Fork Wildcat Creek Watershed

Nitrite, and total suspended solids. Previous water quality data collected during past watershed studies in various subwatersheds of the greater South Fork Wildcat Creek Watershed indicated excessive levels of nutrients (i.e. phosphorus and nitrogen), *E. coli*, Atrazine, and total suspended solids. These areas included Blinn Ditch, Boyle's Ditch, Stump Ditch, Lauramie Creek, and Spring Creek-Lick Run. Finally, given the number of previous studies completed within areas of the watershed, local stakeholders desired to complete a comprehensive management plan for the area as a whole which would result in a single, coordinated effort for watershed protection and restoration.

Soil erosion and sedimentation is a widespread concern in the watershed and can originate from both rural and urban sources. Row crop farming occurs extensively throughout the watershed and livestock have access to open water resulting in potentially high rates of soil erosion as well as nutrient and bacteria loading into local waters. Urban areas, with increased concentrations of impervious surfaces and land disturbing construction activities, can significantly impact local waterways through accelerated runoff and concentrated pollutant loads. Illegal dumping has also been reported as a problem in the watershed, and discharge from septic systems is a concern. In fact, Purdue University estimated that 70% of septic systems in Indiana fail providing potential pathways for various pollutants and waste products to enter local waters. All of these activities have the potential to directly influence the local water quality in the South Fork Wildcat Creek Watershed.

The South Fork Wildcat Creek is listed as one of Indiana's State Scenic Rivers, a State Heritage Program Site; a State designated Canoe Trail, and is a High Water Quality River, according to the Natural Resources Commission Information Bulletin #4. In order to preserve all of these designations, the Clinton County Soil & Water Conservation District (CCSWCD) and its Partners felt it was imperative to create a comprehensive WMP that would address the water quality impairments of the present and plan for the future.

The CCSWCD Board of Supervisors and Staff are the local leaders of the project and formed a Steering Committee of partners and watershed residents to help guide the process. All of the partners who were invited to participate in the planning process have a vested interest in the outcome of the WMP, and many of them are currently working to improve the water quality in the Wildcat Watershed.

1.1 Community Leadership

A Steering Committee was assembled with representatives from local government, environmental organizations, and citizens (Table 1). Potential members were encouraged to become involved through direct mailings and solicitations during the first official Stakeholder Meeting.

The Steering Committee for the project wishes to have a long lasting impact in the watershed and help plan for a sustainable future. A vision statement was established to provide direction throughout the planning process. The vision of the South Fork Wildcat Creek Watershed Management Plan is to have a clear, natural and inviting stream highly regarded for recreation and wildlife opportunities.

Table 1. Steering Committee Members and Affiliations

NAME	AFFILIATION
Al Parsons	Citizen
Anita Hiatt	Tipton County SWCD
Brandy Daggett	USDA-Natural Resources Conservation Service
Calvin Hartman	Howard County SWCD
Chris Remley	Tippecanoe County SWCD
Chuck Calvert	Clinton County SWCD Board Supervisor
Clint Orr	Agricultural Producer
Curt Emanuel	Clinton County Extension
Dan Towery	Wildcat Creek Foundation
Dennis Kern	Wildcat Guardians
Devin Bell	Clinton County SWCD Board Supervisor
Dustin Johnson	Clinton County SWCD Board Supervisor
Greg Bright	Commonwealth Biomonitoring, Inc.
Hilary Barnhart	USDA-Natural Resources Conservation Service
Jeff Mathews	Citizen
Jerry Batts	Clinton County SWCD Board Supervisor
Jim Fleeger	Citizen
Joe O'Donnell	Wildcat Creek Watershed Alliance
Leah Harden	Clinton County SWCD
Lisa Christie	Tippecanoe County Surveyors Office
Mark Newhart	Clinton County SWCD Board Supervisor
Matt Kelley	Clinton County SWCD Board Supervisor
Matt Shively	Tippecanoe County Surveyors Office
Megan Benage	Tippecanoe County SWCD
Rene Weaver	Howard County SWCD
Sarah Brichford	Wildcat Guardians
Steve Yeary	Clinton County Health Department
Sue Gerlach	Indiana State Department of Agriculture

*** Soil & Water Conservation District (SWCD)**

Figure 2. The Steering Committee discusses stakeholder concerns and comments gathered during public meetings

1.2 Stakeholder Involvement

Planning and decision making is a joint venture of the stakeholders, Project Coordinator, Partners, and the Clinton County SWCD Board of Supervisors. In order to attain input from the many residents, agencies, industries, and businesses that will be impacted by the WMP, stakeholder involvement was generated through various education and outreach efforts. Throughout the project, information and calls for involvement were distributed through resources such as the local media, newsletters, public meetings and local events, and watershed signage. In addition a pre- and post-project survey was conducted to gather information on local knowledge and views within the South Fork Wildcat Creek Watershed. Public involvement is essential to the long-term success of the WMP, which ultimately belongs to the stakeholders and residents who help create it.

A total of six stakeholder meetings were held throughout the life of the project (Table 2). The first stakeholder meeting was held during January 2010 with the primary purpose of providing local residents with information on the goals of the project. Another focus of this first meeting was to begin collecting water quality concerns from community members. A wide variety of concerns were collected from the 21 meeting attendees. One other meeting was held during the 2010 calendar year. This second meeting took on more of an educational focus. Videos were shown which highlighted the unique and scenic characteristics of the Wildcat Creek system as well as a video on public water supplies and the importance of water quality.

Table 2. Public Meetings and Topics

Public Meeting Date	Meeting Topics
January 21, 2010	Introduce project goals, Collect water quality concerns, Recruit committee members
December 6, 2010	Show educational videos, General project update
March 2, 2011	General project update
December 6, 2011	Present water quality information
December 8, 2011	Present designated Critical Areas and Priority Protection Areas
September 5, 2012	Review of South Fork Wildcat Creek Watershed Management Plan

Three public meetings were held during 2011 to provide updates on the development of the South Fork Wildcat Creek Watershed Management Plan. These meetings provided local stakeholders and residents an opportunity to provide input on land use/water quality evaluations and analysis as well as the designation of Critical Areas for future implementation projects.

In addition to hosting meetings, information was delivered during other events such as county fairs and meetings of partnering organizations. Presentations were made to groups such as the Greater Wabash Resource Conservation & Development Council (RC&D), Wildcat Creek Foundation, SWCD annual meetings, and Clinton County's Natural Resources Focus Group for their Comprehensive Plan Update. These presentations provided updates and information on the development of the South Fork Wildcat Creek WMP as well as provided an opportunity for additional water quality concerns from local residents to be collected. Print materials with information on the South Fork Wildcat Creek WMP and watershed restoration were given away during the 2010-2012 Clinton County Fair and displayed during SWCD annual meetings of partnering counties. Information was also provided at the 2010 Earth Day Celebration hosted by Frito-Lay in Frankfort.

Workshops and volunteer cleanup days were held to engage local residents in the watershed planning and restoration efforts. Workshop topics included information on Best Management Practices (BMP) such as the use of cover crops, proper septic system management, and soil health. Volunteer cleanup days generated a lot of interest due to local concerns regarding littering and illegal dumping. Stream cleanups were held during 2010, 2011, and 2012. These events resulted in approximately 668 volunteer Hours and over 31,000 pounds of metal, trash, and waste tires removed. Cleanup volunteers came from all parts of the community. However, strong commitments have been seen from the Clinton Central FFA (Future Farmers of America) Program as well as recreational groups such as the Wildcat Foundation and Indiana Smallmouth Alliance.

Other methods for reaching out to local stakeholders and community members included quarterly mailings (13 total). Informational articles and project updates were published in the quarterly Clinton Co. Conservation Newsletter as well as the Guardian Gazette distributed by the Wildcat Guardians. Press releases (15 total) advertising local events were provided to local media outlets such as the Frankfort Times and Lafayette Journal & Courier. A website for the South Fork Wildcat Creek WMP was created and linked to the Clinton SWCD site. This watershed website provided an online presence to advertise for local events and to post updates to the South Fork Wildcat Creek WMP. Watershed signage (8 total) was posted at locations around the South Fork Wildcat Creek Watershed. Signage was targeted towards heavily traveled routes and public areas. The primary intent of these signs was to deliver the message that all land within the watershed impacts the South Fork Wildcat Creek.

1.3 Stakeholder Concerns

Initial stakeholder concerns were gathered during the first Stakeholder and Steering Committee meetings in two formats. Attendees were invited to voice their concerns and have them recorded on flip charts during the meetings (Figure 3). For those attendees that did not feel comfortable voicing concerns, worksheets were provided to each individual to allow them to list their concerns and make further comments. During this meeting, three of the active environmental organizations in the watershed (the Wildcat Creek Foundation, Wildcat Creek Watershed Alliance, and the Wildcat Guardians) gave presentations on their historic and current work in South Fork Wildcat Creek Watershed and presented concerns that they have witnessed in the watershed. These presentations were meant to generate discussion between present stakeholders. In total, 21 stakeholders representing Clinton, Howard, and Tippecanoe Counties attended this first public meeting to provide input. Additional stakeholder concerns were solicited in the press releases announcing the public meeting and in two newsletter articles. Table 3 includes all concerns collected during the first meeting by stakeholders and steering committee members.

Table 3. Stakeholder Concerns Gathered During Initial Public Meetings

Drainage &Flooding	Drainage and Flooding Issues
	Development Impact
	Altered Hydrology
	Shifting Channels
	Education on Drainage Law
	2-Stage ditches as tributaries to creek
	Appropriate wildlife control (beavers)
	Construction in the Floodplain
	Allowing creek to be used as drain affects the property of others
	Changing the water holding capacity through filling and riprap
Pathogens & *E. coli*	High levels of *E. coli*
	Small unsewered towns and lack of septic absorption fields
	Improper waste utilization
	Livestock in creeks
	E. coli and its source
	Combined Sewer Overflow's (source of raw sewage)
	Septic systems (improperly maintained, non-functioning, and lack of)
	Poop in creek - numerous small towns without septic systems dumping in watershed
	Building wastewater treatment plants and collection systems
	E. coli
	Septic system maintenance

Table 3 Continued. Stakeholder Concerns Gathered During Initial Public Meetings

Category	Concern
Urban & Industrial	PCBs and their source
	Industrial and Urban Pollution
	Incorporate bio-engineered stabilization over "hard armored" stabilization
	Landfill expansion - monitoring and testing below sites
	State Road 26 widening project and how it will affect the South Fork
	Development Impact
	Residential use of pesticides and nutrients
Sediment & Nutrients	Streambank Erosion
	South Fork and tributaries carry an excessive amount of sediment
	Excessive nutrients and pesticides/organics from agricultural land
	Lack of buffers/filter strips
	Tillage
	Lack of conservation practices paired with continuous no-till
	Excessive sediments and nutrients
	Not enough land in no-till
	Groundwater
	Grass area between every field and water body (including ditch)
	Sediment
	Inadequate buffers - poor incentives to establish and maintain buffers
	Too much sediment runoff
Under Appreciation of the Resource	Illegal dumping
	No public appreciation of the resource
	Lack of public knowledge
	No public access points or trails
	Recreational opportunities
	Need for education
	Change in local regulations to protect
	Protection of private property adjacent to stream (i.e. outlets, drain)
	Water test results and timely distribution of results to property owners in watershed
	Need increased awareness (travelogues, speeches, photo displays, school presentation)
	Education for all age groups
Wildlife	Lack of quality wildlife habitat
	Lacking 100+' riparian forest buffer
	Trees along creek
	Establish riparian buffers and encourage wildlife in the buffered area

NOTE. Each concern is listed only once. Concerns that fall under multiple categories are listed in the most relevant category.

Figure 3. Joe O'Donnell discusses the Wildcat Creek Watershed Alliance's concerns in the Wildcat Creek Watershed at the first Public Meeting held January 21, 2010.

1.4 Social Indicator Survey

Surveys have been used traditionally in local watershed projects to collect information on the attitudes, knowledge, and behavior of local residents. Those attitudes, knowledge, and behaviors serve as social indicators which can be tracked over time. The measurement of these indicators allows natural resource managers to document progress towards a particular goal, in this case watershed restoration and/or protection. The South Fork Wildcat Creek WMP used a protocol referred to as the Social Indicator Planning and Evaluation System (SIPES) for Nonpoint Source Management. This protocol was developed by a team of university researchers from the Midwestern land grant universities for use by the U.S. EPA and state level environmental agencies. Developed specifically for U.S. EPA Region 5 (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin), the SIPES Handbook provides a specific methodology for developing and administering a Social Indicator Survey to show change over time in various social indicators. Along with the Social Indicators Data Management & Analysis (SIDMA) tool, this methodology was used to construct and administer a survey titled, "Community Views of the South Fork Wildcat Creek Watershed". All survey results can be found in Appendix C.

Surveys were administered to two separate target audiences. The first target audience included only individuals or landowners involved in agricultural production. The second target audience included individuals not involved in agricultural production such as members of urban, suburban, and rural residential land uses. Mailing lists for agricultural producers in each county with land within the watershed were requested from the Farm Service Agency. This included producers in Clinton, Howard, Tippecanoe, and Tipton counties. Addresses where geocoded using ESRI ArcGIS software. This allowed for the selection of addresses based on their geographic location. Over 80% of all addresses where matched to their specific geographic locations with a strength >80 (on a scale of 100). All addresses contained by or within one mile of the watershed boundaries of the South Fork Wildcat Creek were selected for a total of 185 agricultural producers/landowners. After removing duplicate addresses a total of 166 addresses were used for the survey.

Mailing lists for non-agricultural residents were collected using a tool called Audience Targeter from Water Words that Work, LLC. This tool allows users to select targeted audiences based on various geographic and demographic characteristics. Addresses are compiled from more than 30 different databases which are updated monthly and used by various Fortune 500 companies. Selections were made by property type (e.g. single family dwelling, condo, mobile home, etc.) to identify community members in urban, suburban, and rural residential areas. A total of 11,152 addresses were geocoded with over 80% of all addresses matched to their specific geographic locations with a strength >80 (on a scale of 100). Of these, only 4,963 addresses were located within the South Fork Wildcat Creek Watershed. A sample of 881 addresses was randomly selected from the pool of 4,963. The total number of selected addresses is based on guidelines given by the SIPES methods. After removing duplicate addresses a total of 857 addresses were used for the survey.

Agricultural Producers

The survey response rate for agricultural producers within the South Fork Wildcat Creek Watershed was 45%. This met the minimum response threshold (40%) of the SIPES protocol. The average respondent was a 64 year old male, living on a farm, with at least a high school education, most with at least some college training. Farm management was primarily made alone or with family members. Approximately 24% made decisions with input from a tenant farmer. The average farm size was about 460 acres. 69% percent responded that their property touches a stream, river, lake, or wetland. Almost 51% indicated that they currently have a nutrient management plan in place. The majority of these plans were developed through private-sector agronomists or crop consultants. Common sources of information regarding soil and water conservation were: newsletters and fact sheets, conversations with others, internet, magazines, and workshops or meetings, in that order. Approximately 86% indicated they read a local newspaper. The most trusted sources of information included the Soil and Water Conservation District, Natural Resources Conservation Service, and Purdue Extension. The least trusted source of information was “environmental groups”.

Overall, respondents rated water quality as “Okay”. Approximately 50% of respondents rated the scenic quality of local water resources as “Good” while about 20% rated local waters as “poor” for recreational activities such as fishing, canoeing, and kayaking. When asked which activities were most important, 34% indicated providing fish habitat or eating locally caught fish while 45% indicated scenic beauty. Respondents were well aware of how runoff is conveyed across their properties with 81% indicating they knew where water leaves their land. Attitudes related to local water quality show that the majority of respondents believe that water quality is important, their actions do have an impact on water quality, and they are responsible for helping to protect the quality of their water resources. Despite this, respondents were hesitant to indicate that they would be willing to pay more to help protect water quality and only slightly more willing to change their management practices to improve local water quality. No specific impairment was overwhelmingly rated as “Severe” with the average response indicating most water quality impairments as “Slight” or “Moderate” problems. The three impairments with the highest average scores were trash/debris, sediment (i.e. dirt and soil), and bacteria/viruses. Responses regarding sources of impairments show a similar pattern with littering/dumping, soil loss from agriculture, and failing septic systems being the highest perceived threats. Interestingly, "animal feeding operations" ranked lower than "natural sources" as a source of impairments. Concerns regarding negative impacts resulting from impaired water quality focused most on fishing, followed by concerns regarding scenic and recreational characteristics as well as algae growth. Two out of the three lowest ranking concerns were impacts to drinking water quality and cost of treatment for drinking water. However, all listed concerns were only seen as a "slight problem".

The second half of the survey focused on land management practices and constraints to change. Some of the most common practices in use were maintaining crop residues on cropland, nutrient and pest management, and septic system maintenance. Practices which rated highest as "not relevant" included: manure management practices, prescribed grazing, wetland restoration, and heavy use area protection. The most little known practices were regulating tile flow and heavy use area protection. When asked about general constraints to changing land management practices cost, appropriate equipment, available cost-share assistance, and governmental program restrictions ranked highest. Constraints related to four specific management practices were also evaluated. Currently 61% of respondents are applying variable rate fertilizers. Sixty-eight percent responded "yes or already do" and 20% "maybe" when asked if they would be willing to try the practice. The highest ranking constraints were: lack of equipment, cost, and "desire to keep things the way they are". The use of cover crops saw a lower adoption rate with about 26% indicating they currently use the practice. When asked about their willingness to try the practice 48% responded "yes or already do" and 37% "maybe". The highest ranking constraints were: cost, lack of equipment, and time required. The use of livestock fencing along waterways was relatively uncommon with about 58% indicating it was "not relevant". The majority of respondents (47%) marked they would not be willing to try the practice while 35% responded "maybe". The highest ranking concerns were: lack of equipment, cost, and time required. Conservation tillage saw a high adoption rate with almost 67% of respondents indicating they currently use the practice. Regarding their willingness to try 75% responded "yes or already do" and 17% "maybe". None of the listed constraints ranked highly. The most significant constraints focused on lack of equipment, traditions, and compatibility of conservation tillage with site characteristics.

Non-Agricultural Producers

In addition to surveying agricultural producers, residential and urban audiences were surveyed for their opinions, attitudes, and behaviors related to local water quality. These non-agricultural surveys were customized to include information regarding lawn maintenance practices, waste disposal, and other residential issues more relevant for this target audience. The survey response rate for this audience was 24% which does not meet the recommended minimum response threshold (40%) of the SIPES protocol. Results should be interpreted with this fact in mind. The average respondent was a 59 year old male, living within a town or city, and owning a ¼ acre or less sized lot. Approximately 30% indicated they lived in an isolated rural residence or rural subdivision. Just over 30% of respondents had at least some college education while 42% possessed a high school education. Commercial lawn care was fairly uncommon among respondents with 69% indicating that they do not pay for lawn care service. Among this audience print publications (e.g. newspapers, newsletters, brochures, etc.) and the internet were the most commonly accessed sources of water quality information. The most trusted source of information came from the local Purdue Extension office. The local watershed group was the most unfamiliar source for information.

Overall, respondents rated water quality as “Okay”. The highest ranking characteristic of water quality was “Scenic Beauty” while recreational activities such as fishing and boating were ranked lower. When asked which activities were most important, almost 40% indicated “Scenic Beauty”. Approximately 38% fishing activities were most important. Only about half of all respondents knew where storm water runoff from their properties drain to. Attitudes related to local water quality show that the majority of respondents believe that water quality is important, their actions do have an impact on water quality, and they are responsible for helping to protect the water of their water resources. Despite this, most were hesitant to indicate that they would be willing to pay more to help protect water quality and only slightly more willing to change their management practices to improve local water quality. No specific impairment was rated as “Severe” with the average response indicating most impairments as “Slight” or “Moderate”. The three highest scoring impairments were pesticides, bacteria and viruses, and trash. Illegal dumping and trash in streams was rated as “Severe” more than any other listed impairment. The lowest ranking impairments were flow alterations and sedimentation issues. Results also showed that nutrient impairments (i.e. nitrogen and phosphorus) were relatively new issues and most indicated they didn’t know the impact these impairments were having on local water quality. In regards to sources of water quality impairments, most were seen as “Slight” to “Moderate” threats. The most significant sources indicated by respondents were littering/dumping, farming practices (e.g. fertilizers, pesticides, manure, erosion, etc.), landfills, and septic system discharges. Littering and dumping was rated as “Severe” more than any other listed source. The lowest ranking sources were soil erosion from construction sites and natural sources such as wildlife. Concerns regarding negative impacts from water quality impairments focused primarily on scenic and recreational characteristics on local waterways and less on threats to drinking water supplies or property values.

Some of the common practices currently being used among respondents was proper disposal of household wastes (61%) and keeping yard wastes out of waterways (55%). Almost 25% of respondents indicated that they knowingly do not follow lawn fertilization recommendations. The least understood practices focused on utilizing native plants or other vegetation next to waterways to help protect water quality and filter runoff. When asked about general constraints to changing land management practices, cost, lack of equipment, and availability of technical assistance on installing practices ranked highest. Constraints related to four specific management practices were evaluated in more detail. Currently 41% of respondents have never heard of rain gardens and only 6% indicated they are currently using this practice. When asked if they would be willing to try this practice 28% responded “Yes or already do” while 49% indicated they may be willing to install rain gardens on their property. The biggest constraints related to rain gardens were cost as well as lack of knowledge on installing vegetated areas to collect and filter storm water runoff. Filter strips were another practice that was unfamiliar to respondents with 60% indicating they were not very familiar with the practice. When asked if they would be willing to install the practice 31% indicated “Yes or already do” while 31% responded that they may be willing to implement filter strips on their property. The biggest constraints associated with filter strips were cost and knowledge of how the practice is installed. Rain barrels, or rain water harvesting, was split with 40% indicating that they knowingly do not use the practice while 43% of remaining respondents indicating they weren’t familiar with rain barrels. When asked if they would be willing to install rain barrels 38% responded “Yes or already do” while 33% indicated they may be willing to install the practice on their property. The biggest constraints to rain water harvesting were lack of equipment and cost of implementation.

2.0 Description of the South Fork Wildcat Creek Watershed

2.1 Geology and Topography

Geology

Until 20,000 years ago, the Wisconsin glacier covered the region. The glacial drift ranged from 100 to 400 feet thick. Due to the sand and gravel layers in the glacial till, wells are the main source of water in the watershed. Much of the South Fork flows through relatively flat farmland, but glacial mounds, known as kames, may be seen in the creek valley. The Teays River system was a pre-glacial system which ran in a general east-west direction across central Indiana. The old river channel was abandoned when its course was diverted southward to the Ohio River drainage by the movements of the early Pleistocene ice and the emplacement of glacial deposits approximately two million years ago (Figure 4). Part of the pre-glacial Teays River system supplies well water for the City of Frankfort.

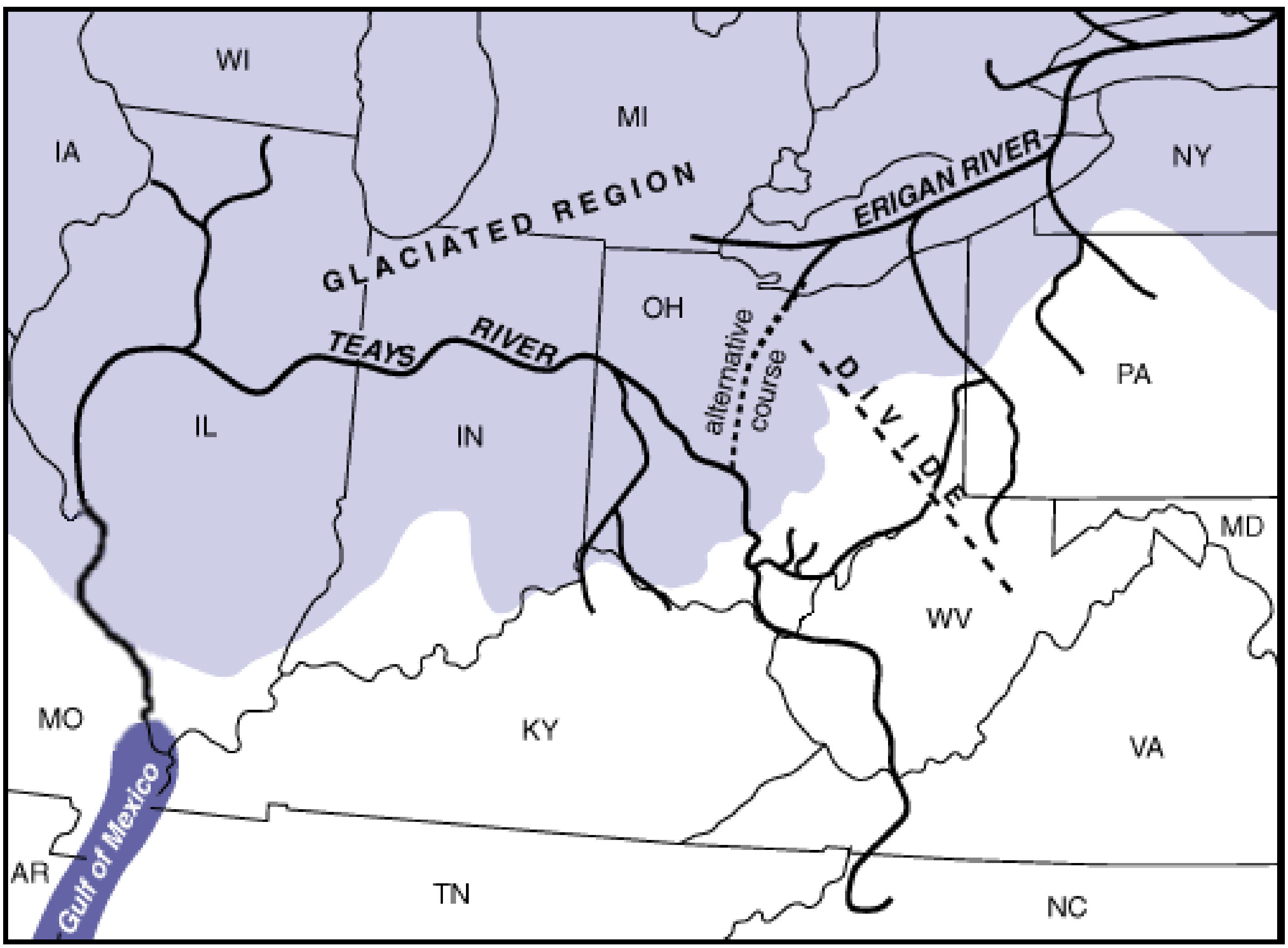


Figure 4. Pleistocene Glaciated Region in Indiana

Topography

The South Fork Wildcat Creek Watershed is located within the Tipton Till Plain. The region is characterized by relatively flat, gently rolling land resulting from glaciations during the most recent ice age. Elevation ranges from 930 feet above sea level at the highest point in the headwaters to about 545 feet downstream (Figure 5). The watershed slopes towards the west from its headwaters in Tipton County before turning north/northwest after entering Tippecanoe County. The average slope in the watershed is approximately 4%, according to the South Fork Wildcat Creek TMDL study. However, steeper slopes are not uncommon along local waterways as you move farther downstream in the watershed (Figure 6).

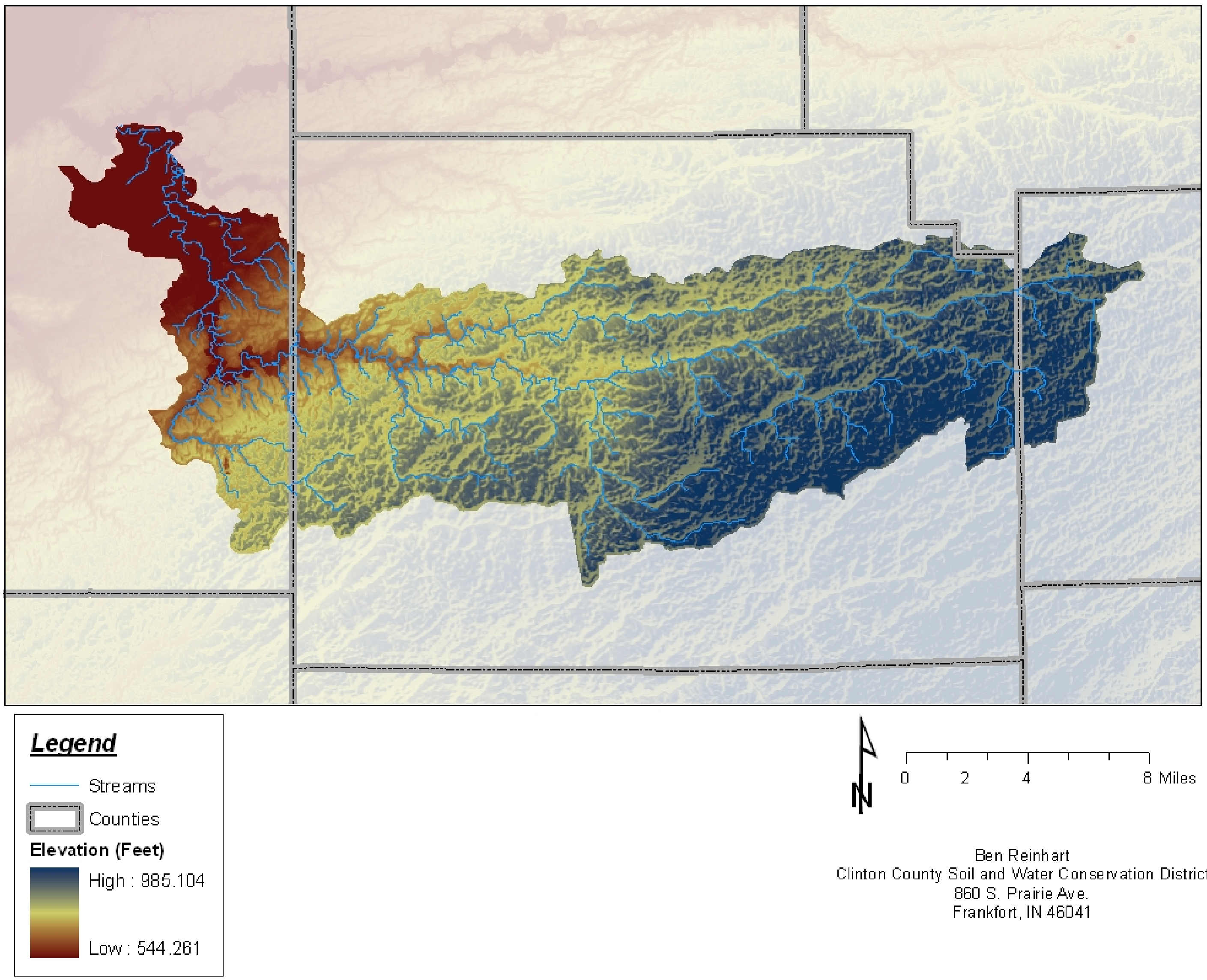


Figure 5. Elevation Map of the South Fork Wildcat Creek Watershed

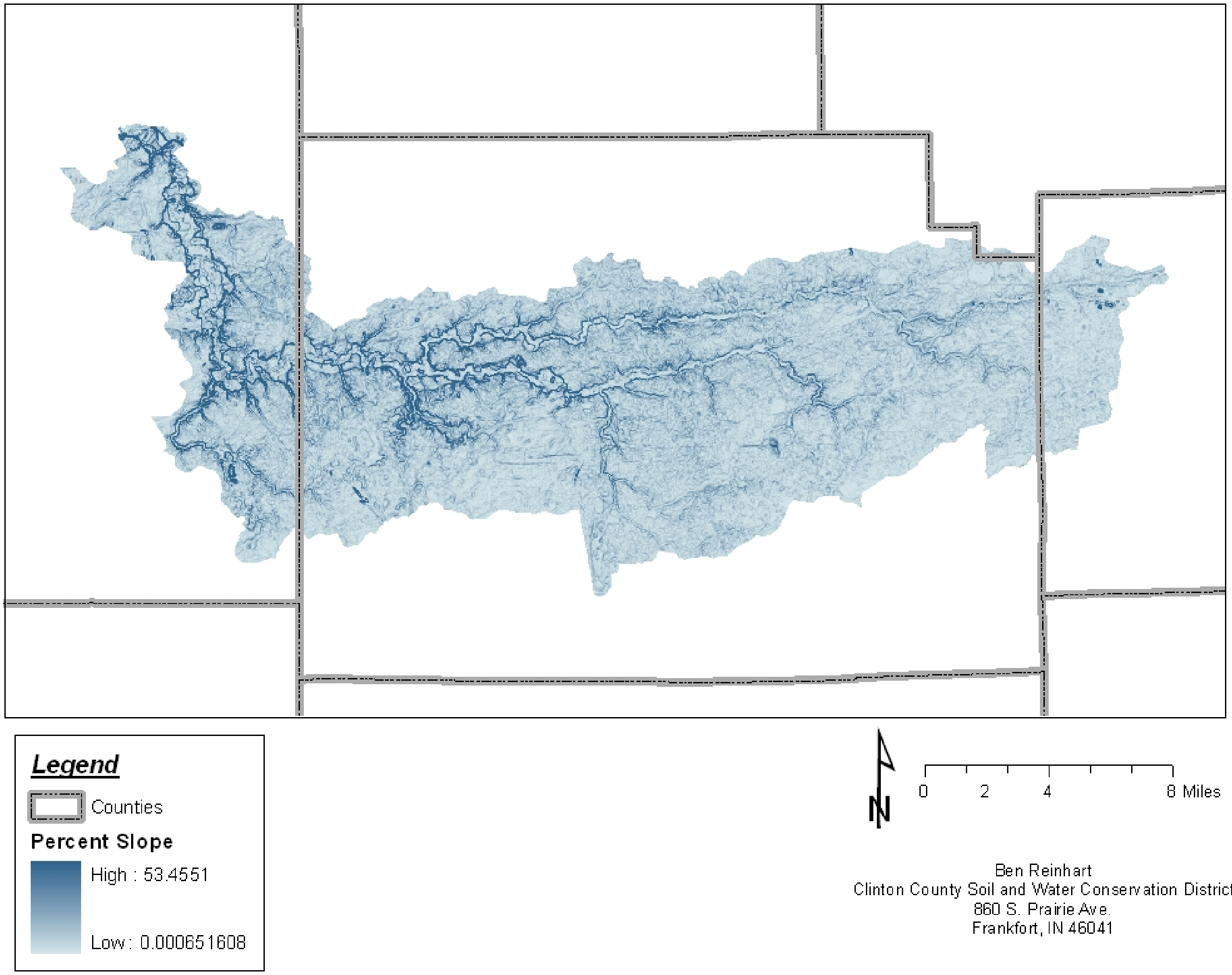


Figure 6. Sloping Lands of the South Fork Wildcat Creek Watershed

2.2 Hydrology

The South Fork Wildcat Creek watershed drains 250 square miles and covers portions of Clinton, Howard, Tipton, and Tippecanoe Counties. Its waterways flow for 63 miles in an east to north-west direction from near Kempton, IN to Lafayette, IN where it empties into the main channel of Wildcat. Approximately 36 miles of the South Fork Wildcat Creek and Kilmore Creek have been listed as Outstanding Rivers by the Natural Resource Commission (Figure 7). As such, a number of stakeholders utilize local water resources for aesthetic or recreational purposes such as fishing and canoeing. It should be mentioned that there are a number of other uses of waterways in the South Fork Wildcat Creek Watershed. Various concerns have been expressed by stakeholders regarding the impact of livestock on local waterways, especially when there is clear access to the water, depletion of surface and groundwater by high-capacity irrigation, and other rural uses of natural water resources. (See 1.3 Stakeholder Concerns).

Due to the high percentage of agricultural row crop farming and drainage limitations on local soils, open ditches and subsurface tile systems (both public and private) are widely used and seen as a means for drainage (Table 4). This type of hydrologic modification has helped create highly productive soils for crop production as well as create outlets for flood waters that may threaten fields, roads, or developed areas. However, these modifications do also have potential to negatively impact local waters. Artificial drainage can actually increase downstream flooding since waters enter our ditches and waterways at a much faster rate than you would see in natural systems. This can result in those channels quickly filling up to their storage capacity and allowing flood waters to overtop their banks. Subsurface tile drainage prevents natural infiltration and soil cleansing processes. This prevents natural groundwater recharge of local aquifers as well as does not allow natural soil bacteria and microbes to break down pollutants before entering surface and groundwater. Some of the natural headwater streams have undergone maintenance (e.g. channelization, dredging, etc.) to be maintained as open drainage channels. Maintenance activities such as channelization and dredging can result in the destruction of aquatic organisms and their habitats as well as create a disturbance in physical or chemical processes of the waterway leading to unstable or unproductive waterways. Figure 8 shows a location of artificial drainage in the South Fork Wildcat Creek Watershed.

Table 4. Natural and Artificial Waters of the South Fork Wildcat Creek Watershed

Streams	213.5 Miles
Open Ditches	96 Miles
County Tile	198.1 Miles
Private Tile	31.3 Miles
Wetlands	11,535.7 Acres
Lakes, Ponds, and Reservoirs	352.6 Acres (277 Bodies of Water)

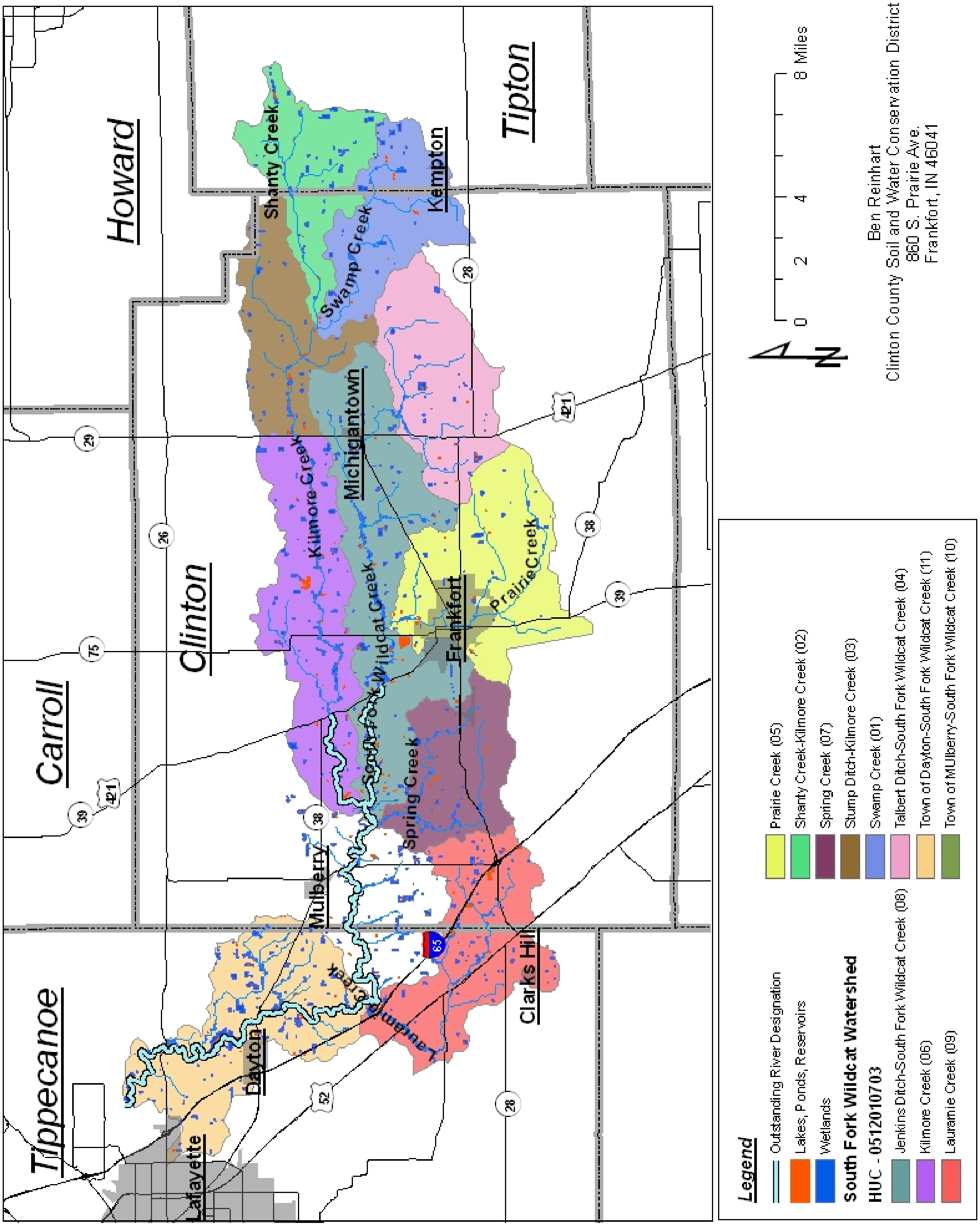


Figure 7. Waterbodies of the South Fork Wildcat Creek Watershed

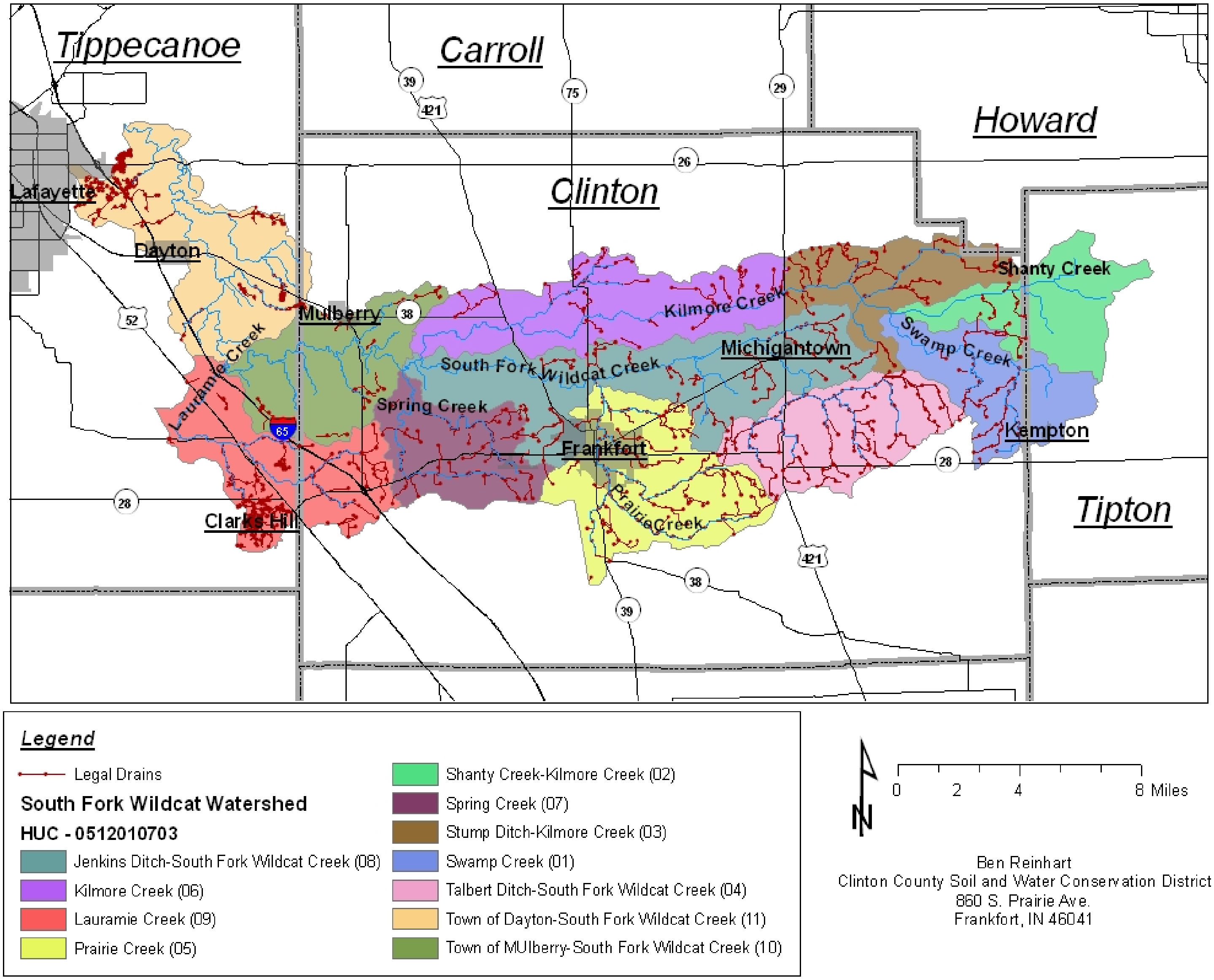


Figure 8. Tile and Open Drains within the South Fork Wildcat Creek Watershed

2.3 SOILS

Soils within the watershed can be grouped and described by looking at various physical and chemical characteristics. One such characterization is called STATSGO which stands for the State Soil Geographic Database. This database groups together soil types into general associations based upon their general characteristics. Another characterization is called SSURGO which stands for the Soil Survey Geographic Database. SSURGO is a much more detailed database than STATSGO and can differentiate between various soil types even at very detailed levels such as single farm tracts. Both databases are maintained by the US Dept. of Agriculture's (USDA)-Natural Resources Conservation Service (NRCS).

Soil types in the watershed are generally derived from two general groups: alluvial and gray-brown podzolics. The podzols originally developed from deciduous forest situations and are located on uplands and slopes. Alluvial soils developed under water-based systems (e.g. rivers) and are generally located in bottomlands. The soils in the watershed vary in maturity but many have been exposed long enough to form distinct soil horizons in the soil profile. However, some soils that have formed from recent alluvial material lack these distinct horizons. Processes that have been involved in the formation of the soils include: accumulation of organic matter; solution, transfer, and removal of calcium carbonates and bases; and the liberation and translocation of silicate clay minerals. A total of eight general soil associations are found within the South Fork Wildcat Creek Watershed. However, over 70% of the watershed is designated primarily to only two soil associations (Figure 9).

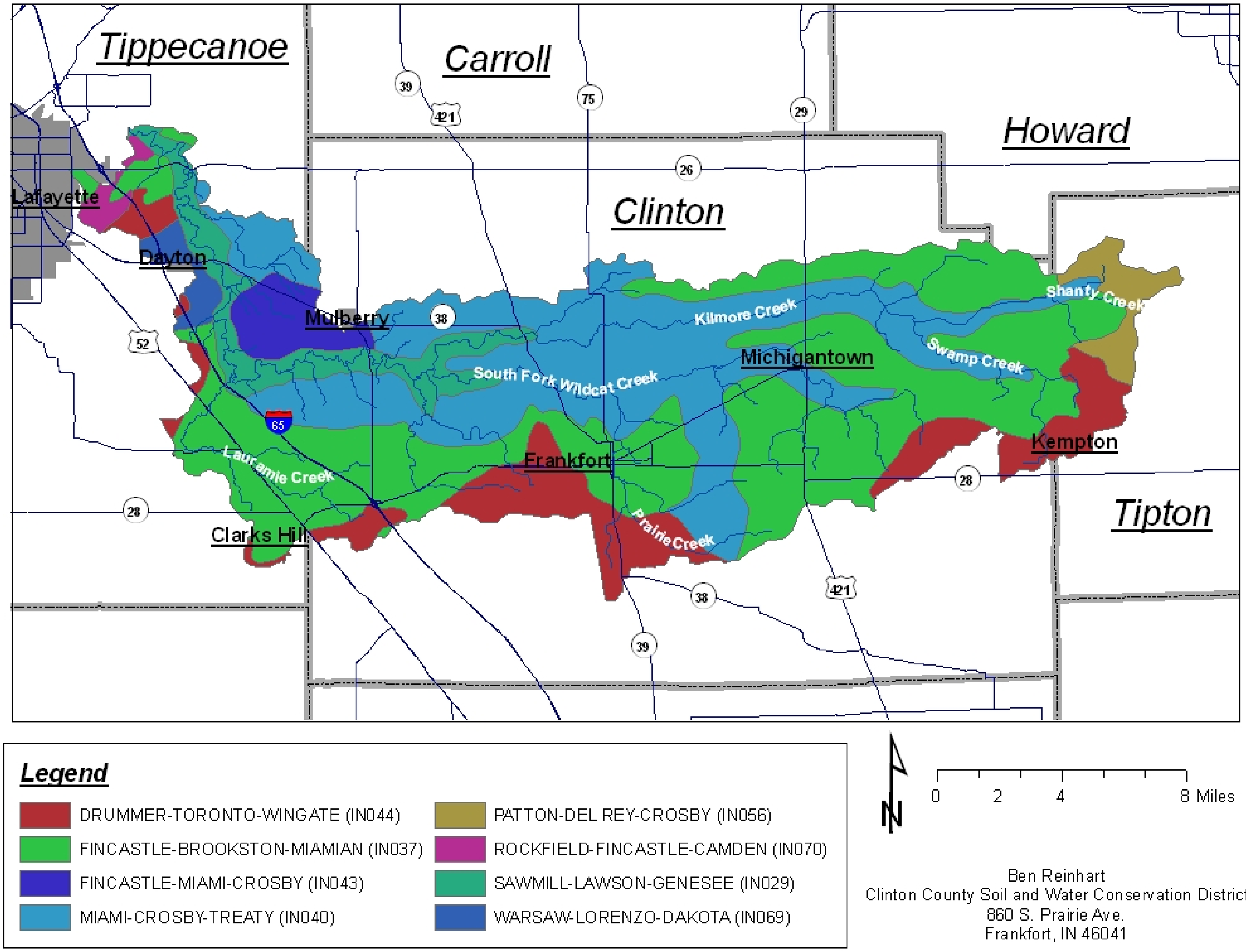


Figure 9. General Soil Associations within the South Fork Wildcat Creek Watershed

Septic Suitability

Roughly 92% of soils within the watershed area are poorly suited to handle on-site wastewater treatment systems (i.e. septic systems) (Table 5). Common soil limitations focus on issues such as high water tables and excessively slow infiltration rates. The result of these limitations is often the input of raw sewage into local waterways. In an effort to get around these soil limitations many county health departments require perimeter drains and large absorption fields. However, even these larger, more modern wastewater systems require periodic maintenance to ensure proper functioning and limit environmental impacts.

Table 5. General Soil Characteristics within the South Fork Wildcat Creek Watershed

Drummer-Toronto-Wingate (12.1% of Watershed Area)	Sawmill-Lawson-Genesee (6.7% of Watershed Area)	Fincastle-Brookston-Miamian (41.3% of Watershed Area)	Miami-Crosby-Treaty (32.1% of Watershed Area)
Nearly level, poorly drained and somewhat poorly drained, silty soils; on till plains **Poorly suited for sanitary facilities*	Nearly level, well drained to very poorly drained, formed in loamy alluvium; in bottomlands	Nearly level, deep somewhat poorly drained on slight rises on broad till plains, silt loam **Poor suitability for sanitary facilities*	Strongly sloping to nearly level, well drained and somewhat poorly drained, silty and loamy soils; on till plains **Poorly suited for sanitary facilities*
Fincastle-Miami-Crosby (3.1% of Watershed Area)	**Patton-Del Rey-Crosby (2.5% of Watershed Area)**	**Rockfield-Fincastle-Camden (0.8% of Watershed Area)**	**Warsaw-Lorenzo-Dakota (1.4 % of Watershed Area)**
Nearly level and gently sloping, somewhat poorly drained; silty material on till plains ** Moderate to severe limitation for sanitary facilities*	Nearly level poorly drained soils formed in silty and sandy sediments on lake plains and till plains **Unsuitable for private sanitary facilities*	Nearly level, gently sloping, moderately well drained to somewhat poorly drained soil; on till plains; silt loam **Poorly suited for sanitary facilities*	Nearly level to strongly sloping, well drained; gravelly coarse sand formed in loamy sediments; on outwash plains and terraces

Other potential impacts from wastewater exist in communities that operate without modern treatment systems. A number of communities within the watershed are unsewered (Figure 10). Many times these areas are operating on old and out-dated septic systems that may be discharging raw sewage into local waterways and present local health risks. Fortunately, there has been interest by some communities to address this issue as can be seen by the switch to city sewer by the Town of Jefferson and participation from the Kempton community in a Septic System Maintenance Workshop. Many stakeholders acknowledge these communities as sources of waste discharge and *E. coli* loading (Table 3). However, due to long distances for connection to existing infrastructure and small landowner bases to cover the cost of new infrastructure development, many of these communities currently have limited options for reducing their impacts. Various grant and loan programs have been discussed for certain communities such as Kempton.

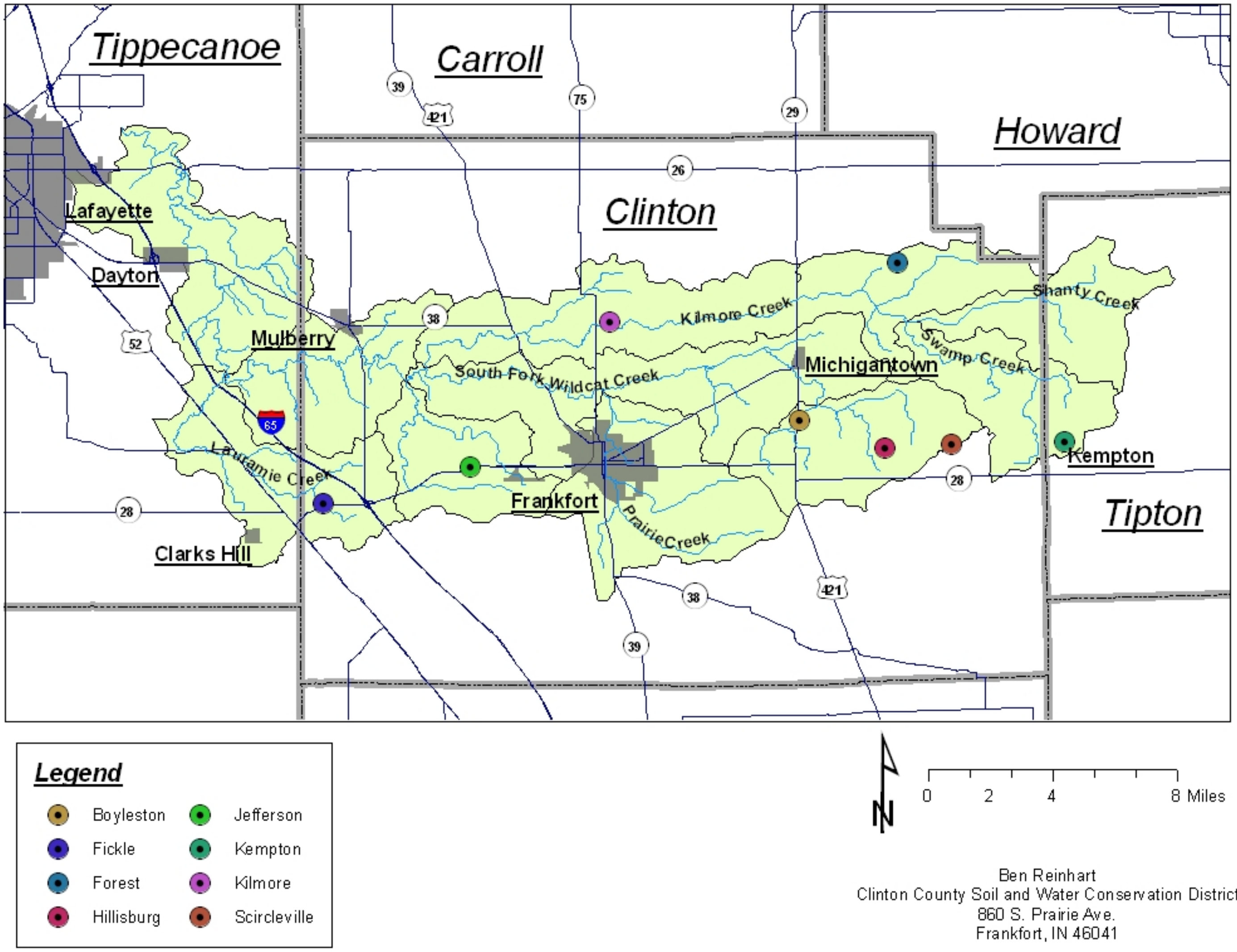


Figure 10. Unsewered Communities within the South Fork Wildcat Creek Watershed

Highly Erodible Lands

As was noted by stakeholders, erosion and sedimentation is a concern within the watershed. Soil erosion involves the breakdown, detachment, transport, and redistribution of soil particles by forces of water, wind, or gravity. The redistribution of eroded soils into local waterways represents the process of sedimentation. Highly erodible lands (HEL) describe those areas that are potentially exposed to soil erosion by wind or water. A number of factors go into determining if any particular farm or unit of land can be classified as HEL. Some of these factors include: the amount and intensity of rainfall or wind, the inherent erodibility of a certain soil type, and the topography (e.g. slope and slope length). The USDA Natural Resources Conservation Service makes determinations on HEL or potential HEL (PHEL) and has compiled a list of soils, by county, which they commonly see in these situations. Soils are classed as 1 (Highly Erodible), 2 (Potentially Highly Erodible), and 3 (Not Highly Erodible). Lands that are determined to be HEL can contribute a significant amount of sediment, nutrients, and chemicals to local waterways, especially if those areas are cropped and lack appropriate conservation measures. In addition, tons and tons of productive soil are lost from farmland during each rain event impacting not only local streams but also the yields of local farmers. About 6% of the South Fork Wildcat Creek watershed is classified as HEL soils. The majority of these soil types are located primarily in the bottom third of the watershed and adjacent to waterways. Almost 30% of the watershed area can be classified as PHEL and these soils are widely distributed across the area (Figure 11).

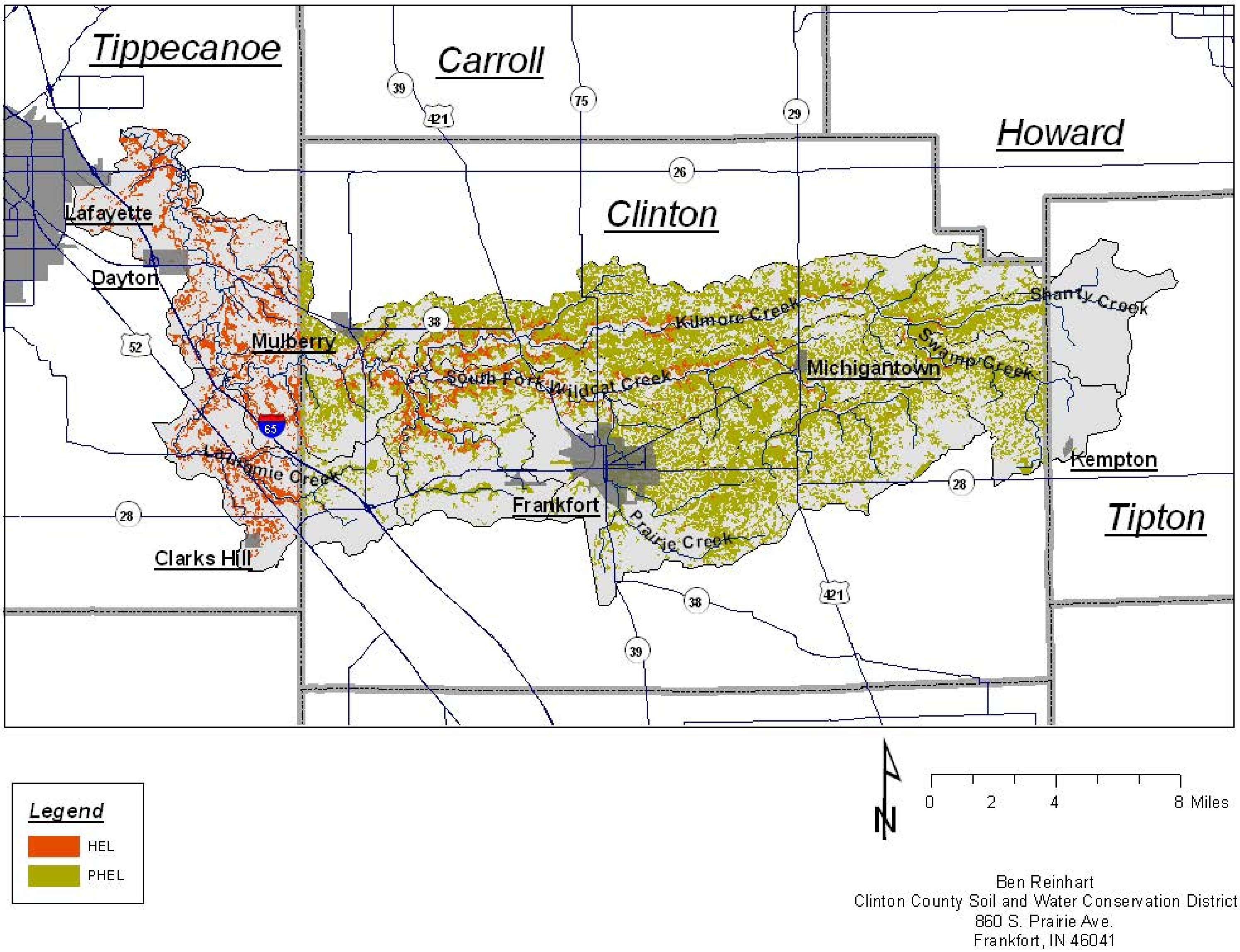


Figure 11. Highly Erodible and Potentially Highly Erodible Lands within the South Fork Wildcat Creek Watershed

Hydric Soils

Hydric soils describe those soil types which are wet or ponded with water long enough that they start to develop anaerobic (i.e. low oxygen) conditions in the upper parts of their layers. Many times the presence of hydric soils indicates where a wetland once was or currently is located. This soil designation is important for the natural occurrence or restoration of wetland ecosystems. Hydric soils are capable of supporting wetland ecosystems which act like natural wastewater treatment plants, removing various water pollutants and helping to cycle excess nutrients through the environment. Wetlands are also extremely important wildlife habitat and can support diverse collections of birds, amphibians, reptiles, mammals, insects, and plants. The lack of appropriate wildlife habitat was one major concern for stakeholders. It is also important to understand that while a number of areas of hydric soil have been artificially drained or filled in, they still retain their hydric capabilities. This means that areas of hydric soil are excellent candidates for the restoration of wetland habitats due to their natural ability to hold water. Roughly 34% of the watershed area is classified as hydric soils. The vast majority of these areas is cropland and artificially drained providing a direct conduit for nutrient loading into local waterways. A high percentage of the soils within the headwaters of the South Fork Wildcat Creek watershed are hydric (Figure 12).

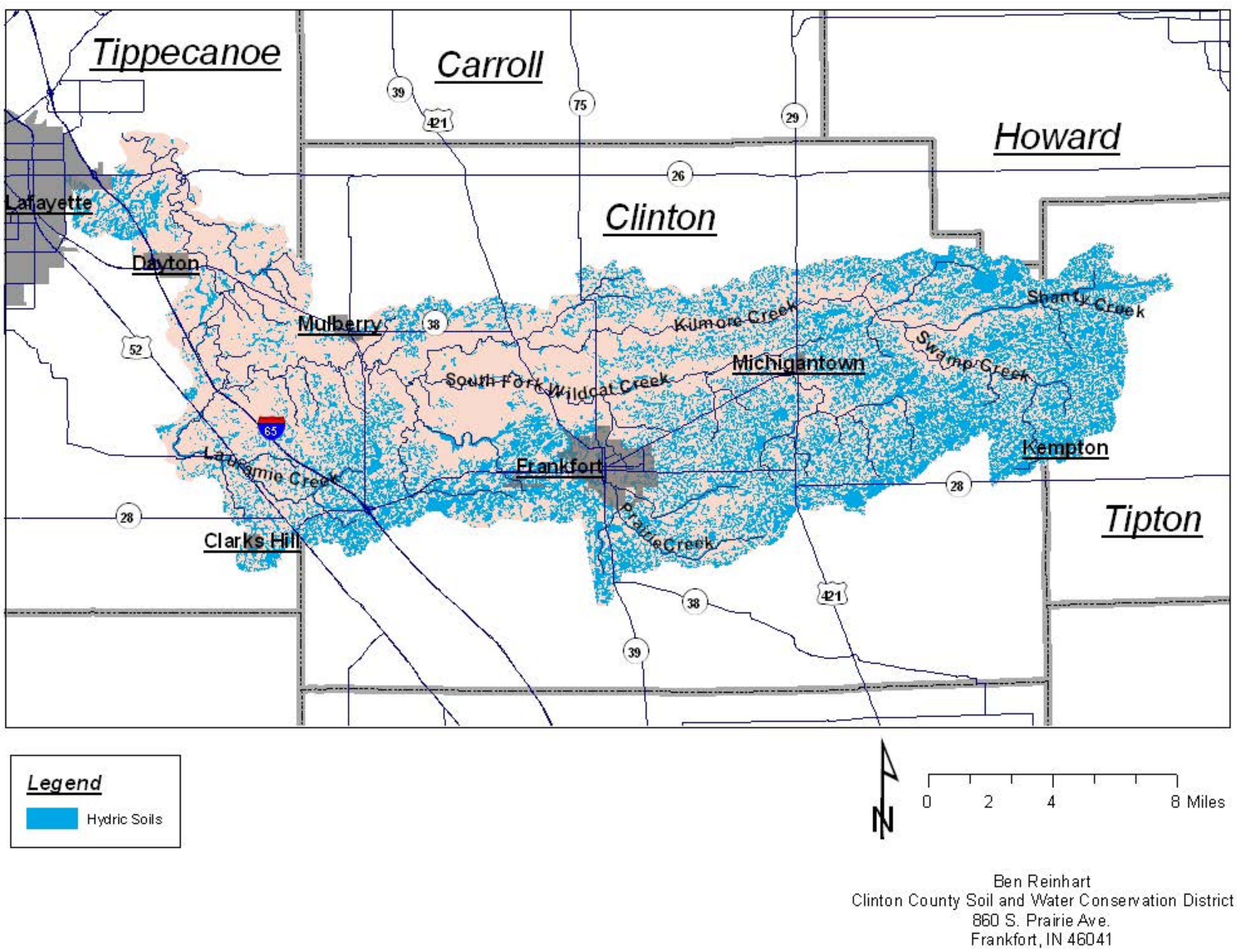


Figure 12. Hydric Soils within the South Fork Wildcat Creek Watershed

Tillage Transect

The region contains some of the most productive soils in the United States. Almost 22% of soils within the South Fork Wildcat Creek watershed are classified as Prime Farmland while another 69% are considered prime farmland given proper drainage (Figure 13). Combined with our humid-continental climate and good management, crop yields are consistently high within the watershed.

Tillage transects are windshield surveys that collect data and current and past crop use, tillage practices, and various soil loss factors. Data from these surveys provide valuable information on trends in cropland use and acceptance of conservation practices such as conservation tillage and cover crops. Tillage transects are generally completed in Indiana counties every other year. Comparisons from 1990 to 2007 have shown drastic increases in the adoption of no-till soybeans through the local counties while no-till corn has seen more modest adoption rates. Tippecanoe County has recorded relatively high levels of no-till rates for both corn and soybeans when compared with other counties contributing land

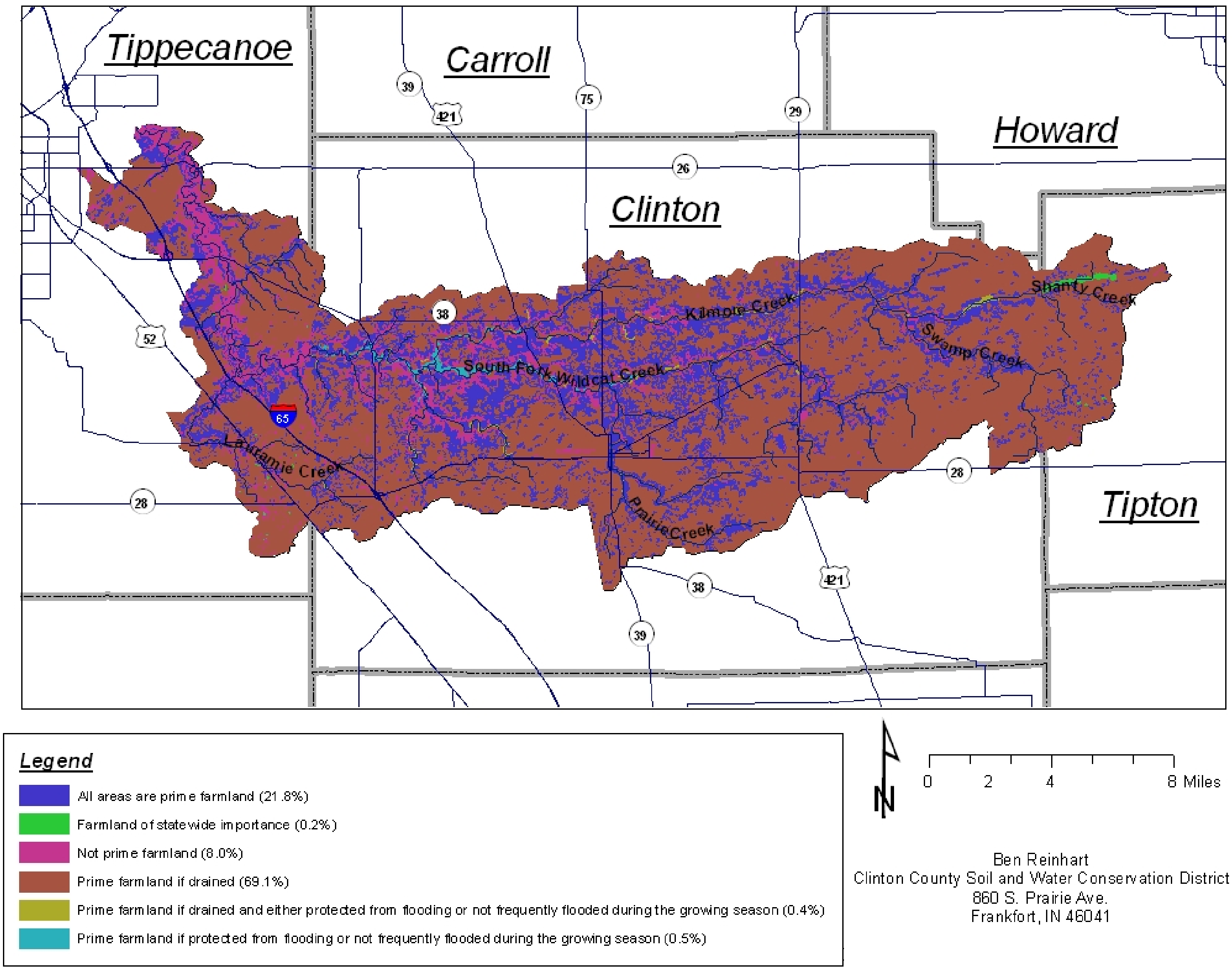


Figure 13. Farmland Classifications within the South Fork Wildcat Creek Watershed

to the watershed area. Both Tipton and Howard County have had relatively low no-till levels but have maintained high participation levels in reduced tillage practices when compared with Tippecanoe and Clinton Counties. Estimates for conventional, reduced, mulch till and no-till practices for both corn and soybeans were calculated for each county with land area within the South Fork Wildcat Creek Watershed during the years 2004, 2007, 2009, and 2011. These estimates were averaged across the seven years and weighted by the percentage of watershed area occupied by each county. This provided an overall estimate of tillage practices for the entire South Fork Wildcat Creek Watershed (Table 6). One assumption of this method is that tillage practices in each county are evenly distributed which is likely not true. For example, in the Tippecanoe County portion of the watershed no-till practices for corn are much more common than in some of the flatter areas of the county. This would result in estimates for the South Fork Wildcat Creek Watershed slightly underestimating true no-till adoption rates. Nevertheless, these estimates provide an approximate value for planning purposes.

Table 6. Tillage Transect Data

Watershed Average (Percentage)				
	Conventional	*Reduced*	*Mulch Till*	*No-Till/Strip Till*
Corn	70	17	5	8
Soybeans	9	12	12	66
Watershed Average (Acres)				
Corn	43,251	9,886	3,089	4,943
Soybeans	4,953	6,604	6,604	36,871

2.4 Rare, Threatened, or Unique Wildlife and Their Habitats

According to the Indiana Department of Natural Resources Division of Nature Preserves and the Natural Resources Conservation Service, several endangered, threatened, and rare plants and animals have been identified in the watershed (see specific species habitat information below). A detailed field study of these plants and animals was not conducted to verify their actual presence in the South Fork Wildcat Creek Watershed.

Mammals

Lasiurus borealis – Eastern Red Bat

The Eastern Red Bat is currently listed as an Indiana Species of Special Concern. During the summer, the Eastern Red Bat prefers to roost in dense foliage. The red coloring of the Eastern Red Bat can help camouflage them from predators, particularly for bats roosting in sycamore, oak, elm, and box elder trees. Not coincidentally, these trees seem to be the bat's preference. The largest trees, high off the ground and near the canopy edge, are where these bats are often found roosting. It is possible that these roosting locations are chosen to shelter the bats from high temperatures, both by filtering sunlight and the cooling effect of evapotranspiration. A permanent water source nearby is also part of the bat's preferred habitat. A bat can return to the same roosting area yearly, which is indicative of the site making a good breeding ground.

The Eastern Red Bat will forage in different habitats, with their preference being in forested environments. They will also forage along the edge of pastures, fields and open areas that have deciduous trees present. The bat will travel 2,000 to 3,000 feet from the day roosting site to the feeding area and may return to the area on consecutive nights.

During the winter, these bats will hibernate in tree hollows or exposed tree trunks. There have been recent discoveries of these bats hibernating on the ground covered by grass and leaf litter which may make them vulnerable to certain management activities (e.g. prescribed burning, timber clearing, etc.) during winter months.

Farmers find the Eastern Red Bat a beneficial mammal to keep nearby and would benefit to foster a hedgerow roosting area along crop boundaries. Thought and consideration should be used on how pesticides are used to minimize the bats eating inflicted insects.

Myotis sodalist – Indiana Bat

The Indiana Bat is listed as Federally Endangered. The Indiana Bat winters in cool caves, or mines, with stable temperatures around 40° F. The relative humidity of the caves or mines is from 66% to 95%. As the wintering caves are further south than Delphi, Indiana, further detail has been omitted but can be provided if desired.

In early spring, the Indiana Bat wakes from hibernation and migrates to its summer roosting and foraging area. The females spend the summers separate from the males. The females will develop maternity colonies of 50 to 100 individuals. The maternity colony can be formed in hollow trees or under the loose bark of dying and dead trees that retain large slabs of peeling bark. The primary roosting trees are exposed to direct sunlight for more than half the day. The roosts can be found along a fence line, the edge of a forest, or in an opening in the forest canopy. Rivers and streams are near the maternity roosting site. At least 100 feet of natural vegetation needs to be on either side of the water's bank. The maternity roosts occur in riparian forests, floodplains, wooded wetlands, as well as upland forests. Where the male bat spends its summer is not well documented. Some male bats will migrate to upland forest and floodplains and some male bats will remain close to the hibernation location. The few male roosting spots found during the summer have been located near water. Indiana Bats are extremely loyal to their hibernation and roosting sites and will not roost or hibernate in man-made structures.

Indiana Bats consume large quantities of insects. Indiana Bats begin to forage for food approximately half an hour after sundown. The bats prefer to forage in a dense riparian forest near the canopy but they will also forage in the treetops located in floodplains, low fields and pastures, and upland forests.

Loss of roosting habitat occurs from human interference such as streamside deforestation, timber harvesting, agricultural development, pesticide use, and conversion of forested land.

Birds

Lanus ludovicianus – Loggerhead Shrike

Listed as State Endangered in Indiana, the Loggerhead Shrike prefers land with a variety of uses. The Loggerhead Shrike utilizes open land with lookout perches for hunting. The Loggerhead Shrike prefers the hunting ground to have shorter vegetation such as recently plowed fields, well grazed grasslands, roadside ditches, and lawns. Grassland with scattered trees or shrubs would be a preferred area for the Loggerhead Shrike as that would provide hunting ground with lookout posts as well as nesting spots.

Branches, thorns, or barbed wire fences are utilized by the Loggerhead Shrike to impale their prey, helping the bird to tear the prey into bite size pieces or possibly to store the food for a later point in time. The availability of these items might be an important part of habitat selection.

The Loggerhead Shrike nests in bushy vegetation either in hedgerows or isolated trees and shrubs near their preferred hunting area. More than half of the shrike nests discovered in Indiana have been in red cedar trees although sassafras, multiflora rose, and other plant types are used. The cover the plant provides to the nest is valued over the type of plant actually used. The nests are sturdy but bulky nests made from sticks and roots. The nests are lined with hair, cotton and feathers. Nesting sites can be reused the following year if left undisturbed.

Activities that benefit landowners as well as the shrikes would be to fence out livestock from dugouts, converting cropland to grassland, planting isolated trees or shrubs in yards or pastures, and/or implementing a rotational grazing system.

Buteo lineatus – Red Shouldered Hawk

Listed as an Indiana Species of Special Concern, Red Shouldered Hawks are year round inhabitants of mature deciduous or mixed deciduous-conifer forests. Typically these forests have wetlands nearby such as lowland forests, beaver ponds and wet meadows. The wetland areas are used for foraging. The hawks enjoy a dead tree in which to perch and view the forest floor.

During non-breeding, the hawk is less selective about its habitat, utilizing smaller forests, open areas and edges. During breeding, the hawks shy away from fragmented woodlots and forests that do not contain trees large enough to provide a nesting area. The Red Shouldered Hawk requires 250 to 620 acres of wooded land. The forest needs to have a closed canopy of tall trees, an open subcanopy and varying amount of understory cover. These hawks use a variety of mature tree types in which to build their nests such as American beech, birch, ash, oak, pine, maple, elm, hickory, and tulip poplar. Tree structure and not tree species seems to hold the greatest influence on nest placement. Nests are normally found 35-40 feet above the ground and within $1/8^{th}$ of a mile of wetland. The nests are kept away from human activity. The Red Shouldered Hawk is an extremely territorial breeder and will reuse its nest and breeding site for many years. Incubating hawks, nestlings and eggs can be the target of predation by the red-tailed hawk, great horned owl and raccoons.

Ardea Herodias – Great Blue Heron

The Great Blue Heron can be found commonly along inland freshwater lakes and rivers, lagoons, and wetlands. Not listed as threatened and endangered in Indiana, many people recognize and have a natural affinity for this bird. Nesting occurs in single-species or mixed colonies usually formed in trees, but ground, rock, reeds or rushes may also be used. They are inclined to nest in the same area year after year. The Great Blue Heron forages by walking slowly or standing motionless in water and striking at pray. Fishing requires shallow waters with a firm substrate, and main prey items include fish and amphibians.

Nycticorax nycticorax – Black-crowned Night-Heron

Endangered in Indiana, the Black-crowned Night-Heron suffers from long-term declines due to ongoing habitat loss and chemical threats from insecticides. This species are wetland habitat generalists, utilizing marshes, swamps, lagoons, flooded fields, and mudflats. They are omnivores and forage for small fish, crayfish, snakes, mice, and insects at night time. They nest in colonies of mixed species in the southern portion of their range.

Aquatic

Lamsilis fasciola, Pleurobema clava, Ptychobranchus fasciolaris, Toxolasma lividus

The Wavy-Rayed Lampmussel (Indiana Species of Special Concern), Clubshell (Federally Endangered), Kidneyshell (Indiana Species of Special Concern), and Purple Lilliput (Indiana Species of Special Concern) are all found in similar habitats. Once common in natural streams, freshwater mussels are now rare and uncommon. The common components of good mussel habitat exist in medium sized streams to small rivers with gravelly and/or sandy substrates. The water should be clear with a good steady flow. The largest threats to freshwater mussels are stream flow alterations, siltation, pollution, and exotic species such as the zebra mussel.

Plants

Poa wolfii – Wolf Bluegrass

Wolf Bluegrass is listed as a rare species in Indiana and is generally found in woods along streams, rocky wooded slopes, and in prairie patches.

2.5 Land Use

The primary use of land within the South Fork Wildcat Creek Watershed is dedicated to cultivated crops and agricultural purposes (Figure 14). The remaining use of land is split up between developed areas and natural (e.g. woods, shrublands, grasslands, wetlands, etc.) land cover. Deciduous, or non-evergreen, woodlands are the primary type of natural areas within the watershed. The vast majority of developed lands fall under the category of either open space or low-intensity developments. Land uses represented by “Developed, Open Space” include areas such as single-family residences, parks, golf courses, or undeveloped lots. Generally speaking these land areas include some impervious surfaces, usually less than 20%, but are mostly comprised of short vegetation such as lawn grasses. Common land uses within “Developed, Low Intensity” include areas such as single-family residences but can also include large-lot residential subdivisions or other sprawling developments in rural areas. Under these situations the total coverage of impervious surfaces such as roads, sidewalks, and rooftops increase to 20-49% of the total land area. These land uses present situations where turf management (e.g. lawn fertilizers, pesticides, yard waste, etc.) may impact local water quality. Also, some of these areas may be situated away from municipal services such as wastewater treatment and as a result rely more on on-site wastewater treatment (i.e. septic systems) which can be prone to discharge sewage into local waterways. When plotting land use information spanning from the year 2000 to 2010 we can see a drop in land use for agricultural purposes while the amount of developed land use and natural areas have seen slight increases in total land coverage (Table 7). These trends may be explained by the conversion of agricultural lands to rural residential developments and subdivisions, which also allows for a greater variety of vegetation to grow. Many local residents and stakeholders have notice increased residential growth around the Town of Mulberry in Clinton County and Town of Dayton in Tippecanoe County.

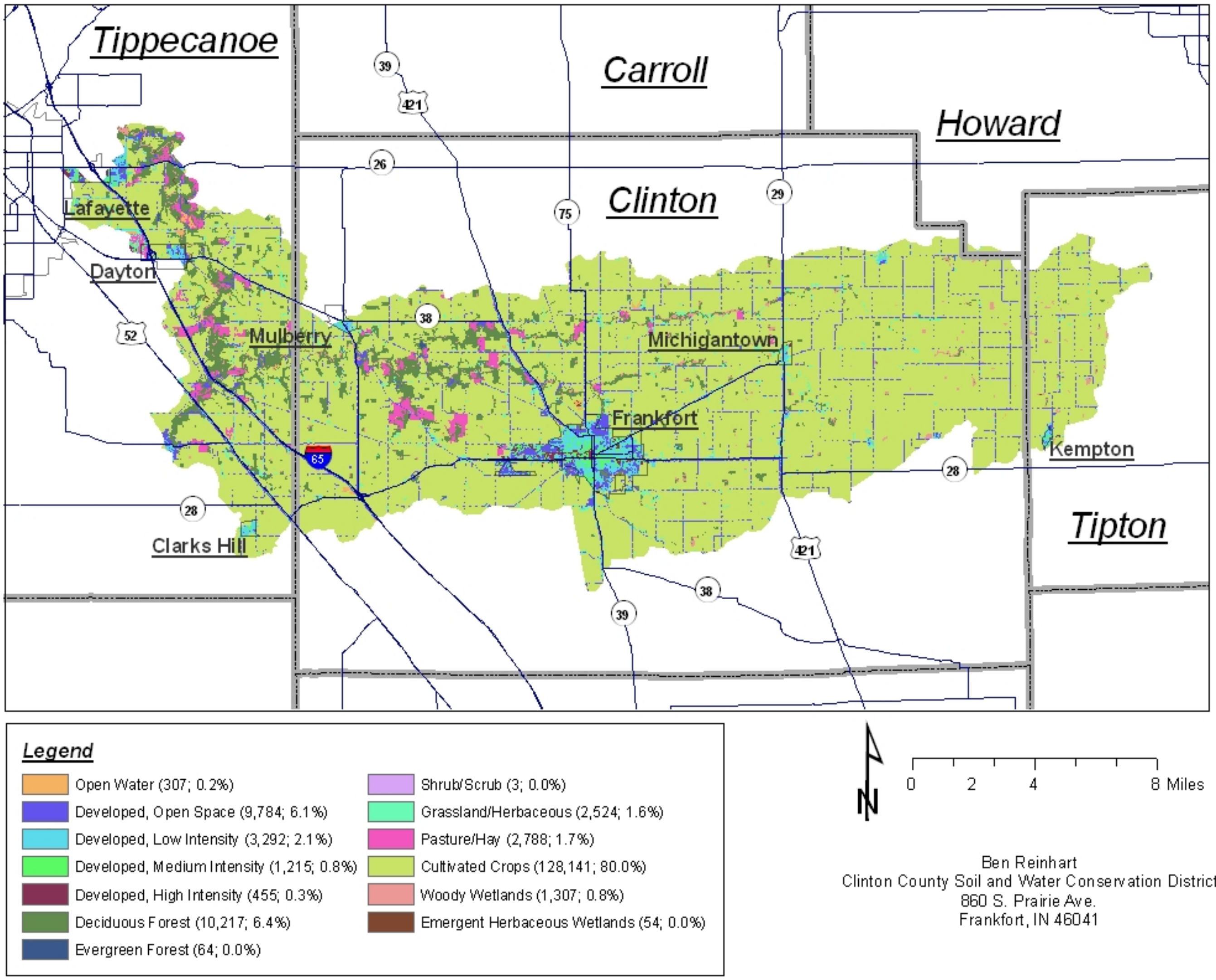


Figure 14. Land Use of the South Fork Wildcat Creek Watershed

Table 7. Land use trends within the South Fork Wildcat Creek Watershed

Watershed Land Use						
	2000	**2002**	**2004**	**2006**	**2008**	**2010**
Agriculture	93%	93%	88%	90%	77%	80%
Natural	4%	6%	8%	7%	12%	11%
Developed	3%	2%	4%	3%	11%	9%

The amount of impervious surface occurring within the watershed is important to consider. These surfaces, as well as compacted earth (i.e. lawns and some cultivated areas), prevent natural infiltration of water into the ground and disrupt the natural water cycle which helps the environment maintain adequate levels of clean water throughout the South Fork Wildcat drainage area. Often times these areas also contribute higher loads of pollutants such as excess nutrients, chemicals, sediment, and waste products as these pollutants are carried away by storm water runoff without having the chance to be filtered out or broken down as would normally occur in more natural environments. According to the Center for Watershed Protection's *'Watershed Protection Techniques'*, there is a direct relationship between the amount of impervious surfaces in a watershed and the quality and quantity of water found within that drainage. Where less than 10% of a watershed is covered in impervious surfaces, the streams are generally protected; where 11-25% of a watershed is covered in impervious surfaces, the streams are most likely impacted; where over 25% of a watershed is covered in impervious surfaces, the streams are most likely degraded. If going by these standards, development within the South Fork Wildcat Creek Watershed is right on the edge of potentially producing significant impacts on our natural waters. Under any situation, continual development within the South Fork Wildcat Creek Watershed is likely to increase the potential for further degradation unless conscious efforts are made to plan and develop with water and soil resources in mind.

Table 8 shows a comparison between primary stakeholder concerns and major land use types. Below, all stakeholder concerns gathered during the initial meetings were consolidated and refined by the Steering Committee. These concerns were then listed against the land use types where they most commonly occur. Agriculture and livestock uses include cultivated crops and animal operations. Rural land uses include natural and undeveloped areas as well as rural subdivisions, unsewered communities, and old mining or dump sites. Urban land uses include more developed areas that contain relatively high-density development and often have public utilities established. Given the widespread agricultural land use, highly fragmented natural or artificial (e.g. stormwater ponds) habitats, and lack of many highly urbanized locations, the impact of pet waste and natural wildlife is assumed to be minimal across the watershed.

Table 8. Stakeholder Concerns by Land Use

Stakeholder Concerns	Agriculture & Livestock	Rural	Urban
Development and land use change has resulted in more frequent flood events and problems with drainage	✓	✓	✓
Mismanagement of our floodplains and streams (e.g. construction in floodplain, use of natural waterways as drains, channel filling, etc.) has altered the natural hydrology of the watershed resulting in unstable channels and flows as well as reduced flood storage.	✓	✓	✓
Developing areas are contributing pathogens and *E. coli* through Combined Sewer Overflow events and other wastewater discharges.	-	✓	✓
Livestock and the spreading of their manure increase pathogen and *E. coli* loads in local waters	✓	-	-
Lack of septic systems, or maintenance of older systems, increase pathogen and *E. coli* levels especially near local unsewered communities	-	✓	-
Urban and industrial areas are contributing various environmental toxins including PCB's	-	-	✓
Current and past landfill sites are introducing sediments and pollutants into local waters	-	✓	-
Stormwater runoff from developed or developing areas contain high levels of water quality pollutants	-	✓	✓
Lawn runoff from high-residential areas contain elevated levels of pesticides and nutrients	-	-	✓

Table 8. Stakeholder Concerns by Land Use (continued)

Stakeholder Concerns	Agriculture & Livestock	Rural	Urban
Streambank erosion and slope failures input high levels of sediment directly into local streams	✓	✓	✓
The lack of conservation tillage practices in the county is contributing to high levels of sediment and nutrients in our waterways	✓	-	-
The lack of buffers, filter strips, and grass waterways allow agricultural land to introduce a lot of sediment and nutrients across the watershed	✓	-	-
Many people are not aware or know much about the watershed	✓	✓	✓
There is low public appreciation and support for the watershed as can be seen through illegal dumping activities, passive regulations, and lack of maintained access points or other recreational amenities	✓	✓	✓
Forested riparian habitat is limited across the watershed impacting local wildlife and water quality	✓	✓	✓

Agriculture

Within the South Fork Wildcat Creek Watershed area much of the agricultural ground is dedicated to the farming of corn and soybeans (Figure 15). Considering this, agricultural lands likely play a significant role in nonpoint source pollution within the South Fork Wildcat Creek Watershed. The total acreages planted to these crops each year have stayed fairly consistent over the past decade (Table 9). Pasture and other rangelands are also somewhat common throughout the drainage area but their total acreage has appeared to decrease during that same timeframe. There are a number of other crops that are grown throughout the watershed but do not account for significant acreage. Most commonly these include various small grains and alfalfa. Estimates on fertilizer and pesticide use, as well as other farm statistics, were gathered from the 2007 Census of Agriculture (Table 10 and 11). Watershed averages were calculated by weighting each county value by the amount of land area within the South Fork Wildcat Creek Watershed. Again, as mentioned with data from tillage transects, this assumes an even distribution across each county. In addition to commercial or manure-based fertilizers, biosolids from municipal wastewater operations are occasionally applied in a few localized areas throughout the watershed (Figure 16). Total amount and incorporation method of biosolids varies annually.

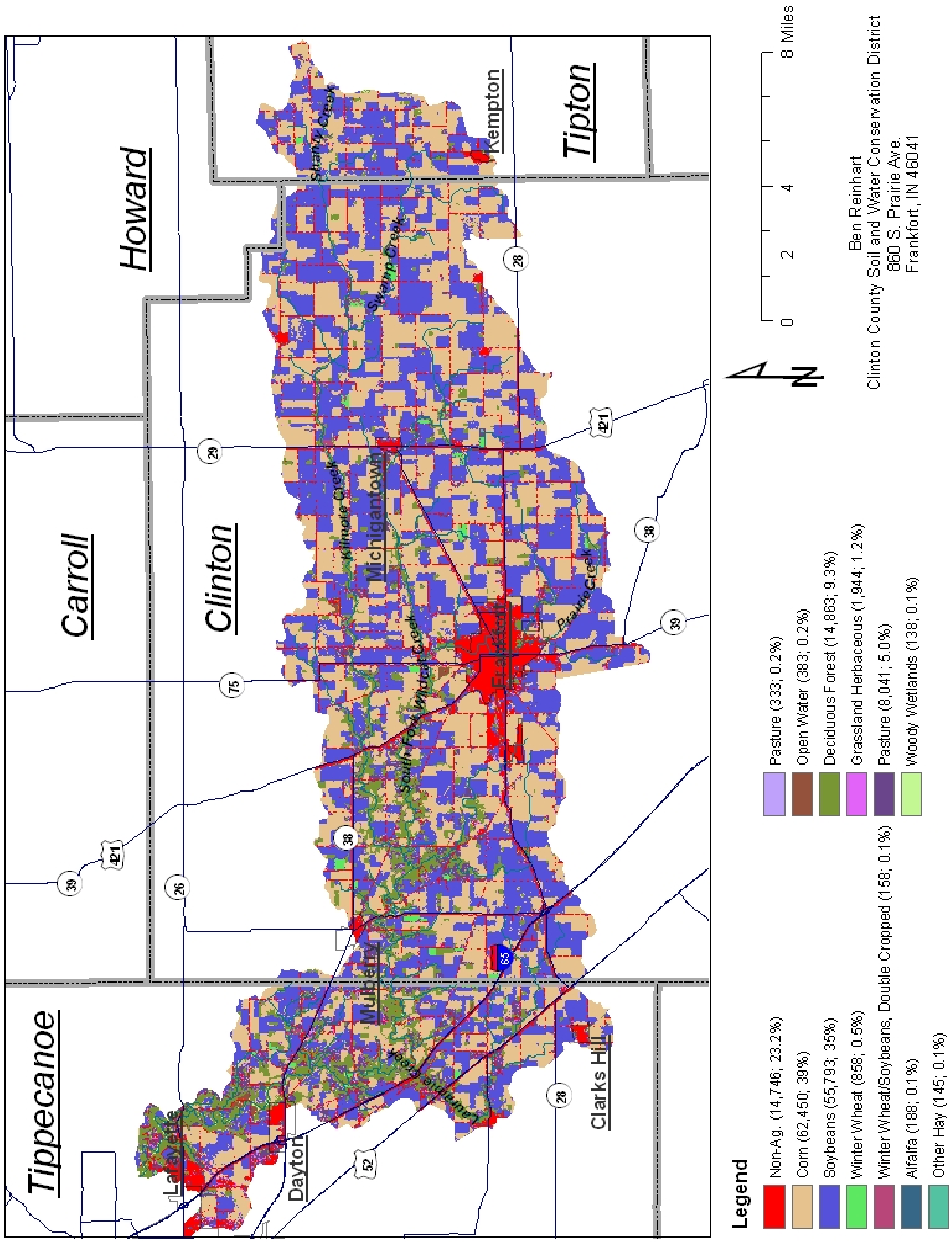


Figure 15. Cultivated Lands of the South Fork Wildcat Creek

Table 9. Primary Crops of the South Fork Wildcat Creek (% of Ag. Lands)

	2000	2002	2004	2006	2008	2010
Corn	35%	37%	42%	38%	40%	39%
Soybeans	35%	37%	33%	35%	31%	35%
Pasture	22%	18%	11%	14%	6%	6%
Other	1%	1%	2%	3%	1%	1%

Table 10. Farm Statistics for the South Fork Wildcat Creek Watershed.

Farm Statistics	Clinton	Howard	Tipton	Tippecanoe	Watershed Average
Percentage of Watershed Land Area	73.5	<1	6.5	20	-
Farms (#)	693	601	458	757	690
Avg. Farm Size (Acres)	368	270	362	288	352
Conservation Methods Applied (% of farms)	46.8%	35.8%	49.1%	40.2%	46%
Commercial Soil Amendments Applied (Acres)	192,476	111,517	129,523	156,329	181,146
Manure Applied (Acres)	6,078	4,741	5,380	4,202	5,660

Table 11. Estimated Pesticide Use for Croplands in the Watershed

Pesticide Use by Crop	Planted Acres in Watershed (10 yr Avg.)	Assumed Application Rate (lb. /ac.)	Estimated Applied Product (lbs.)
Soybeans (Glyphosate)	55,031	0.91	50,078
Corn (Atrazine)	61,787	1.31	80,941

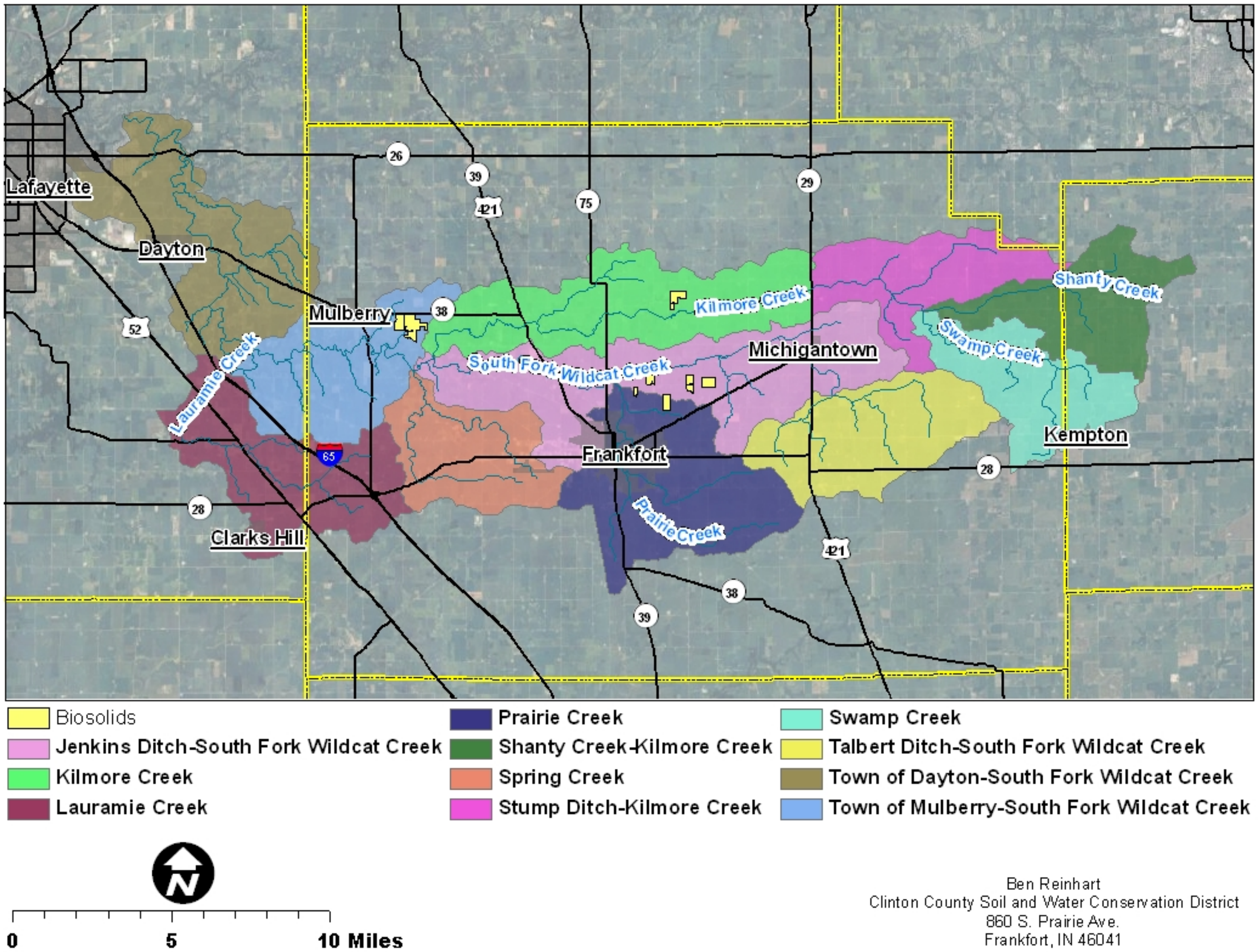


Figure 16. Approximate Location of Lands Receiving Biosolids from Local WWTP Facilities

2.6 Local Planning Efforts

The South Fork Wildcat Creek Watershed covers parts of four counties: Clinton, Howard, Tippecanoe, and Tipton. Each county has undergone various planning efforts to help guide future development and growth across their land base. In relation to water quality within the South Fork Wildcat Creek Watershed, these planning efforts were reviewed to take in consideration how local communities are intending to manage their water resources. Figure 17 shows general zoning classes and urban growth boundaries for lands within the South Fork Wildcat Creek. Figure 18 shows platted subdivisions across the South Fork Wildcat Creek Watershed. These areas can serve as an indicator for future residential development and where construction site runoff could pose a threat to local water quality.

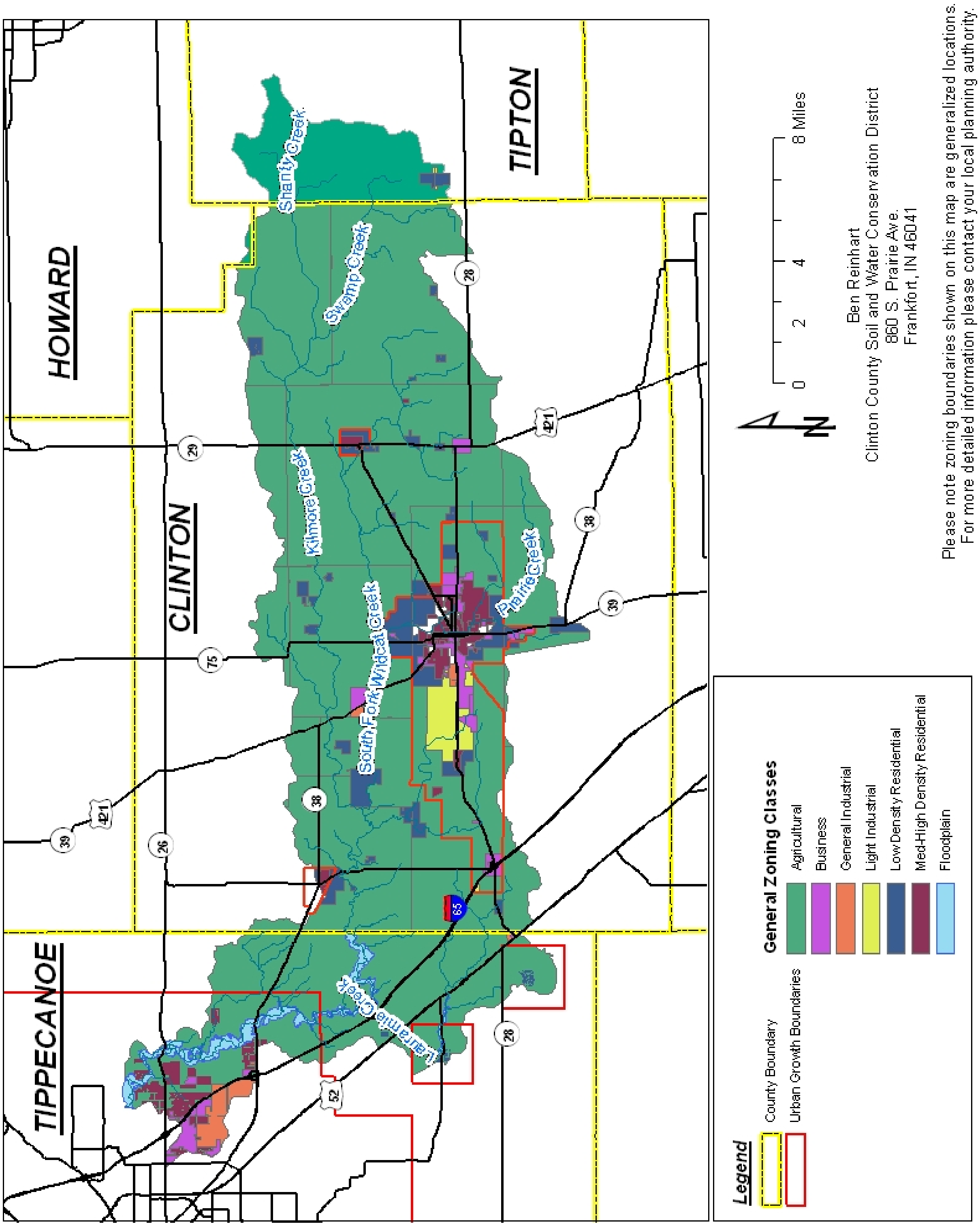


Figure 17. General Zoning Map and Urban Growth Boundaries for the South Fork Wildcat Creek

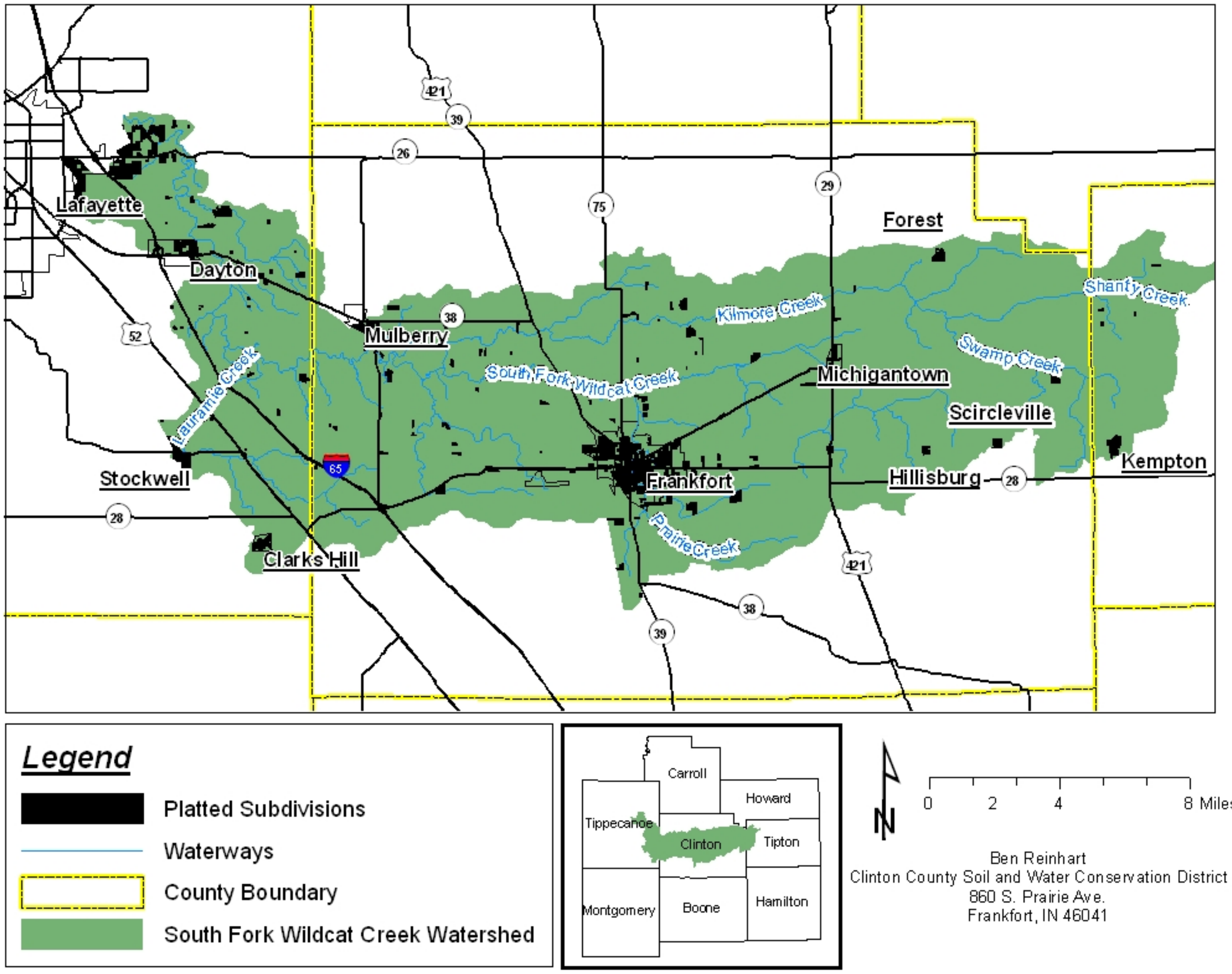


Figure 18. Platted Subdivisions of the South Fork Wildcat Creek Watershed

Clinton County

Clinton County recently went through an update to their 1993 Comprehensive Plan with the approved updates being released in early 2012. This update included information from the City of Frankfort's 2007 Comprehensive Plan as well as a number of new development initiatives such as wind energy development and regional landfill activities.

The Clinton County Comprehensive Plan includes six goals related to the future management of natural resources in the county (Table 12). Also, the Clinton County Comprehensive Plan establishes an overlay land use for stream protection which emphasizes the set aside of riparian and floodplain areas for recreational and environmental benefits. Overall the plan looks to put continued emphasis on farmland protection while encouraging new development within designated Urban Growth Areas. Little growth in total population size is expected over the next 30 years.

Table 12. Natural Resource Goals from Clinton County Comprehensive Plan

	Goals	Strategies
Clinton County	Preserve and Protect Natural Soils	Protect Prime Ag. Soils from Development
		Develop and Implement County Drainage Plan
		Encourage Soil Conservation Plans and BMPs for Erosion Control
		Minimum Setbacks for regulated drains
		Encourage sustainable farming practices
		Encourage regular septic system maintenance
	Preserve and Protect Water Resources	Establish committee on groundwater supply and management
		Develop database of abandoned wells and well records
		Promote Clean Water Act and continue to require necessary permits for development
		Restrict development in wetlands and discourage wetland disturbances
		Continue enforcement of Clinton County Drainage Ordinance
		Deny development in areas with severe drainage problems
		Establish county-wide drainage districts and regulated drains
		Review and regulate development along major waterways and encourage appropriate BMPs
		Utilize natural waterways as greenways and open space

Table 12. Natural Resource Goals from Clinton County Comprehensive Plan (Continued)

Goals	Strategies
	Adopt zoning standards for floodplain management
	Encourage watershed planning and implementation
	Encourage strict enforcement of illegal dumping laws
	Encourage regular septic system maintenance
Preserve and Protect Plant Life	Encourage participation in IDNR Classified Forest and Wildlands Program
	Encourage and protect tree plantings, habitat establishment, and landscaping
	Promote the establishment of easements and nature preserves
	Restrict development in wetlands and discourage wetland disturbances
	Promote the control of invasive species
Preserve and Protect Wildlife	Limit wetland disturbances and require all necessary permits for development
	Promote the establishment of easements, nature preserves, and habitat for endangered wildlife
Promote Air Quality	Inform public on Clean Air Act
	Encourage establishment of affordable waste removal opportunities

Howard County

Howard County has operated primarily through a zoning ordinance which was first developed in 1956 and updated in 1977 and 2010. However, the county has also developed a Comprehensive Plan which became official in 2005.

The Howard County Comprehensive Plan emphasizes the preservation of the rural character of the county by encouraging the consideration of natural water features, forest lands, fence rows, and farmland during future development. The Howard County Plan also establishes environmentally sensitive areas (i.e. floodplains and natural waterways) as a separate land use where development and disturbance will be strongly restricted. Other natural resource issues which are strongly emphasized in the plan are an effective watershed management approach within the Wildcat Creek Watershed, protection and management of woodlots, wetland conservation, and the overall quality of ground and surface waters. Some specific strategies are listed in Table 13.

Table 13. Natural Resources Strategies from Howard County Comprehensive Plan

	Strategies
Howard County	Revise county's zoning and subdivision ordinance to minimize soil erosion and promote water quality
	Maintain flood storage potential through well-designed stormwater features, restrictions on floodplain disturbances, and support of basin-wide effort to protect floodplain storage capacity
	Work with municipalities to minimize Combined Sewer Overflows and implementation of Long Term Control Plan
	Encourage small cluster subdivisions within rural areas
	Adopt ordinance to restrict impervious surfaces within developments and encourage natural features to be incorporated
	Establish legally binding means for management of stormwater features by adjacent or benefiting property owners
	Continue to support groups with community cleanups and water quality monitoring on Kokomo and Wildcat Creeks
	Regular maintenance of regulated drains in an environmentally sensitive approach
	Support implementation of separate municipal storm sewer system
	Provide recreational access along streams

Tippecanoe County

Tippecanoe County originally completed their Comprehensive Plan in 1981 with numerous amendments being adopted since then to address development issues. The most recent amendment was to the Housing Element of the Comprehensive Plan which was accepted in 2010.

The plan is largely focused on protecting prime farmland areas while encouraging continued residential growth. While the plan states “wooded and sloped areas adjacent to our rivers and creeks can be expected to remain undisturbed" residents rated "multi-purpose development of Wildcat Creek" highest during a public meeting. Various goals and policies throughout the plan do acknowledge designations given to Wildcat Creek as a Scenic River and look to promote public consideration of these areas. The primary implementation strategy to achieve these goals and policies rely almost entirely on established floodplain regulations as can be seen through zoning maps. In comparison to plans developed by other counties with land within the South Fork Wildcat Creek Watershed, Tippecanoe County has fewer strategies to establish environmental protections related to the South Fork Wildcat Creek.

Tipton County

The current Master Comprehensive Plan for Tipton County was adopted at the end of 2003. Currently updates are being made to these plans which are expected to be completed by 2013. The 2003 Master Plan contains no goals or objectives related to water quality or natural resources. Largely the plan is focused on protecting farming interests within the county, including Confined Feeding Operations, as well as guiding future development proximal to current municipal areas and the U.S. 31 corridor.

Watershed Management Plans

Several watershed management plans have been previously completed within the South Fork Wildcat Creek Watershed at the historic 14-digit watershed scale. However, these plans vary in the amount of detail provided regarding land use and water quality within their respective areas and were largely developed in isolation from one another. Rather than updating, and managing, each of these smaller plans individually, it was decided that a more holistic approach would be to incorporate each of them into a single South Fork Wildcat Creek Watershed Management Plan.

Three communities regulated as Municipal Separate Storm Sewer Systems (MS4) areas do impact land within the South Fork Wildcat Creek Watershed. The Howard County MS4 area constitutes a very small land base while the City of Frankfort MS4 and Tippecanoe County MS4 are the primary urban stormwater areas. Each of these MS4 areas maintains storm water plans with the intent to protect water quality during development activities and daily operations of municipal facilities. The South Fork Wildcat Creek watersheds with complete plans as well as MS4 areas are indicated in Figure 19. Also noted is the coverage of the South Fork Wildcat Creek TMDL which is covered in more detail in Chapter 3.2, Historical Water Quality Data.

The South Fork Wildcat Creek-Blinn Ditch & Kilmore Creek-Boyle's Ditch Watershed Management Plan completed in 2008 and is the most up to date plan in the watershed. Additionally, it is the only plan written in house by a local agency. The WMP addresses several causes of water quality impairments in the watersheds based on scientific data and visual observations by the Steering Committee and Soil & Water Conservation District staff. The causes addressed in this plan are Atrazine; sediment and nutrients; *E. coli*; garbage, trash, appliances, tires, and debris; and stream corridor degradation. Baseline water quality testing combined with stakeholder input pointed to the following sources of impairments: farm field runoff, construction site runoff, illegal dumping, lack of sufficient buffer strips,

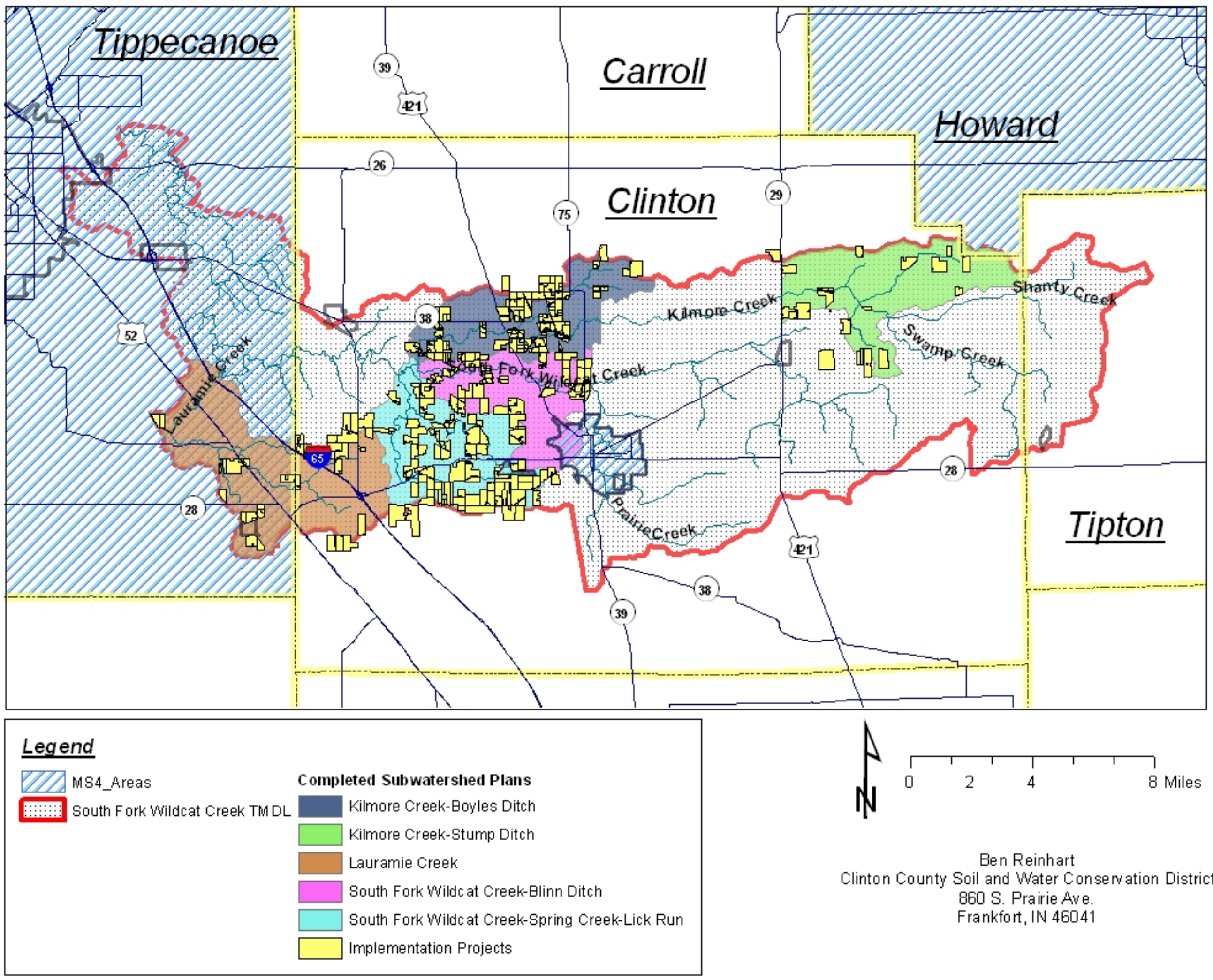


Figure 19. Completed Subwatershed Plans & Implementation Projects of the South Fork Wildcat Creek Watershed
(6 Rain Barrels and 1 Rain Garden were also implemented in the Lauramie Creek drainage area)

conventional tillage practices, lack of appreciation for the creek, and application of lawn fertilizer to name several.

The Lauramie Creek Watershed Management Plan was completed in 2005 by Christopher B. Burke Engineering, Inc. and was sponsored by the Tippecanoe County Commissioners. The WMP examines and discusses information that described the current water quality conditions in the watershed. The firm researched and compiled information on past studies, analyzed trends, and conducted a chemical monitoring program.

The water quality concerns outlined in the WMP included elevated concentrations of *E. coli* and nutrients, sedimentation, and the potential for toxic chemicals associated with traffic accidents and hazardous spills to enter Lauramie Creek. Sources include runoff from agricultural lands, impervious surfaces, and failing residential septic systems. Increased sedimentation is also linked to severely eroded streambanks and the lack of a healthy riparian corridor or agricultural filter strips in the watershed.

The Spring Creek-Lick Run Watershed Management Plan was completed in 2003 by Goode & Associates, Inc and sponsored by the Wildcat Creek Watershed Alliance. The emphasis of this WMP was improving water quality and addressing non-point sources of pollution from agricultural practices and urban development.

In 2001, the Clinton County SWCD completed a general subwatershed plan for the Stump Ditch-Kilmore Creek drainage area. This plan identified priority areas in and around the Town of Forest, due to the reported occurrences of outdated and failing septic systems discharging into Stump Ditch, as well as highly erodible land areas within the subwatershed. The primary goals of this plan were to reduce sediment and nutrient loading from cultivated cropland and livestock facilities and to address concerns related to *E. coli* and nutrient loading from on-site wastewater systems (i.e. septic systems).

2.7 Watershed Summary

Agriculture is a primary driver of many relationships throughout the South Fork Wildcat Creek Watershed. Given the relatively flat and rolling topography and productive soils, row crops dominate. Artificial drainage speeds up the delivery of storm water to receiving streams and provides a direct conduit for fertilizer and chemical runoff. Regular management of open ditches and conversion of idle lands to row crop result in losses of environmentally valuable land which would normally provide benefits such as water quality improvement, flood protection, and wildlife habitat.

With agriculture comes rural residential development as opposed to more concentrated urban settings. A number of small rural communities are spread throughout the watershed. Generally these communities do not carry services such as centralized wastewater treatment which are normally seen in today's populated areas. This creates potential for significant impacts from wastewater discharges to waterways. Also of note is that many of the soils within the South Fork Wildcat Creek Watershed are naturally unsuitable for on-site septic systems, often requiring perimeter drains and other protections. Many of these older or unmaintained systems fail resulting in additional wastewater discharges to our streams and creeks.

Urbanized areas do exist within the watershed, most notably the City of Frankfort and southeast corner of Lafayette. These areas present different threats to water quality in the form of urban residential, commercial, and industrial impacts. Many of these urban relationships have yet to be fully evaluated but work is being done by both city and county personnel to collect and analyze this information (e.g. urban stream stability, outfall monitoring, illicit discharge detection, stormwater retrofit opportunities, etc.) to provide a more holistic view of how urban areas are impacting the South Fork Wildcat Creek.

In light of the various threats which exist to water quality and the high quality of the South Fork Wildcat Creek, local communities and various agencies have committed a number of resources to help guide future management of the South Fork Wildcat Creek Watershed. Many communities have completed updates to Comprehensive Plans which outline future protections for water resources. Also a number of smaller Watershed Management Plans have already been developed and implemented to address concerns. The South Fork Wildcat Creek Watershed Management Plan will bring all of these efforts together to provide a comprehensive guiding document for the protection and management of the South Fork Wildcat Creek and its tributaries.

3.0 Environmental and Water Quality Data

3.1 Water Quality Targets

Water Quality targets for each parameter has been selected based on applicable Indiana Administrative Code, the South Fork Wildcat Creek TMDL, and other standards accepted by the Indiana Department of Environmental Management. Table 14 details selected water quality parameters and target levels being used for the South Fork Wildcat Creek Watershed to assess the water quality throughout the drainage area. A more detailed description of these parameters is included in Appendix D.

Table 14. Water Quality Parameters and Target Levels in the South Fork Wildcat Creek Watershed

Parameter	Target Level	Source
pH	> 6 or < 9	Indiana Administrative Code
Temperature	Monthly standard	Indiana Administrative Code
Dissolved Oxygen	> 4 mg/L and <100%	Indiana Administrative Code
E. coli	• 125 colony forming units/100 mL *(measured as a geometric mean of ≥ 5 samples within a 30-day period)* • 235 colony forming units/100 mL *(as a one time sample)*	Indiana Administrative Code
Total phosphorus	< .30 mg/L	South Fork Wildcat Creek TMDL
Nitrate+Nitrite	< 10 mg/L	South Fork Wildcat Creek TMDL
Total Suspended Solids	< 30 mg/L	South Fork Wildcat Creek TMDL
Qualitative Habitat Evaluation Index	> 51 points	IDEM 2008 303d List; Criteria for Aquatic Life Use Support
Macroinvertebrate Index of Biotic Integrity	> 35	IDEM

3.2 Historical Water Quality Data

A variety of historical sources of water quality data were reviewed in an effort to determine long term trends in data. A brief review of these data sources is included below. More detailed discussions of these data are included in their respective subwatershed descriptions. Maps showing all locations with water quality data for each subwatershed can be found in Appendix E.

City of Frankfort Combined Sewer Overflow – Stream Reach and Characterization Evaluation Report (2000)

The City of Frankfort maintains a combined sewer overflow (CSO) as part of its wastewater treatment system. A combined sewer system collects both stormwater and wastewater for the Frankfort Wastewater Treatment Plant. A CSO essentially acts as an emergency overflow during times when the combined sewer system and/or storage at the Frankfort Wastewater Treatment Plant (WWTP) may become overwhelmed. During these times wastewater and sewage can be discharged directly into local waterways. The City of Frankfort's CSO discharges into Prairie Creek. As part of Frankfort's CSO control plan it is required to establish baseline water quality conditions and determine if the local CSO events are degrading local waterways. This is done through a Stream Reach and Characterization Evaluation Report (SCREC). Frankfort's SCREC was completed in 2000 by Commonwealth Biomonitoring.

This study was completed using evaluations of aquatic habitat and measures of biological integrity at four selected points along Prairie Creek and near its confluence with the South Fork Wildcat Creek. Aquatic habitat quality was measured using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA. Under this technique, various habitat categories (e.g. substrate, riparian vegetation, channel morphology, etc.) are measured and converted to numerical scores. All scores are summed across the site with a maximum score of 100. Higher total scores indicate higher quality aquatic habitat. Indices of biological integrity focused on an assessment of both macroinvertebrate (i.e. aquatic insects) and fish communities in comparison with "reference" conditions. Within this approach, reference conditions represent a high-quality waterway of similar size and geographic location. Differences in local samples versus reference conditions can allow the assumption of local water impairments. Macroinvertebrate communities were sampled using a dip net in riffle areas and were analyzed for ten separate metrics within a laboratory setting. Fish communities were sampled using electrofishing gear and tallied in the field. Final counts of fish communities were analyzed for 12 separate metrics to analyze water quality. Specific results from this study are discussed within the Prairie Creek subwatershed description.

Kilmore Creek-Stump Ditch Watershed Management Plan (2001)

The Kilmore Creek-Stump Ditch (KCSD) Watershed Management Plan was completed by the Clinton County Soil and Water Conservation District in 2001. No quantitative water quality data appears to have been collected as part of this planning project but the primary impairments were determined to be sediments, nutrients, and bacteria. Sources of impairments were primarily identified through visual assessments of the watershed conducted by Indiana Dept. of Natural Resources (IDNR) and USDA-NRCS personnel, along with the Wildcat Creek Technician. Agricultural runoff, on-site wastewater systems (i.e. septic systems), and confined feeding operations were interpreted to be the primary sources of impairments within the watershed. Priority areas within the KCSD Watershed Plan were determined to be the area around the Town of Forest, due to the role of failing septic systems, and the western third of the watershed, due to more highly erodible lands. Collection of current water quality data will be useful in confirming these proposed sources or determining other sources for impairments.

Also, included in the development of the KCSD Watershed Management Plan was implementation of a cost-share program to encourage conservation practices within the drainage area. As a part of this effort, pest and nutrient management plans were completed for 1,694 acres; 1,341 of these acres also included enrollment in conservation tillage practices.

Spring Creek-Lick Run Watershed Management Plan (2003)

The Spring Creek-Lick Run (SCLR) Watershed Management Plan was completed in 2003. The project was coordinated by the Wildcat Creek Watershed Alliance Inc. who hired the consulting company, Goode & Associates, Inc. The study indicated most waterways within the SCLR subwatershed consist of small headwater streams and manmade drainage ditches. Around 45% of these waterways did have an adequate vegetative buffer. As part of this plan, it was decided to focus on utilizing existing water quality data rather than conducting their own water quality analysis. The SCLR Watershed Management Plan utilized a number of water quality sources such as IDEM's 305(b) and 303(d) reports, Hoosier Riverwatch data, and the Fish Consumption Advisory (each source discussed below). However, the SCLR Watershed Management Plan also included data review from the 1998 Upper Wabash Basin Survey completed by IDEM. This survey included water quality data from six test sites located within the SCLR Watershed. Another data source that was included was the Unified Watershed Assessment (UWA) which was a joint effort between the USDA-NRCS and IDEM. These assessments were similar to the current Rapid Watershed Assessments completed by the NRCS in that the purpose was to quickly identify resource concerns in watersheds across the state and provide a logical process for determining where resources can be leveraged between common partners. The results of this assessment process specifically identified the entire South Fork Wildcat Creek Watershed as being a high priority for funding due to total percent cropland and aquatic vulnerability. Specific water quality results from the SCLR Watershed Plan are discussed in the Spring Creek subwatershed description.

Lauramie Creek Watershed Management Plan (2005)

The Lauramie Creek Watershed Management Plan was completed in 2005 by Christopher B. Burke Engineering, Ltd. (CBBEL) who was hired by the Tippecanoe County Commissioners. This planning effort included a review of past water quality data including sources such as IDEM's 305(b) and 303(d) reports, a TMDL study addressing *E. coli* loads in Lauramie Creek, Hoosier Riverwatch, and the Fish Consumption Advisory. Additional sampling was done by CBBEL and included data from two sampling events, one shortly after a rain event and one during dry conditions, from a total of seven sites. Water quality parameters that were measured included dissolved oxygen, pH, conductivity, total phosphorus, ammonia, turbidity, nitrates, and *E. coli*. Also, the physical characteristics of Lauramie Creek were measured using the Citizen's Qualitative Habitat Evaluation Index (CQHEI). A more detailed review of the water quality results is included in the Lauramie Creek subwatershed description.

South Fork Wildcat Creek-Blinn Ditch & Kilmore Creek-Boyle's Ditch Watershed Management Plan (2007)

Commonwealth Biomonitoring, Inc. conducted a baseline water quality study for the South Fork Wildcat Creek-Blinn Ditch and Kilmore Creek-Boyle's Ditch (SFK-KC) sub watersheds as a part of a watershed planning project. *E. coli* samples were collected by the Clinton County Soil and Water Conservation District and then analyzed by the Frankfort Wastewater Treatment Plant using the Colilert Quanti-Tray method. The study began in April 2006 and was completed in October of 2007. Physical, chemical, and biological parameters that were measured are shown in Table 15. Specific results from this study are discussed further in the Kilmore Creek and Jenkins Ditch-South Fork Wildcat Creek subwatershed descriptions.

Table 15. SFK-KC Water Quality Sampling

Measurement	Parameters	Timetable
Habitat	Qualitative Habitat Evaluation Index at eight sites in each watershed (total of 16). One sample per year for two years.	May 2006 & 2007
Biological	Macroinvertebrate IBI at eight sites in each watershed (a total of 16 sites). One sampling event each year for two years using the Ohio EPA protocol.	May 2006 & 2007
Chemical and Physical	Nitrogen (nitrates-nitrites), total phosphorus, total suspended solids, pH, temperature, conductivity, dissolved oxygen, stream flow. These parameters were measured at eight sites in each watershed (a total of 16 sites). Measurements were made four times a year for two years. One event each year will be immediately following a storm.	April, June, August, and October 2006 & 2007
Atrazine	Atrazine analysis at four sites in each watershed (a total of eight sites). Three sampling events per year for two years.	April -June 2006 - 2007
E. coli	*E. coli* was measured at eight sites in each watershed (a total of 16 sites). Samples will be collected and analyzed weekly from April 1 to October 31st during a two year period.	April 1 to October 31 2006 & 2007

South Fork Wildcat Creek- Total Maximum Daily Load Study (2007)

Total Maximum Daily Load (TMDL) studies are preformed on waterways that have been previously listed on the state's 303(d) List of Impaired Waterways. These studies look to identify more specifically what types of pollutant are leading to impairments and what needs to be done to address those threats so that state water quality goals would be achieved. The South Fork Wildcat Creek Watershed TMDL was conducted in 2007 and the report was made available in 2008. This study looked specifically to address high levels of Escherichia coli bacteria (i.e. *E. coli*), low dissolved oxygen levels, and impaired biotic communities by analyzing *E. coli*, total suspended solids, total phosphorus, and total nitrogen.

Water quality data were compiled from various agencies and organizations. These water quality measurements were used to estimate the current pollutant loads at specific points throughout the South Fork Wildcat Creek Watershed. Estimated pollutant loads were then used to prescribe the necessary reductions in pollutant loads to achieve accepted target levels. State standards were available for *E. coli* but no state-accepted environmental standards are developed for nutrients or total suspended solids. However, benchmarks from other reputable sources were adopted for this TMDL study (Table 16.).

This TMDL study also included some additional computer modeling in efforts to identify potential sources of pollutant loading (Figure 20). Stormwater runoff from rural lands showed up as large amounts of nitrogen, phosphorus, sediments, and *E. coli* in local waterways. However, one would expect this to be true given that rural lands greatly outnumber developed lands in the South Fork Wildcat Creek Watershed. Some interesting results showed that streambank erosion potentially being a significant contributor towards high levels of total suspended solids. Also, urban runoff and on-site wastewater treatment systems (i.e. septic systems) may be contributing significant amounts of harmful bacteria and *E.coli* into local waterways. Larger industrial facilities and wastewater treatment plants showed relatively minor signs of nitrogen and phosphorus pollution. However, given the fact that these facilities are constantly discharging into local waters, they may play a larger role in local impairments during low-flow months (i.e. summer) when stormwater runoff inputs may be less. A more detailed review of the water quality data is included in the subwatershed descriptions.

Table 16. South Fork Wildcat Creek TMDL Target Levels

Water Quality Parameter	Accepted Target Levels	Source
E. coli	125 counts/100 mL*	State of Indiana Standard
Nitrate-Nitrite	≤ 10 mg/L	Indiana Drinking Water Standard
Total Phosphorus	≤ 0.30 mg/L	Ohio EPA
Total Suspended Solids	≤ 30 mg/L	Permit Limit for NPDES
** Geometric mean of five consecutive weekly samples*		

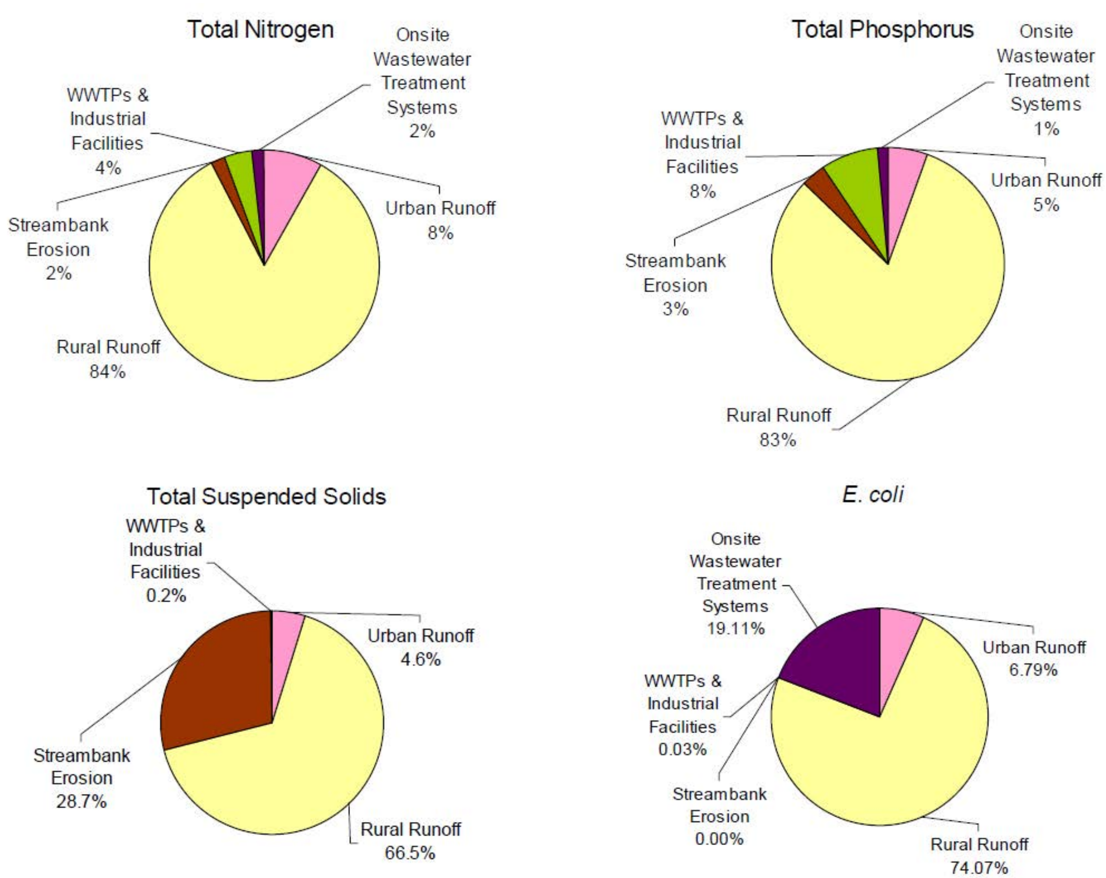


Figure 20. South Fork Wildcat Creek TMDL Modeled Loadings

Indiana Water Quality Atlas – IDEM Assessment Information Management Systems (1991-2008)

The Indiana Water Quality Atlas is an online, interactive mapping application that can be used for watershed management and water quality analysis. Sampling locations and water quality results from IDEM's Assessment Information Management Systems (AIMS) can be accessed and downloaded for use. The AIMS data represents an extensive database of water quality information from a wide variety of sites. This data includes nutrient and bacteria data, fish and macroinvertebrate studies, and environmental toxicity monitoring. Within the AIMS database, water quality information within the South Fork Wildcat Creek Watershed spans from the spring of 1991 to the spring of 2008 and a total of 141 sampling locations, some of these being documented sampling locations from other water quality projects and sampling efforts such as those mentioned in this section (Figure 21). Data from the South Fork Wildcat Creek Watershed was downloaded to analyze for general trends across the drainage area. Also, this information is useful in filling data gaps left from other water quality data sources that are discussed in this section. A more detailed review of the water quality data is included in the subwatershed descriptions.

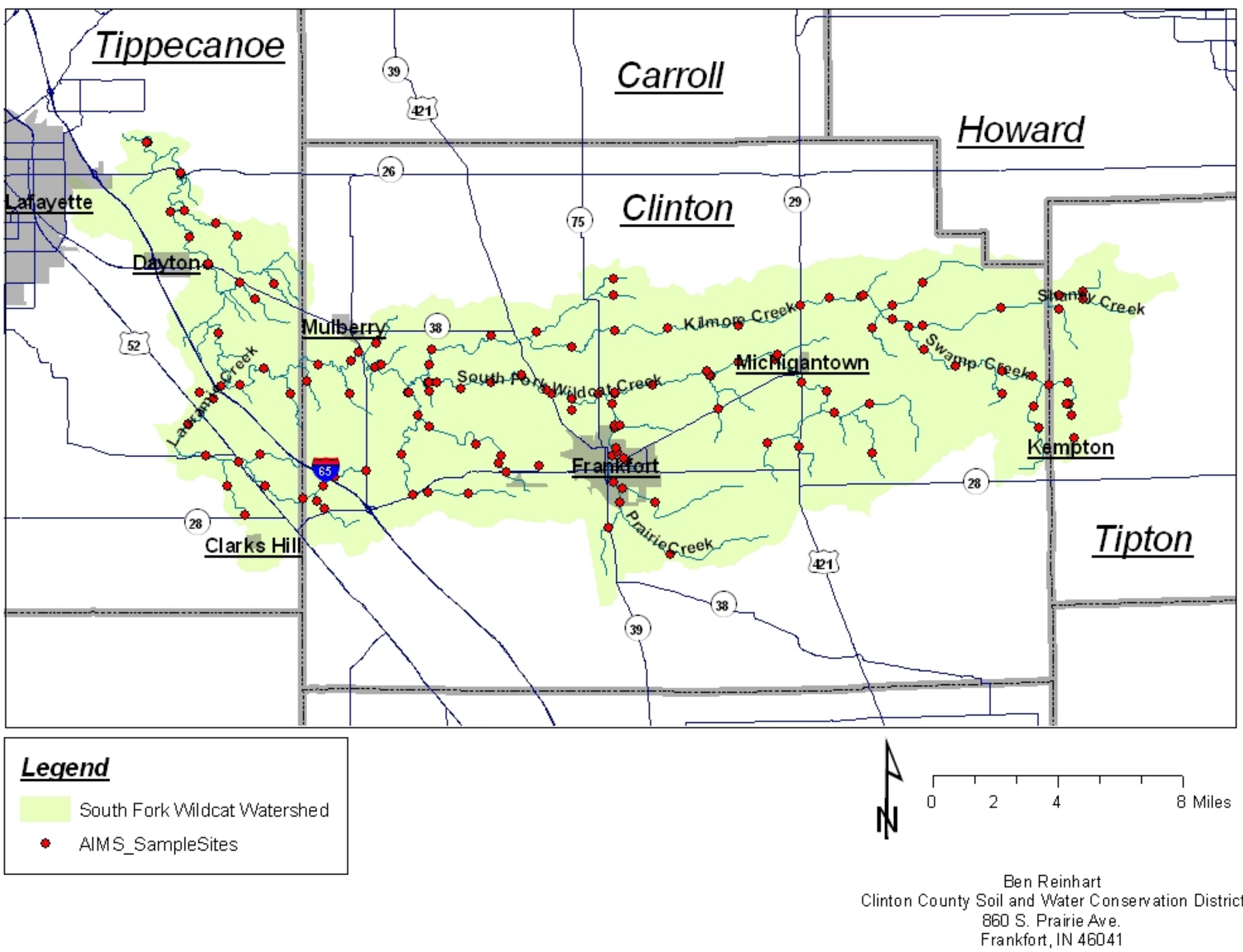


Figure 21. AIMS Sampling Locations within the South Fork Wildcat Creek Watershed

Frankfort Area Source Identification Study (2008)

IDEM's Source Identification – Water Quality Impairment Program (Source ID) is conducted to follow up on known water quality impairments in an effort to better isolate the origins of the pollutants. The Frankfort Area Source ID study took place within both the Prairie Creek and Jenkins Ditch-South Fork Wildcat Creek subwatersheds, which included the City of Frankfort. This area was chosen for study due to historical documentation of high phosphorus levels in Prairie Creek and in the downstream segments of the South Fork Wildcat Creek. Several previous studies have shown that the potential sources of the elevated levels may be from two major NPDES (National Pollutant Discharge Elimination System) dischargers: the Frankfort Municipal Wastewater Treatment Plant (WWTP) and the local Frito Lay factory. Another concern focused on the potential for toxic organic compounds (e.g. fuel, oil, antifreeze, etc.) entering local surface waters from a large junkyard near the confluence of Prairie Creek and the South Fork Wildcat Creek

Sampling took place during the summer of 2008 at a variety of sites along both Prairie Creek and the South Fork Wildcat Creek. Sampling sites were located upstream and downstream of suspected pollutant sources. Information was collected on water chemistry, nutrients, bacteria, and a variety of other parameters (Table 17). Water sampling was done both intensively during a 24-hour period as well as through follow-up samples from specific fixed points. A datasonde multi-parameter device was installed at selected locations to measure daily variations of certain water quality parameters. These datasonde multi-parameter devices are installed at select locations to automatically generate data samples at 15-minute intervals. Results on the Frankfort WWTP are discussed in the Prairie Creek subwatershed description. Results on the Frito Lay outfall and junkyard are discussed in the Jenkins Ditch-South Fork Wildcat Creek subwatershed description.

Table 17. Water Quality Parameters and Locations from IDEM's Frankfort Area Source Identification Study

Site ID	Stream/Facility	Location	Parameters/Tasks
WAW040-0012	Prairie Cr	Kyger St @ Park	GC, Nx, Flow
WAW040-0045	Prairie Cr	Bridge U/S of Outfall	GC, Nx, Mts, TTO, Sed., EC, Flow
WAW040-0047	Frankfort STP	001 Final Effluent	GC, Nx, Mts, TTO, Flow
WAW040-0013	Unnamed Trib	CR 100N	GC, Nx, EC, Flow
WAW040-0014	Prairie Cr	CR 150N	GC, Nx, Flow
WAW040-0006	S Fk Wildcat Cr	CR 00 Rd	GC, Nx, Mts, TTO, Sed., EC, Algae, Sonde, Flow
WAW040-0015	S Fk Wildcat Cr	SR 75	GC, Nx, Mts, TTO, Sed., EC, Algae, Sonde, Flow
WAW040-0016	Blinn Ditch	Union Rd	GC, Nx, EC, Flow
WAW040-0017	S Fk Wildcat Cr	Union Rd (130 W)	GC, Nx, Flow
WAW040-0018	S Fk Wildcat Cr	CR 200N	GC, Nx, EC, Algae, Sonde, Flow
WAW040-0049	Frito Lay	001 Final Effluent	GC, Nx, Flow
WAW040-0019	S Fk Wildcat Cr	CR 300W	GC, Nx, Flow
WAW040-0020	S Fk Wildcat Cr	CR 400W	GC, Nx, Mts, TTO, Sed., EC, Flow
WAW040-0021	S Fk Wildcat Cr	CR 500W (Gasline Rd)	GC, Nx, Flow
WAW040-0130	S Fk Wildcat Cr	CR 580W (Hamilton Rd)	GC, Nx, EC, Algae, Sonde, Flow
WAW040-0043	S Fk Wildcat Cr	SR 26	GC, Nx, Mts (Fixed Station Only Site)
Abbreviation Key - GC=General Chemistry, Nx=Nutrients, Mts=Metals (including Mercury), TTO=Total Toxic Organics, Sed.=Sediment, EC=Escherichia Coli, Algae=Algal Biomass, Sonde=Datasonde			

Kempton Area Source Identification Study – 2008

In 2008, IDEM conducted a Source ID study to evaluate documented water quality impairments within some headwater areas of the South Fork Wildcat Creek Watershed near the Town of Kempton. These areas appeared to be primarily attributable to sewage input into Mott, Floyd, and Paris Ditches which combine to form Swamp Creek. Based on previous studies in 1998 and 2004, excessive levels of ammonia, phosphorus, and chloride were documented in Mott Ditch at CR. 1150 West (Tipton County). Excessively low levels of dissolved oxygen and a low Index of Biotic Integrity (IBI) scores were documented on Swamp Creek at CR. 1000 East (Clinton County). These results indicated pollutants may be entering Mott Ditch and could be leading to downstream impacts on Swamp Creek. It was indicated from background a straight pipe sewage discharge from the Town of Kempton emptied directly into Mott Ditch which may be leading to local impairments.

IDEM conducted sampling during the summer of 2008 at eleven sites covering the Kempton Discharge location, Mott Ditch, Paris Ditch, and Swamp Creek. Each site was sampled for a variety of water quality information (Table 18). Sites were sampled intensively over a 24-hour period to try and determine daily variations in pollutant loads. A datasonde multi-parameter device was installed at selected locations to measure daily variations of certain water quality parameters. These datasonde multi-parameter devices are installed at select locations to automatically generate data samples at 15-minute intervals. Bacteria and algal biomass was also sampled at a subset of sites repeatedly over the course of August and September of 2008. A detailed description of the results is included in the Swamp Creek subwatershed description.

Table 18. Water Quality Parameters and Locations from IDEM's Kempton Area Source Identification Study

Site ID	Stream/Facility	Location	Parameters/Tasks
WAW040-0215	Sewer in Park	King St & Mill St	GC, Nx, EC
WAW040-0209	Mott Ditch	Kempton Discharge	GC, Nx, EC, Sonde, Flow
WAW040-0210	Mott Ditch	CR 50N	GC, Nx, EC, Algae, Sonde Flow
WAW040-0211	Unnamed Trib from Pond	CR 1150W	GC, Nx, Flow
WAW040-0101	Mott Ditch	CR 1150W	GC, Nx, Flow
WAW040-0212	Mott Ditch	County Line (CR 1400W)	GC, Nx, EC, Algae, Sonde Flow
WAW040-0100	Paris Ditch	CR 1350E	GC, Nx, EC, Flow
WAW040-0102	Swamp Creek	CR 1350E	GC, Nx, EC, Algae, Flow
WAW040-0213	Swamp Creek	CR 1250E	GC, Nx, Flow
WAW040-0104	Swamp Creek	CR 1100E	GC, Nx, EC, Algae, Flow
WAW040-0023	Swamp Creek	CR 1000E	GC, Nx, Flow
WAW040-0214	Swamp Creek	CR 400N	GC, Nx, EC, Algae, Flow
Abbreviation Key - GC=General Chemistry, Nx=Nutrients, EC=Escherichia Coli, Algae=Algal Biomass, Sonde=Datasonde			

Indiana Department of Environmental Management – 305(b) and 303(d) Reporting (2008)

Every two years, the Indiana Department of Environmental Management – Office of Water Quality creates a report on the quality of waterbodies throughout the state as required by Chapter 305(b) of the Clean Water Act. The report is a compilation of all water quality data collected by IDEM and other organizations with high-quality data. Each assessed waterbody is assigned a water quality rating based on its ability to meet Indiana's Water Quality Standards, which were developed in efforts to make all Indiana waters swimmable, fishable, and drinkable. Those waterways that fail to meet Indiana standards are declared as "Impaired Waterways" and become part of a list called the 303(d) list. The state maintains this list, as required by the Federal Clean Water Act, and uses it to identify particular impairments on local waterways and to determine where further studies should be focused. Prioritizations and final decisions are made based on the IDEM's Consolidated Assessment and Listing Methodology (CALM). This decision system is updated every two years to adequately incorporate state water quality goals as well as include guidance from the U.S. EPA. Indiana's CALM establishes five separate categories for grading Indiana waterways (Table 19). A more detailed review of the water quality data is included in the subwatershed descriptions.

Table 19. Listing Categories for IDEM's Consolidated Assessment and Listing Methodology

Category		Description
1		Attaining water quality standards, designated uses not threatened
2		Attaining some water quality standards, insufficient data to determine threat to other designated uses
3		Insufficient data
4		One or more designated use is impaired or threatened; No TMDL is required
	A	TMDL is already completed
	B	Other pollution control measures can be reasonably expected to address impairments or threats
	C	Impairments or threats are not caused by a pollutant
5		Water quality standards are not being attained
	A	TMDL is required
	B	Mercury and/or PCBs present above human health criteria

Hoosier Riverwatch (2000-2010)

The Hoosier Riverwatch program trains citizen volunteers to coordinate and conduct monitoring on Indiana streams and rivers. Citizen volunteers collect chemical, biological, and physical data on waterways. Physical data is collected based on adaptations from methods used by professional staff of the Ohio Environmental Protection Agency called the Qualitative Habitat Evaluation Index (QHEI). This citizen's QHEI (CQHEI) provides a measure of stream and riparian habitat that can be used to compare changes between sites or within sampling sites over time. Primarily volunteers look for conditions in substrate type, fish cover, stream shape and any human alterations (e.g. dams), adjacent forests and wetlands, stream depth and velocity, and occurrence of riffles and runs.

Biological data is collected by analyzing aquatic bugs and insects. These are more technically referred to as benthic macroinvertebrates and due to their various life history characteristics are good indicators of stream or river quality. Volunteers can collect samples using a couple different methods most commonly based on stream type. Generally shallow, wadeable waterways where riffles are available are sampled using a kick seine. This method collects macroinvertebrates in a net positioned just downstream of someone disturbing the natural stream bottom, usually by making kicking motions. Where riffles are absent, usually dip nets are used to sample. This method involves taking at least 20 separate samples from various in-stream habitats by disturbing the stream bottom with a dip net. After samples are collected, macroinvertebrates are sorted by taxa (i.e. insect family) based on their pollution tolerance (e.g. intolerant, moderately intolerant, fairly tolerant, very tolerant). Scores are then calculated by multiplying the number of taxa within each tolerance category by a weighting factor. The sum of these numbers indicates a Pollution Tolerance Index Rating.

Chemical sampling is done to measure parameters such as temperature, dissolved oxygen, biological oxygen demand, pH, nutrients, turbidity, and bacteria. A variety of methods are used to gather this water quality data which is then converted to Q-values. Q-values are essentially conversions to help standardize the data to allow for easier interpretation. These Q-values are multiplied by a weighting factor and then added to come up with a Water Quality Index. Volunteers then enter all of their physical, biological, and chemical data that they collect into the Hoosier Riverwatch online database.

From 2000 – 2010 several volunteers collected water quality samples from waterways within the South Fork Wildcat Creek Watershed. Not all samples were complete and some sites have been more regularly sampled than others. Sampling sites included Spring Creek, Swamp Creek, Prairie Creek, Kilmore Creek, Mann Ditch, Lauramie Creek and multiple sites on the South Fork Wildcat Creek. A more detailed review of the water quality data is included in the subwatershed descriptions.

Fish Consumption Advisory (2010)

The Indiana Department of Environmental Management, Indiana Department of Natural Resources, and the Indiana State Department of Health collaborate annually with support from Purdue University to produce the Fish Consumption Advisory (FCA). The FCA is based on statewide collection and analysis of fish tissue samples for long-lasting contaminants (e.g. heavy metals, polychlorinated biphenyls (PCBs), and pesticides). Samples are taken from fish that feed at all depths of the water. Based on the results, specific ratings are given to fish for various waterways (Table 20). Table 21 shows results for waterways in the South Fork Wildcat Creek Watershed.

Table 20. Advisory Groups of the Indiana Fish Consumption Advisory

Group 1	Unrestricted consumption. **One meal per week for women who are pregnant or breast-feeding, women who plan to have children, and children under the age of 15.**
Group 2	Limit to one meal per week (52 meals per year) for adult males and females. **One meal per month for women who are pregnant or breast-feeding, women who plan to have children, and children under the age of 15.**
Group 3	Limit to one meal per month (12 meals per year) for adult males and females. **Women who are pregnant or breast-feeding, women who plan to have children, and children under the age of 15 do not eat.**
Group 4	Limit to one meal every 2 months (6 meals per year) for adult males and females. **Women who are pregnant or breast-feeding, women who plan to have children, and children under the age of 15 do not eat.**
Group 5	**No consumption (DO NOT EAT).**

Table 21. FCA Advisory for South Fork Wildcat Creek Waterways

Waterway	Fish Type	Size (in.)	Group
All Indiana Waterways (Unless Specified Otherwise)	Common Carp	15-20	3
		20-25	4
		25+	5
Kilmore Creek (Clinton Co.)	Common Carp	Up to 12	1
	Creek Chub	Up to 7	1
South Fork Wildcat (Clinton Co.)	All Other Species		3/5*
	Common Carp (Statewide Standard)		
South Fork Wildcat (Tippecanoe Co.)	All Other Species		2/3**
	Channel Catfish	13+	3
	Common Carp	Up to 18	2
		18-26	3
		26+	4
***General Population - Group 3; Sensitive Population - Group 5**			
**** General Population - Group 2; Sensitive Population - Group 3**			

South Fork Wildcat Creek Water Quality Assessment (2010-2011)

As part of this watershed planning project for the South Fork Wildcat Creek Watershed, current information was gathered and analyzed by Commonwealth Biomonitoring and the Clinton County Soil and Water Conservation District (Figure 22). Our water quality assessment included macroinvertebrate monitoring, aquatic habitat assessment, water chemistry monitoring, Atrazine levels, and *E.coli* sampling at 16 sites across the watershed (Table 22). Two additional sites were added later in the monitoring program. Site 17 was used as a substitute site for macroinvertebrate sampling to Site 3 due to lack of water during the summer months. Site 18 represents an additional sampling location, requested by the

Steering Committee, where supplementary chemical data was collected downstream of an old landfill site. Monitoring occurred from May 2010 to May 2011.

Stream habitats were measured during a single sampling event at all 16 sampling sites. The primary method used to collect habitat data was the Qualitative Habitat Evaluation Index (QHEI) protocol produced by the Ohio Environmental Protection Agency. The QHEI is a physical habitat index created to provide an unbiased, quantifiable evaluation of the general habitat characteristics that are important to aquatic organisms. It is based on rapid assessment of six metrics: substrate, in-stream cover, channel morphology, riparian zone, pool/glide and riffle/run quality, and map gradient. Each metric is observed in the field and recorded on data forms with corresponding point scores. The maximum QHEI score is 100.

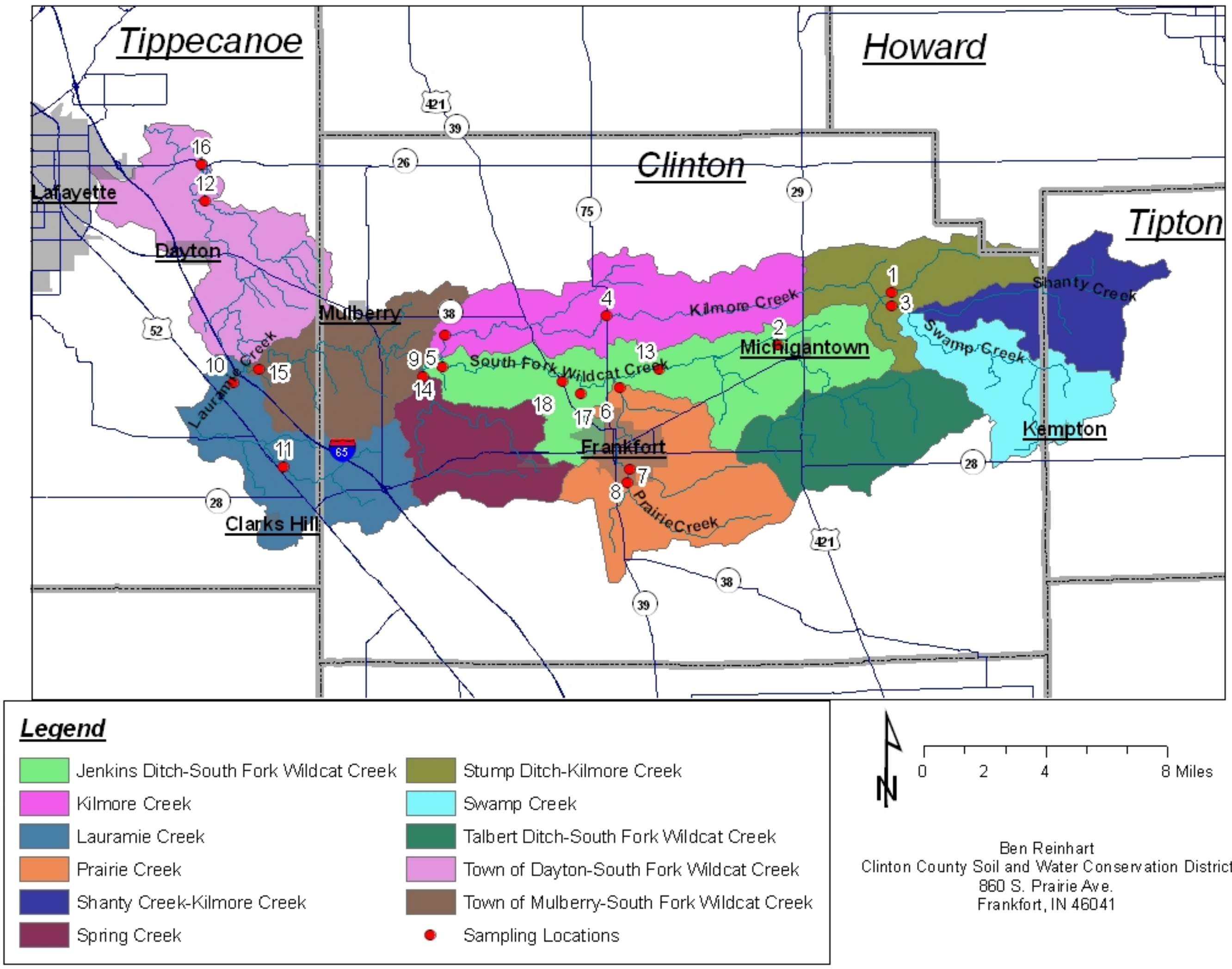


Figure 22. Sampling Locations for the South Fork Wildcat Creek Water Quality Assessment

Biological data was collected during a single sampling event completed at all 16 sampling sites. The primary method used to collect biological data was IDEM's multi-habitat macroinvertebrate collection procedure (MHAB). Collected samples are then evaluated using 12 metrics that combine several aspects of the benthic (i.e. bottom-dwelling) community composition. The metrics measure species richness, evenness, composition, and density. The results from these measurements are then converted into a macroinvertebrate Index of Biotic Integrity (mIBI) score and summed. Total scores less of 35 generally indicate impaired biological communities. Biological data was not collected at Site 3 due to a lack of streamflow and depth. Site 17 was used as a substitute sampling location. Site 17 was chosen as a substitute site since previous monitoring data was available from this location and new data could be compared to discern any noticeable trends.

Water chemistry was collected every other month for one year at various sampling sites. Parameters included temperature, flow, dissolved oxygen, pH, and conductivity. Temperature and dissolved oxygen were measured with a Hach meter while the conductivity was measured with a Hanna instrument conductivity probe. The pH was measured with a field pH meter. .

Atrazine was sampled at eight sites in May, July and September of 2010. Samples were analyzed in a laboratory setting using gas chromatography procedures.

Table 22. Water Quality Parameters of South Fork Wildcat Creek Water Quality Assessment

Parameter	Site(s)	Method
Habitat Measurements - Qualitative Habitat Evaluation Index (QHEI)		
QHEI	1-16	Ohio EPA
Biological Measurements – Macroinvertebrate Index of Biotic Integrity (mIBI)		
mIBI	1-16	IDEM
Chemical and Physical Measurements		
Nitrogen (nitrates+nitrites)	1-6, 9-10, 13-16	SM 4500NO3-E
Total Phosphorus (TP)	1-6, 9-10, 13-16	SM 4500P-F
Total Suspended Solids (TSS)	1-6, 9-10, 13-16	SM 2540D
pH	1-6, 9-10, 13-16	SM 4500H
Temperature	1-6, 9-10, 13-16	EPA 170.1
Conductivity	1-6, 9-10, 13-16	SM 2510A
Dissolved Oxygen (DO)	1-6, 9-10, 13-16	
Stream Flow	1-6, 9-10, 13-16	ASTM D3858
Atrazine	2, 3, 5, 6, 9, 10, 14, 16	EPA 507
E.coli	1-6, 9-10, 12-16	SM 9223B

E. coli sampling occurred during the fall of 2010 and in the spring of 2011 at 13 sampling sites. During both the fall and spring sampling efforts, weekly grab samples were collected during a five-week sampling period. At seven of those sites, water chemistry measurements were taken for temperature, flow, dissolved oxygen, pH, conductivity, and nitrate. The water chemistry measurements were taken using a YSI multi-parameter probe, and the flow was taken using a current meter. *E. coli* samples were analyzed by the Frankfort Wastewater Treatment Plant.

A more detailed review of the water quality data is included in the subwatershed descriptions. All water quality data collected as part of this project is included in Appendix G. Additional information on the methodologies of the South Fork Wildcat Creek Water Quality Assessment can be found in the Quality Assurance Project Plan located in the Appendix F.

3.3 Watershed Inventories

In addition to historical water quality data, land use and other inventories on potential sources of pollutants were analyzed for the South Fork Wildcat Creek Watershed. A brief review of these inventories is included below. More specific discussions of these inventories are included in the subwatershed descriptions.

Indiana Department of Environmental Management, Office of Land Quality

The Indiana Department of Environmental Management-Office of Land Quality is responsible for a variety of environmental compliance issues and works in accordance with the EPA. Often times the Office of Land Quality works with land uses such as agricultural and solid waste, auto salvage, concentrated animal feeding operations, hazardous waste, industrial waste, and underground storage tanks. The primary goal of the Office of Land Quality is to make sure that these developments are achieving the goals established by their official permits.

A survey of areas within the South Fork Wildcat Creek Watershed that are under compliance with the Office of Land Quality was completed. Using location information from the Office of Land Quality locations of various permitted land uses were mapped. A total of 40 active Confined Feeding Operations (CFO) are spread out across the South Fork Wildcat Creek Watershed. By law these areas are described as any area housing at least 300 cattle, 500 horses, 600 swine or sheep, or 30,000 fowl (i.e. turkey, chickens, etc.) for more than 45 days in areas of less than at least half natural vegetation cover (327 IAC 19).

A number of other land uses of concern are seen throughout the watershed. High concentrations of potential threats such as underground storage tanks and old dump sites are seen near some of the more developed areas in the watershed. These are discussed more specifically within each subwatershed.

NPDES Facilities

Several facilities are regulated by National Pollution Discharge Elimination System (NPDES) permits within the watershed. Indiana uses the NPDES to control direct discharges to waters of the state. These permits establish limits on the amount of pollutants that may be discharged by each facility. There are several different types of permits that are issued and they include: Municipal, Industrial, and Wet Weather. In total, nine facilities are located within the South Fork Wildcat Creek watershed. Table 23 provides the name of each NPDES facility, general location, and receiving waters. Each facility's compliance with their NPDES permits will be evaluated in the sub-watershed section of this plan.

Wildcat Creek Watershed – Rapid Watershed Assessment (2008)

The USDA-Natural Resources Conservation Service (NRCS) created Rapid Watershed Assessments (RWA) to provide initial estimates of where conservation practices would best address the concerns of land owners, conservation districts, and community organizations. Essentially these assessments include a quick screen of existing natural resource data such as soils, topography, and impaired waterways to identify broad scale resource concerns for the watershed. The Wildcat RWA, completed in 2008, included not only the South Fork but also the Middle and North Forks of Wildcat Creek. There were a number of resource concerns listed for the entire Wildcat Creek Watershed (Table 24).

Table 23. NPDES Facilities in South Fork Wildcat Creek Watershed

NPDES Facility Name	Location	Receiving Waters
Clarks Hill Municipal Wastewater Treatment Plant	CLARKS HILL	Tributary to Lauramie Creek
Frankfort Wastewater Treatment Plant	FRANKFORT	Prairie Creek
Frankfort Old Stoney Building	FRANKFORT	Prairie Creek
CF Industries, Inc.	FRANKFORT	Lick Run
Frito Lay, Inc.	FRANKFORT	Heavilon Ditch, Blinn Ditch, South Fork Wildcat Creek
Wainwright Middle School	LAFAYETTE	Lauramie Creek
Mulberry Municipal Wastewater Treatment Plant	MULBERRY	South Fork Wildcat Creek
Michigantown Municipal Wastewater Treatment Plant	MICHIGANTOWN	South Fork Wildcat Creek
Lauramie Township Regional Sewer District Wastewater Treatment Plant	STOCKWELL	Lauramie Creek

Table 24. Resource Concerns Identified in Wildcat Creek, Rapid Watershed Assessment

Surface Water Quality	Approximately 68% (471 miles) of the 689 total miles of streams in the Wildcat Creek have identified impairments for excessive amounts of sediments, nutrients, and bacteria.
Ground Water Quality	In excess of 30,700 acres of soils in the Wildcat Watershed have a high leaching index (>10) which allows contaminants on the land surface to be easily carried to the ground water through infiltration. Additionally, within the Wildcat Watershed, 20,100 acres are located inside wellhead protection areas.
Air Quality	Approximately 1% of the Wildcat Watershed has been identified by the Environmental Protection Agency (EPA) as having an air quality concern.
Threatened & Endangered Species	Over 7% of the 519,780 acres in the Wildcat watershed contain known ranges of Threatened & Endangered Species.
Soil Quality	Based on the data available, over 5,000 acres are eroding at twice the tolerable level.

Despite this study being done at a bigger scale than the South Fork Wildcat Creek many of the resource concerns are similar to concerns expressed by other studies. For example, previous studies and assessments have expressed concern regarding the amount of impaired waterways within the South Fork Wildcat Creek Watershed and listed primary impairments as being sediments, nutrients, and bacteria. Also, other studies have listed soil erosion as a concern with the South Fork Wildcat Creek Watershed. Due to these similarities, we will assume for the purpose of this plan other resource concerns associated with ground water quality, air quality, and threatened and endangered wildlife can be applied to areas within the South Fork Wildcat Watershed.

Windshield Inventory (2010-2011)

Members of the South Fork Wildcat Creek Watershed Steering Committee volunteered to complete Windshield Inventories throughout the watershed during the summer and fall of 2010. The Windshield Inventories were conducted by driving local routes throughout the watershed and visually inspecting the local land use and environmental characteristics at each bridge. Each volunteer or pair of volunteers drove sections of the watershed they were familiar with and documented their findings using photographs, GPS units, and field sheets. This information was then compiled and areas of concern were mapped using Geographic Information Systems (GIS) software. The majority of concerns that were noted throughout the watershed included:

- Areas with little or no riparian buffers
- Animal and livestock operations including both larger Confined Feeding Operations and smaller, hobby farms
- Areas where livestock and animals had direct access to local waterways
- Areas of active erosion including sheet, rill, gully, and bank erosion.

Desktop Inventory

In addition to a Windshield Inventory, the Watershed Coordinator used GIS to analyze water courses lacking riparian buffers by cross-referencing land cover data with floodplain and riparian zones. For this evaluation floodplains were delineated using the Flood Insurance Rate Maps from the Indiana DNR. In areas where floodplains were not delineated, a 100' riparian zone width was used. This information was used to calculate the percentage of floodplain and riparian areas containing natural vs. modified land uses. Modified land uses included various types of development including developed, open spaces (i.e. golf courses, large grassy lots, etc.), cultivated crops, and areas dedicated to pasture or hay. Natural land uses included deciduous and evergreen forest, herbaceous grasslands, and wetlands. All GIS used during this project is listed in Appendix B.

The steering committee also wanted to measure participation in available conservation programs. To accomplish this, we used the NRCS Integrated Data and Enterprise Analysis (IDEA) application. This application provides a centralized database of information tracking conservation practices planned and applied by producers as part of NRCS conservation programs. Using this tool, calculations of total practices applied and acres with applied practices were compiled for each subwatershed. Also, by comparing applied conservation acres against total drainage area and water quality data, we can start to identify areas lacking conservation practices and look for trends between areas of high applied conservation acres and high water quality.

4.0 Subwatersheds of the South Fork Wildcat Creek Watershed

4.1 Swamp Creek (HUC: 051201070301)

Land Use Information

The Swamp Creek subwatershed is the most southeasterly drainage area of the South Fork Wildcat Creek drainage. It drains approximately 11,075 acres of Clinton and Tipton County. There are roughly 14 miles of natural waterways within this subwatershed and includes Floyd Ditch, Paris Ditch, Mott Ditch, and the headwaters of Swamp Creek, which eventually empties into Kilmore Creek(Figure 23). Paris Ditch, Floyd Ditch and another small unnamed tributary are maintained as open drains. Almost eight miles of waterways are declared as impaired as a result of documented water quality problems occurring almost entirely in the upstream portions of this subwatershed.

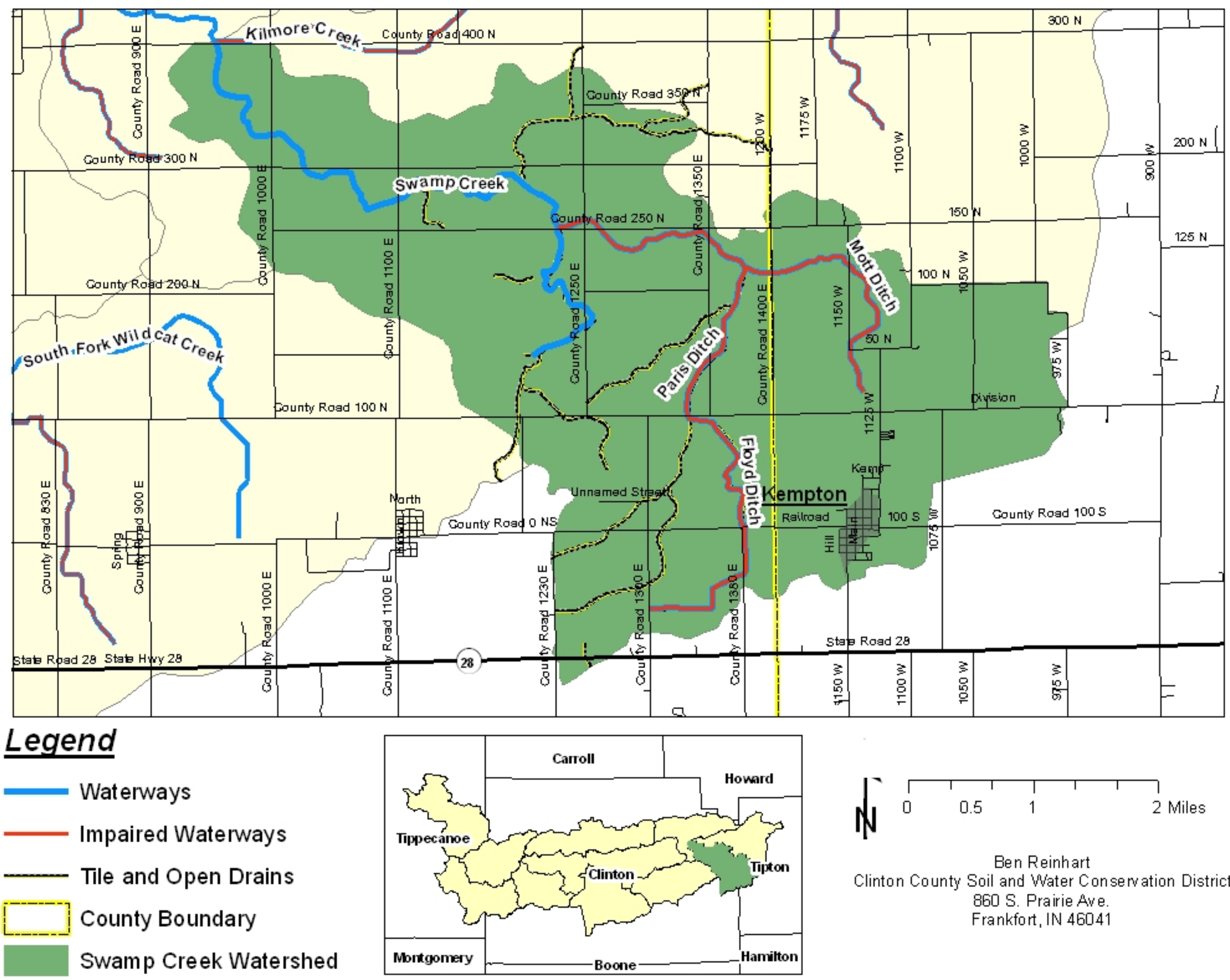


Figure 23. Swamp Creek Waterways and Drainage

Soils within the Swamp Creek subwatershed are largely hydric (Figure 24). Almost 50% of the lands can be classified as hydric soils. This greatly reduces the availability of suitable soils for on-site wastewater treatment facilities (i.e. septic systems) as well as creates drainage issues for agricultural production. Almost 30% of lands can be classified as Potentially Highly Erodible Lands (PHEL) by the NRCS. However, very few lands can actually be classified directly as Highly Erodible Lands (HEL) with only an estimated 58 acres within the entire subwatershed carrying this classification.

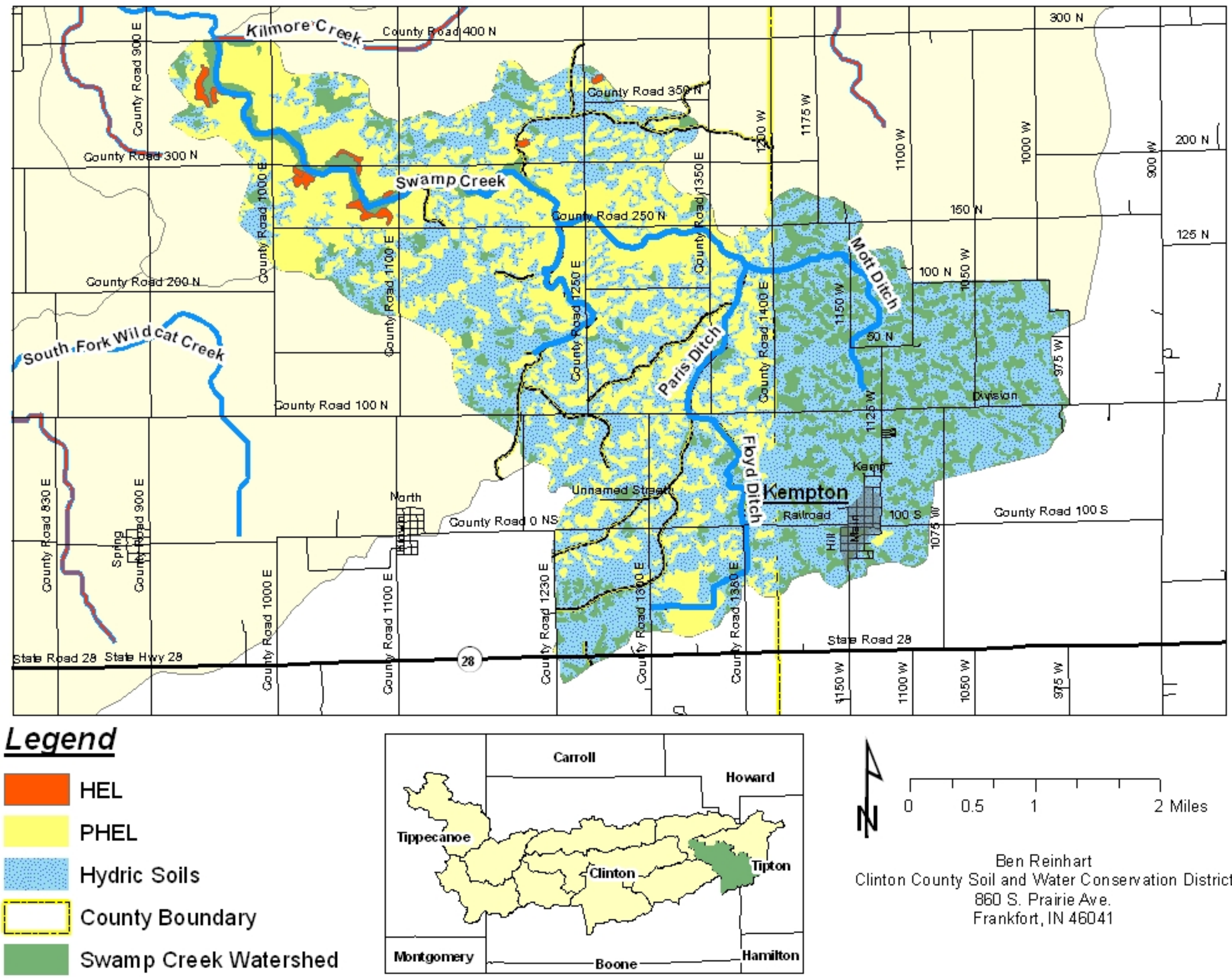


Figure 24. Swamp Creek Soils

Land use within the Swamp Creek Watershed is heavily dominated by cultivated crops (Figure 25). The sole area of development is Kempton, located within Tipton County. Other minor land uses include grassland areas, many of which are likely grazed or hayed. Wet, woody areas are also present likely due to the fact that many remain difficult to convert into cropland.

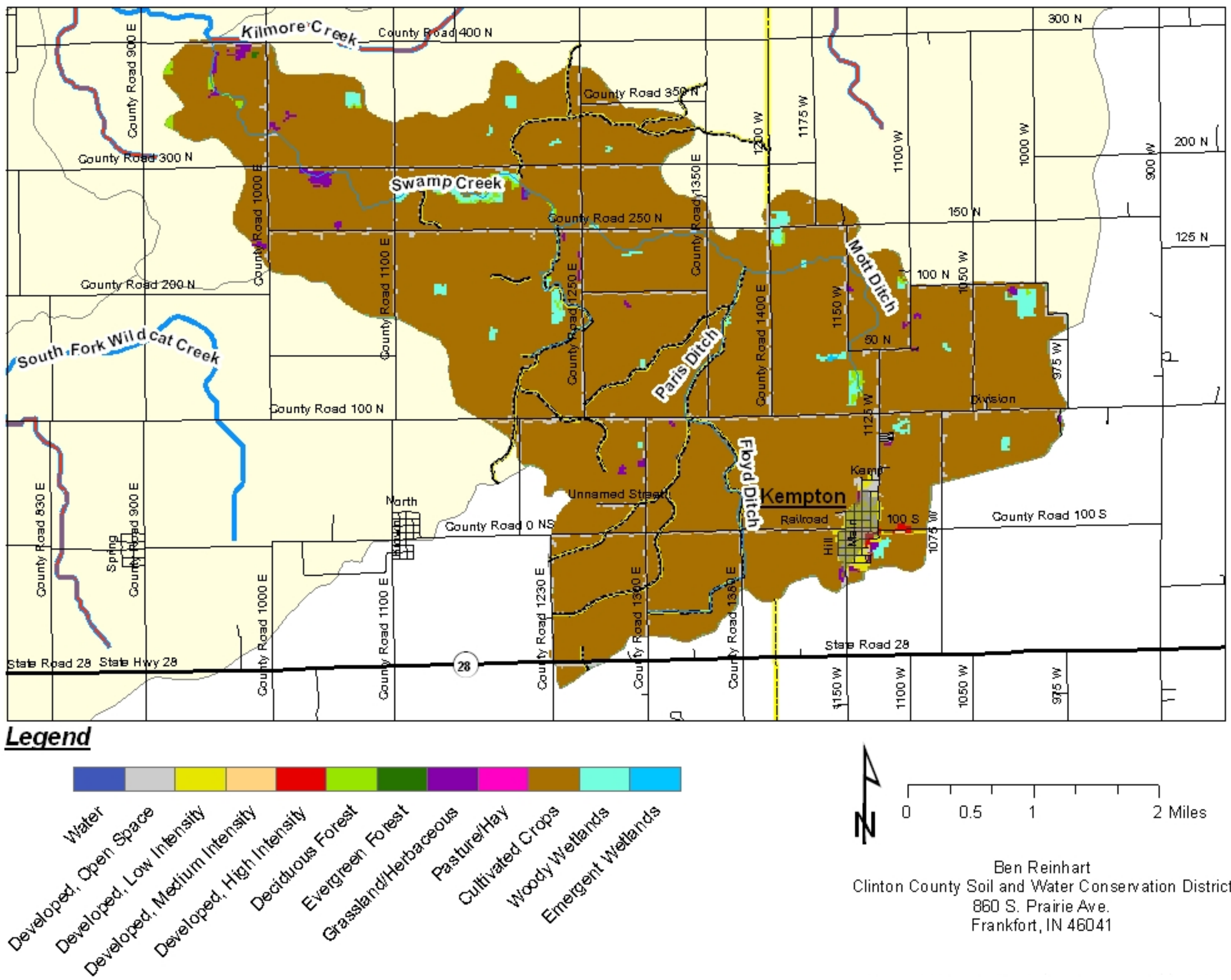


Figure 25. Swamp Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

The Swamp Creek subwatershed hosts five Confined Feeding Operations (CFO) of which only two are listed as active. One is located in Tipton County and Clinton County each. Two of the identified CFOs are classified as “Voided” while one is listed as “Expired”. Volunteers who participated in the Windshield Survey noted inadequate riparian buffers, particularly in upstream locations, as well as areas where livestock had free access to public water sources. The Town of Kempton, an unsewered community, is located within the subwatershed and has been previously identified as a potential source of significant *E. coli* and nutrient loading (Figure 26).

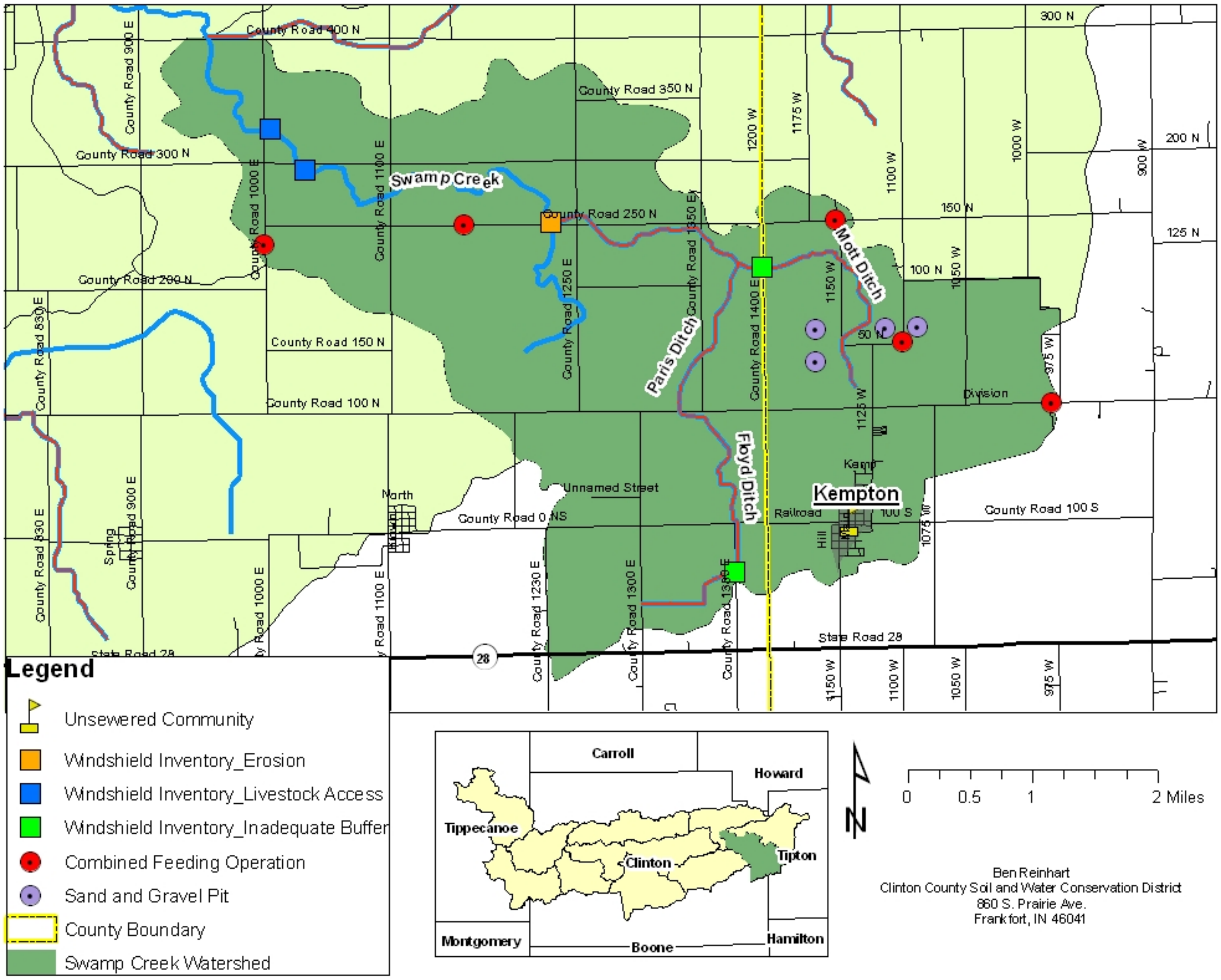


Figure 26. Swamp Creek Source Investigation

Desktop Surveys

Within the Swamp Creek subwatershed, land use within floodplain and riparian areas consist primarily of cultivated crops or livestock pasture. Only about 10% of land area within designated riparian zones fall under the classification of “buffered” which includes wooded lands, herbaceous grasslands, and wetlands. Considering this, roughly 12 miles of primary waterways within the Swamp Creek subwatershed are unbuffered (Figure 27).

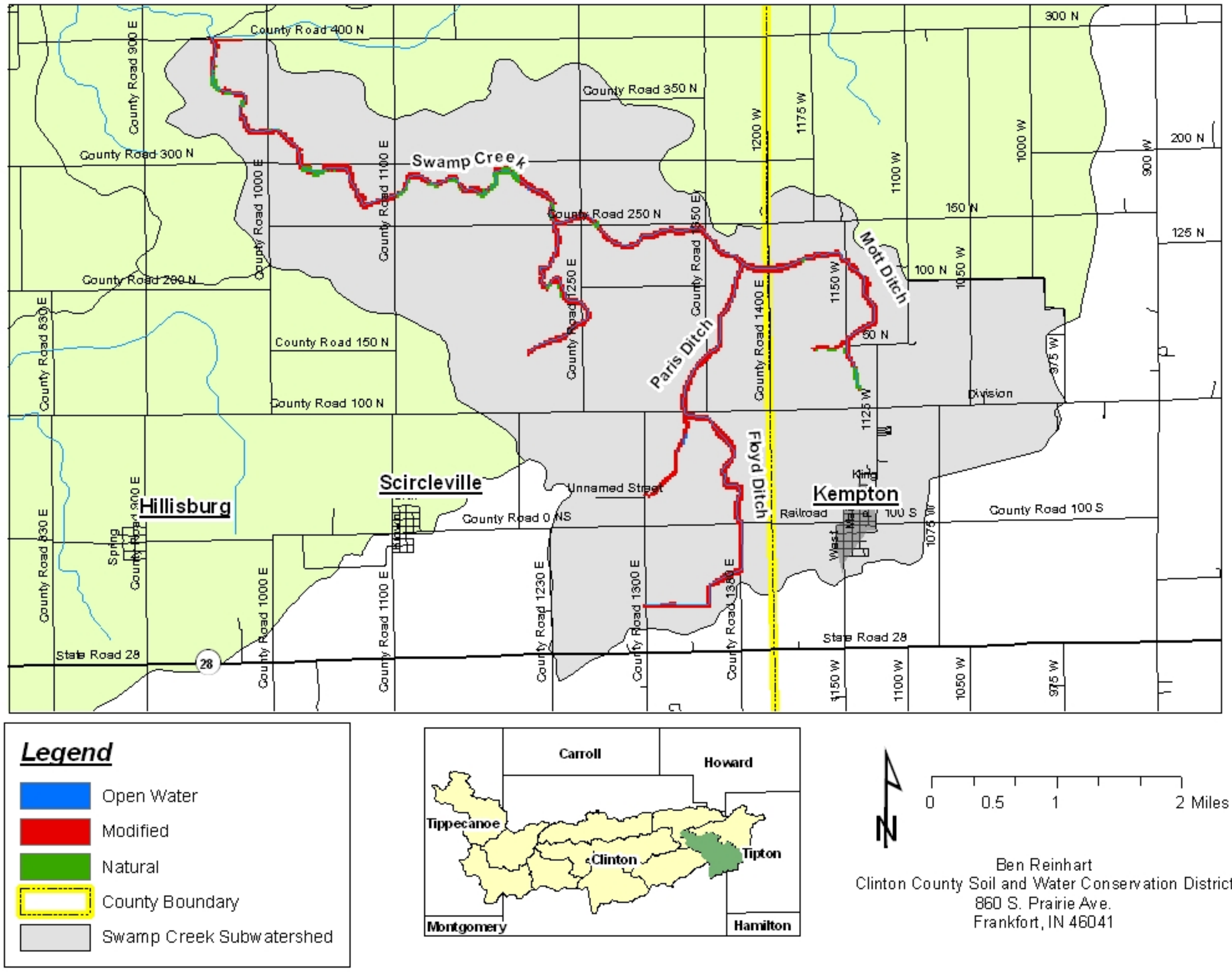


Figure 27. Swamp Creek Riparian Lands Survey

The Swamp Creek subwatershed generally hasn't seen many conservation practices installed with only 8.2% of the land area within the subwatershed seeing any type of documented conservation practices. This is compared with an 18.3% average across the rest of the South Fork Wildcat Creek drainage. The majority of the conservation acreage that has been established primarily focus on the crop rotation or residue and tillage management.

Water Quality Data

IDEM 305(b)/303(d)

A number of waterways within the Swamp Creek subwatershed are classified as being impaired (Figure 28). These waterways are classified as having "impaired biotic communities". Other waterways within the Swamp Creek subwatershed are declared as having insufficient data to adequately determine threats to other uses such as recreation and fishing.

Hoosier Riverwatch

Within the Hoosier Riverwatch data, only one site was found to be located within the Swamp Creek subwatershed. This site included water quality chemistry and biological data from both 2001 and 2002. Aquatic habitat data was only found for 2002. The 2001 sampling occurred in August with weather being recorded as clear and sunny. The calculated Water Quality Index was around 70 which falls at the bottom range of "Good". The Pollution Tolerance Index scored a 27 which classifies as "Excellent". Sampling in 2002 was completed in May with Water Quality Index scores around 82. The Pollution Tolerance Index was much lower than the previous summer however. A Citizens Qualitative Habitat Index was calculated during 2002 with a score of 63. Generally, scores over 60 indicate habitat suitable for most warmwater species.

AIMS

One sampling location on Swamp Creek showed *E. coli* levels slightly above accepted standards as part of a 1998 TMDL study. Habitat assessments done in 2008 across the Swamp Creek subwatershed generally showed increasing scores as sampling efforts moved downstream in the subwatershed. However, only the farthest downstream site on Swamp Creek showed scores above accepted standards. Only two sites (CR 1100E and CR 250N) within the subwatershed met accepted standards during biological assessments of fish communities with one of these being the site on Swamp Creek which hosted the highest habitat scores. The other site on a small tributary of Swamp Creek met biological standards despite low habitat scores. One site on Mott Ditch did show relatively high ammonia concentrations during a 2004 sampling event.

South Fork TMDL

Water quality samples for total phosphorus were included from one site on Mott Ditch. Based on this sample, a reduction of 40% was required.

Water quality samples from Swamp Creek were included for Total Suspended Solids calculations. Based on this sample, a reduction of 32% was required.

One assessment location on Swamp Creek was used to estimate existing pollutant loads and calculate necessary reductions. It was noted that there was little water quality samples available but what was available showed considerable reductions of total phosphorus are necessary.

Kempton Area Source Identification Study

The historical data combined with the additional sampling conducted by IDEM were conclusive that raw sewage was being discharged at the headwater of Mott Ditch. The effects of the discharge was most acute directly downstream, but had impairing impacts for most of Mott Creek and the mainstem of Swamp Creek. The study found elevated levels of ammonia, phosphorus, chloride, *E.coli,* and low Dissolved Oxygen as well as prolific algae growth and sludge accumulation. As the discharge became diluted in the stream, the downstream sampling points showed fewer impacts.

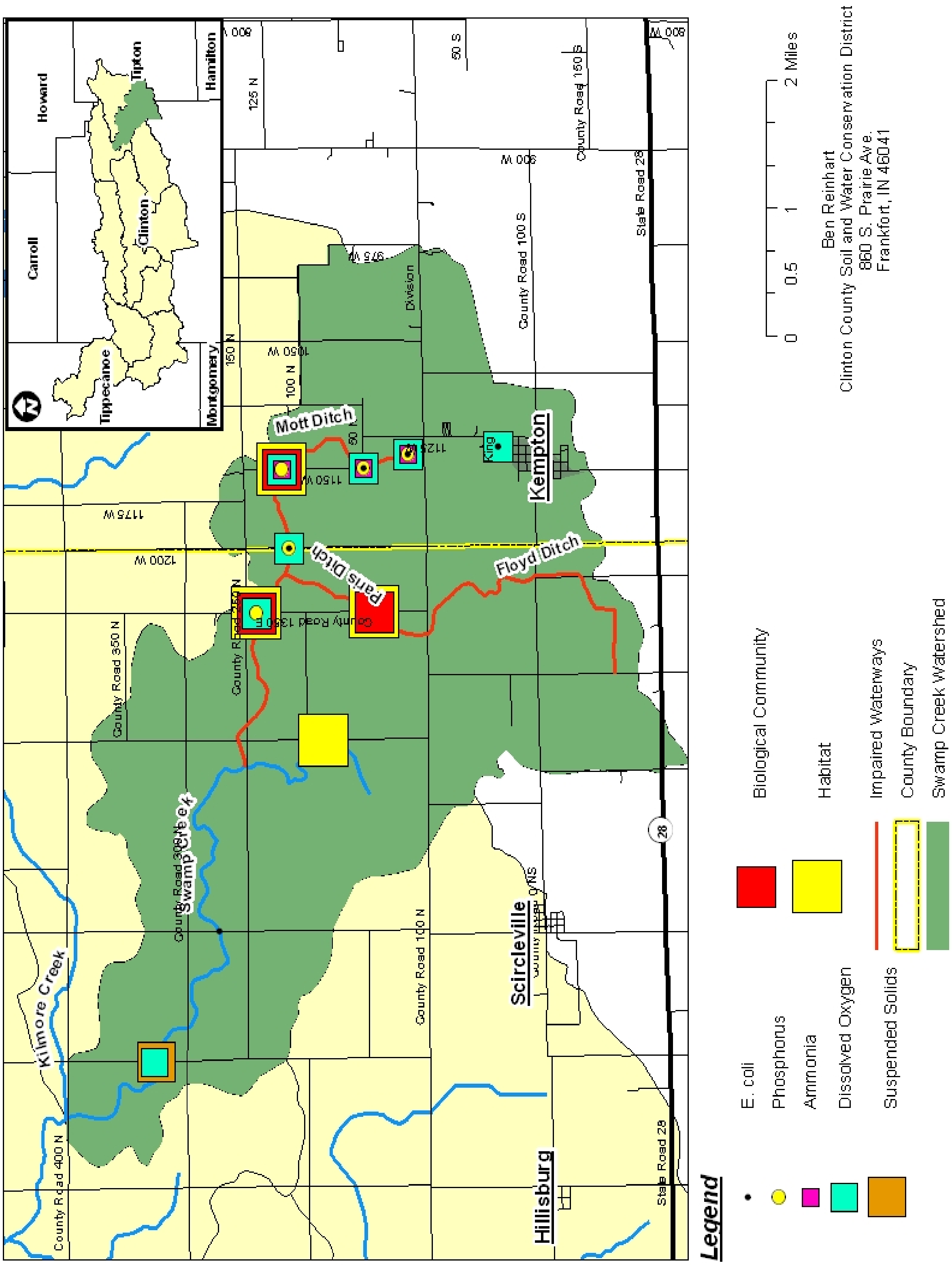


Figure 28. Swamp Creek Water Quality Impairments

4.2 Shanty Creek-Kilmore Creek (HUC: 051201070302)

Land Use Information

The Shanty Creek-Kilmore Creek subwatershed occurs in the most northeasterly corner of the South Fork Wildcat Creek drainage. Draining almost 10,538 acres across Tipton and Clinton Counties, this subwatershed contains roughly 11.4 miles of natural waterways including Shanty Creek and the headwaters of Kilmore Creek (Figure 29). Approximately nine miles of these waterways are listed as impaired waters.

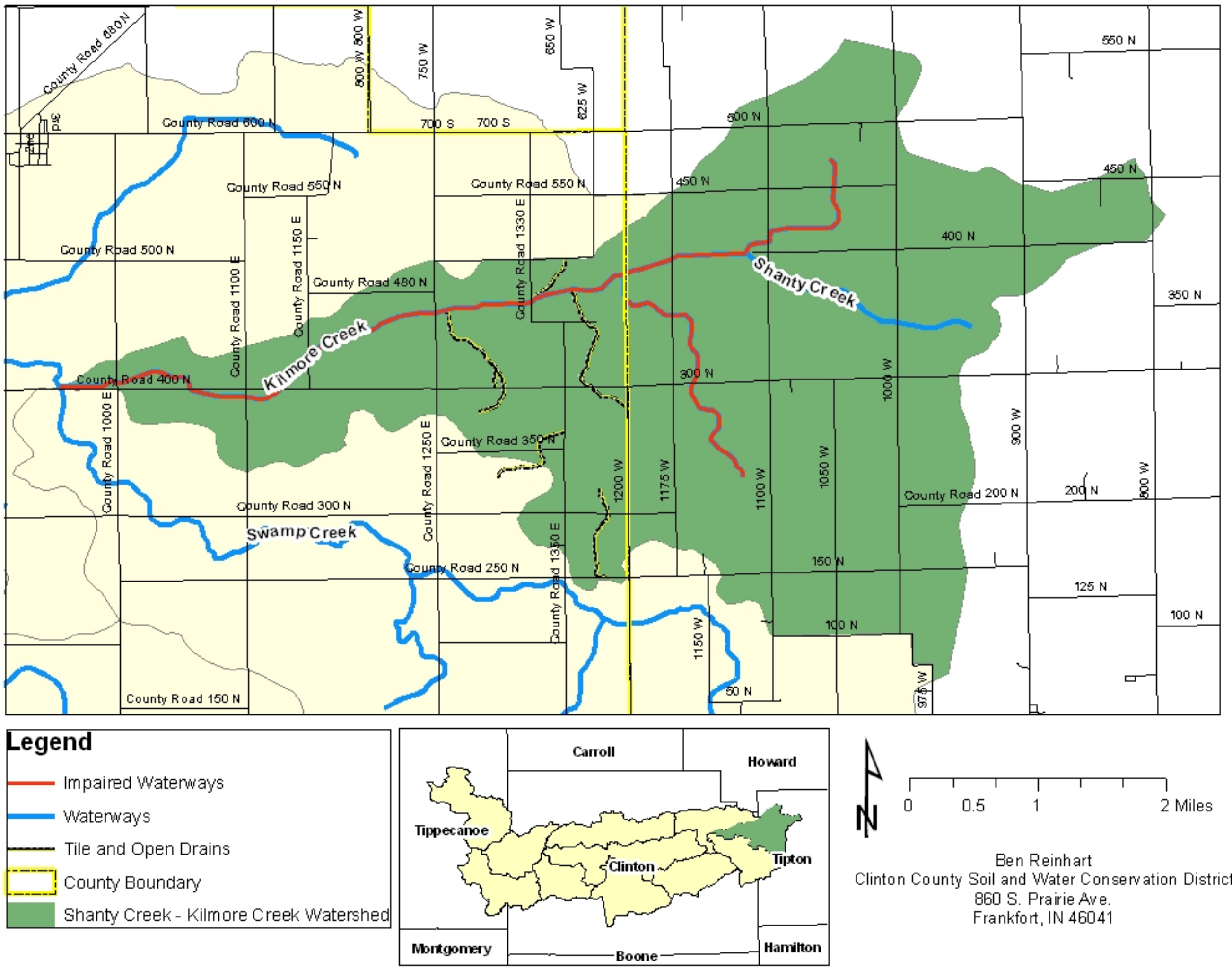


Figure 29. Shanty Creek-Kilmore Creek Waterways and Drainage

Soils characteristics within the Shanty Creek subwatershed are similar to that of nearby Swamp Creek subwatershed. Much of the area, approximately 54%, can be classified as somewhat hydric in nature (Figure 30). Lands that carry a classification of PHEL make up approximately 16% of the land area within the subwatershed. And finally, HEL lands are uncommon within this drainage with only about 30 acres being classified throughout the entire subwatershed.

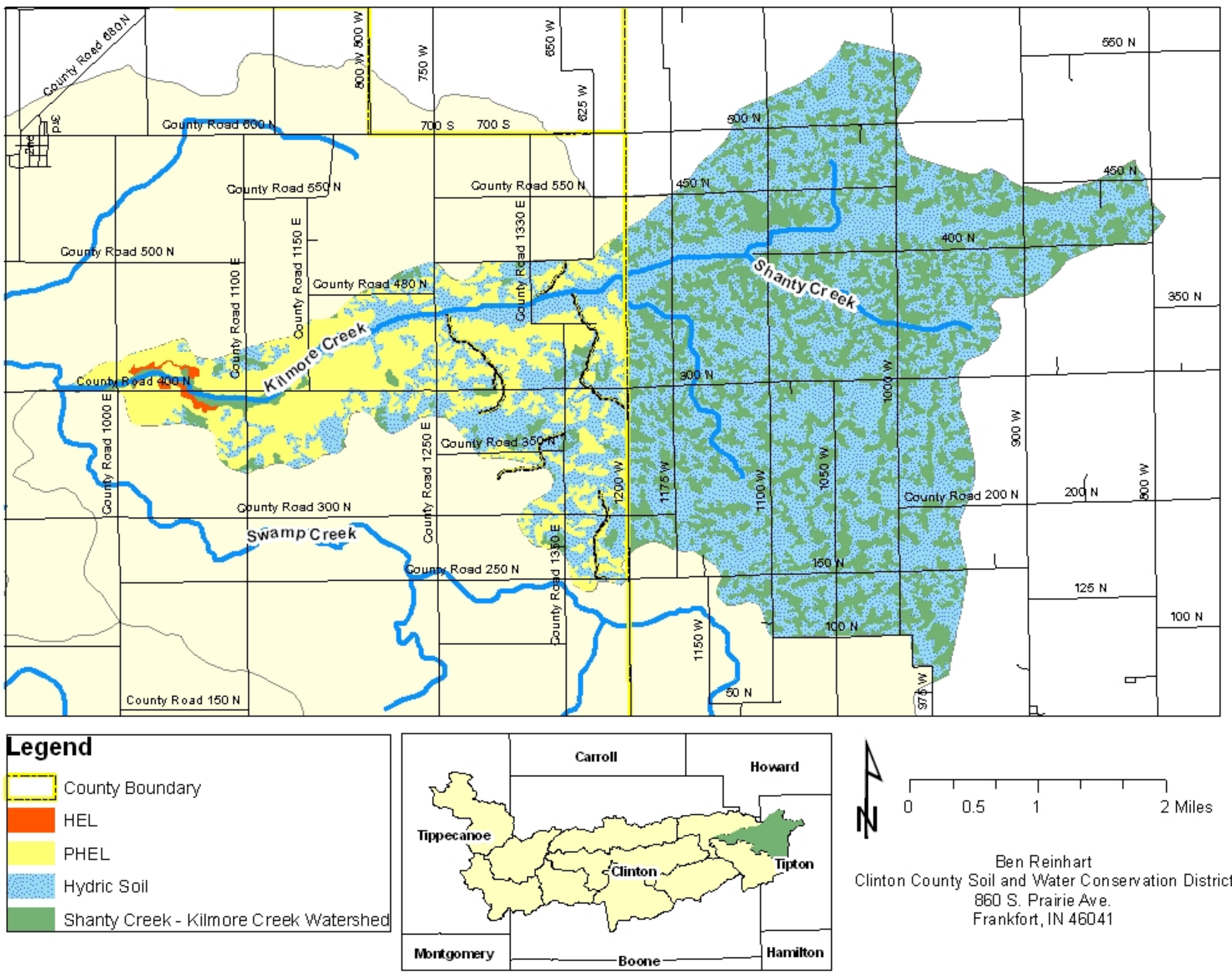


Figure 30. Shanty Creek-Kilmore Creek Soils

The Shanty Creek-Kilmore Creek watershed lacks virtually any developed areas and is characterized by cropland (Figure 31). Grasslands are scattered throughout the drainage area and are most likely grazed or hayed. Also scattered throughout the watershed are fragmented patches of wooded areas, many of which contain wet or swampy areas.

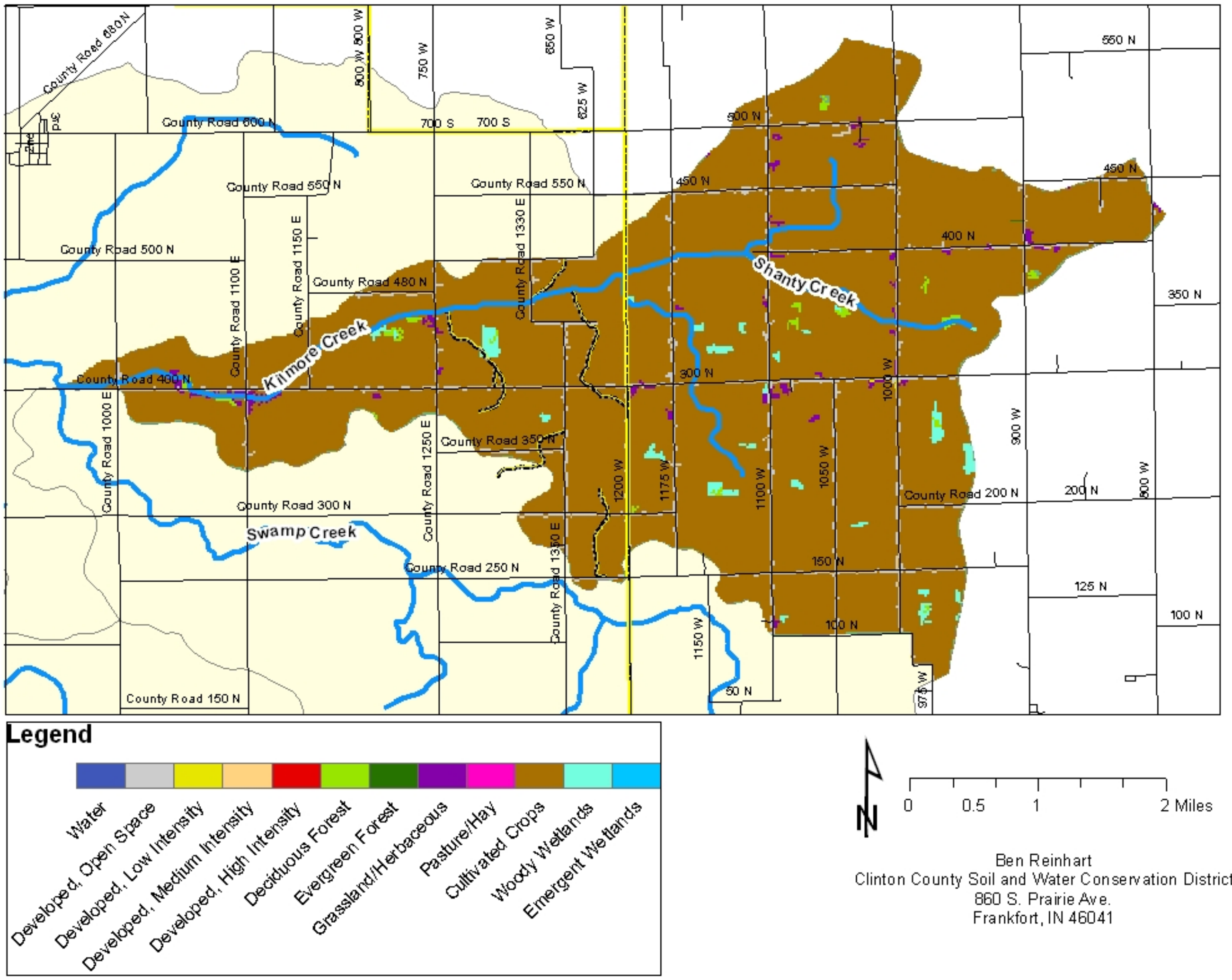


Figure 31. Shanty Creek-Kilmore Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

The Shanty Creek-Kilmore Creek subwatershed hosts two Confined feeding operations. Both CFOs are located within Tipton County and both are currently listed as "Active". The windshield inventory identified one other "Animal Operation" also within Tipton County. Generally, Animal Operations identified during the windshield inventory represent smaller, hobby-sized farms where animals and livestock may be kept. Two locations were identified downstream in the drainage area where livestock may be contributing to water quality impairments due to free access to the stream (Figure 32). A number of old sand and gravel pits also exist in this drainage area. Most of these sites are less than an acre of size and do hold water. Some of these abandoned pits could represent sources of erosion and sediment loading, particularly those located directly adjacent to waterways.

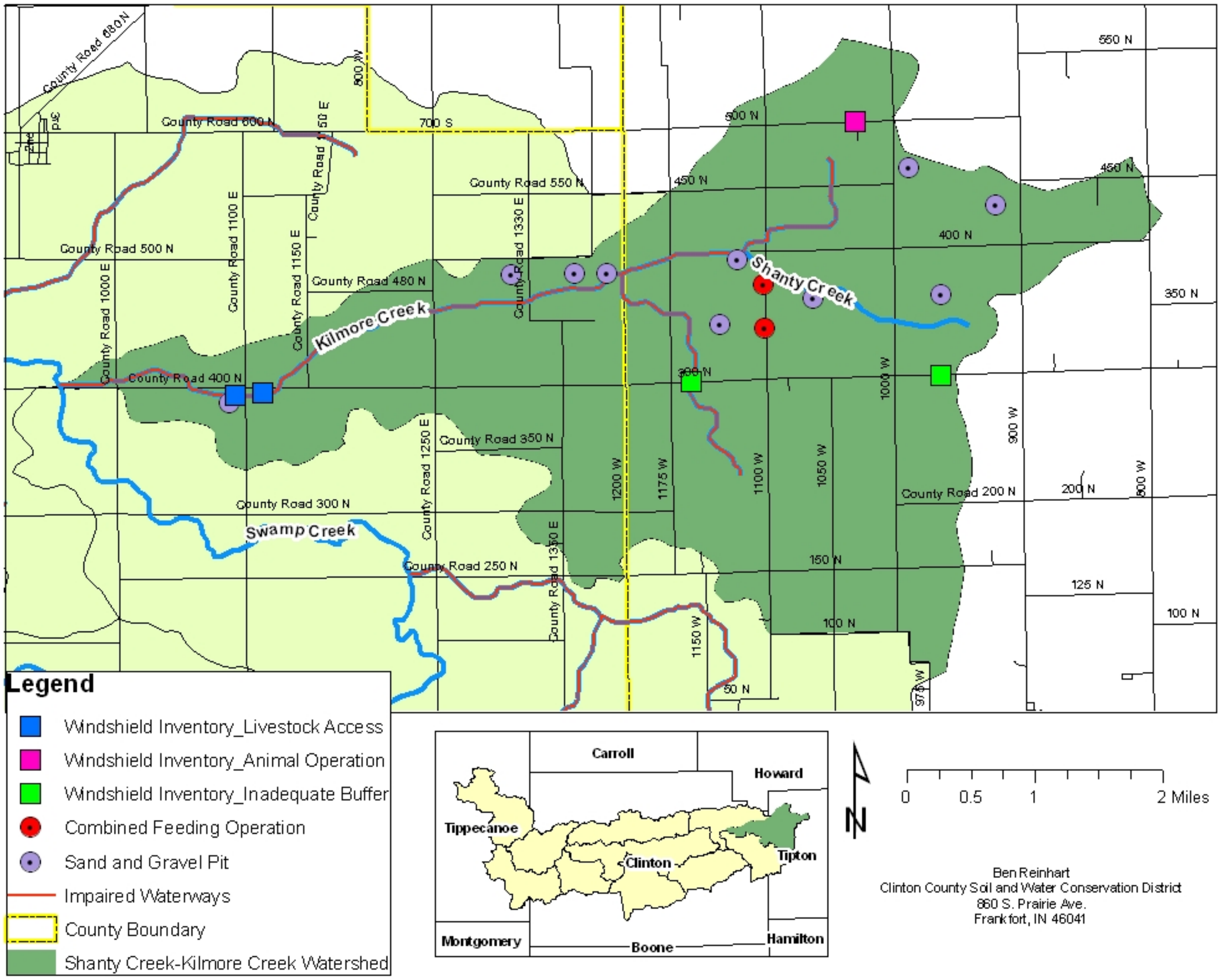


Figure 32. Shanty Creek-Kilmore Creek Source Investigation

Desktop Surveys

The Shanty Creek-Kilmore Creek subwatershed ranks the lowest of any subwatershed in regards to the percentage of natural land types within floodplain and riparian buffer zones. Over 90% of lands near waterways can be classified as unbuffered (e.g. cultivated lands, livestock pasture, development, etc.) meaning virtually all stream miles within this subwatershed lack riparian buffers (Figure 33).

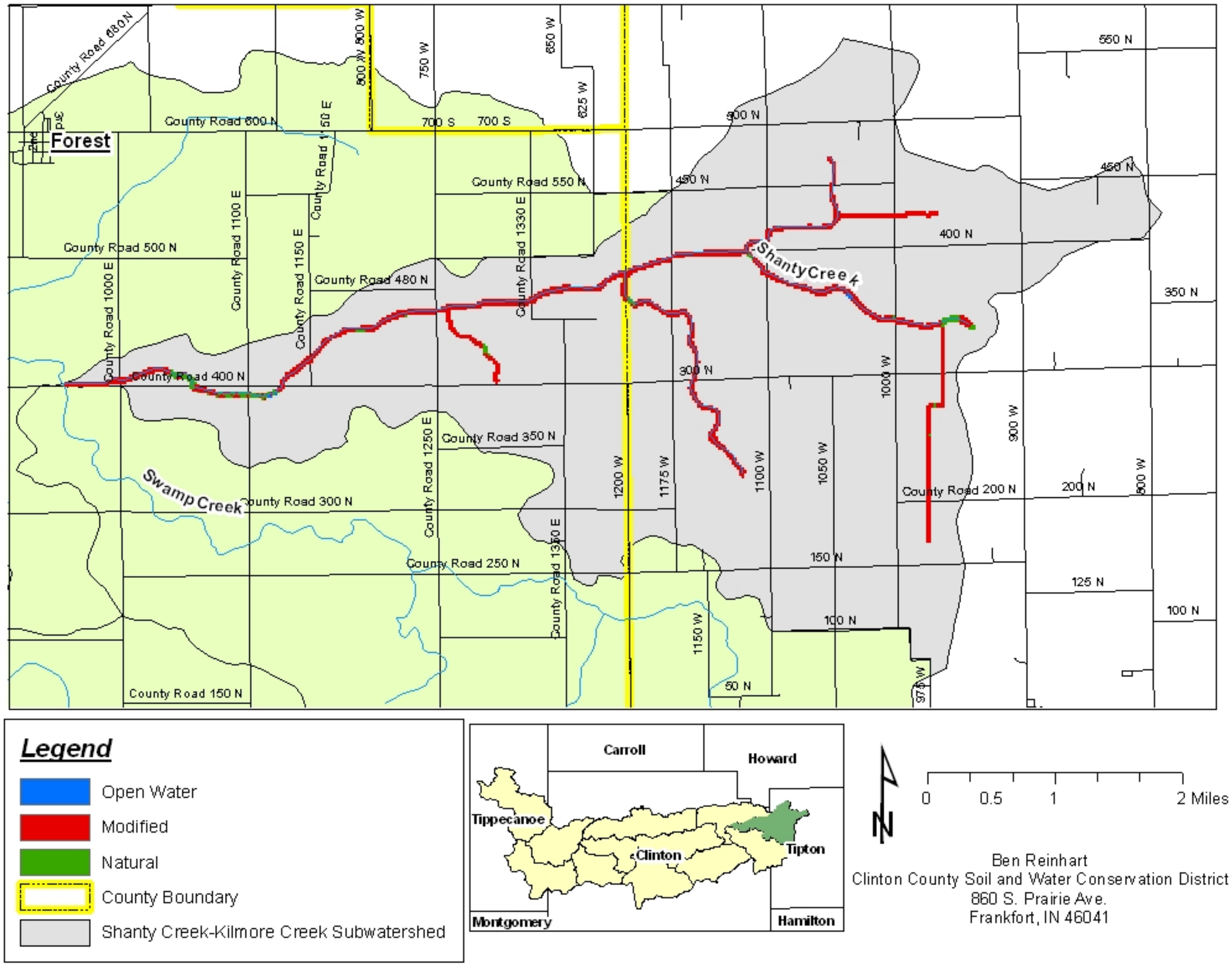


Figure 33. Shanty Creek-Kilmore Creek Riparian Lands Survey

Conservation practices within the Shanty Creek-Kilmore Creek subwatershed have been applied on almost 14% of the acreage compared against an 18.3% average across the South Fork Wildcat Creek drainage. A number of these areas have adopted practices such as Conservation Crop Rotation as well as residue and tillage management. There are some acres that have developed Pest and/or Nutrient Management Plans guiding their applications of chemicals and soil amendments.

Water Quality Information

IDEM 305(b)/303(d)

Virtually all waterways within the Shanty Creek-Kilmore Creek subwatershed are impaired (Figure 34). Similar to Swamp Creek, waterways located within the Shanty Creek-Kilmore Creek subwatershed are listed as having impaired biotic communities. Also similar to Swamp Creek, it is noted that insufficient data is present to assess some threats related to recreational and fishing uses.

AIMS

One site located on Kilmore Creek was sampled for *E. coli* in a 1998 TMDL. This site showed *E. coli* levels approaching but not exceeding accepted standard levels. Five sites were sampled in 2004 to evaluate habitat quality and biological communities. Sites were located on Collier Ditch, Shanty Creek, Kilmore Creek, and Lydy Fillenworth Ditch. No sites met accepted standards for habitat quality while one site on Shanty Creek at County Road 1100 West (Tipton Co.) met standards quality of fish communities. The sampling location on Collier Ditch showed the lowest levels for habitat quality and fish communities combined. Two sites, one on Kilmore Creek at County Road 1250 East and another on Shanty Creek at County Road 1175 West, had fish community scores approaching but not meeting accepted standards.

South Fork TMDL

One site within the Shanty Creek-Kilmore Creek area was included in the TMDL study. Sample data from this site showed a necessary reduction of around 6% for total phosphorus levels.

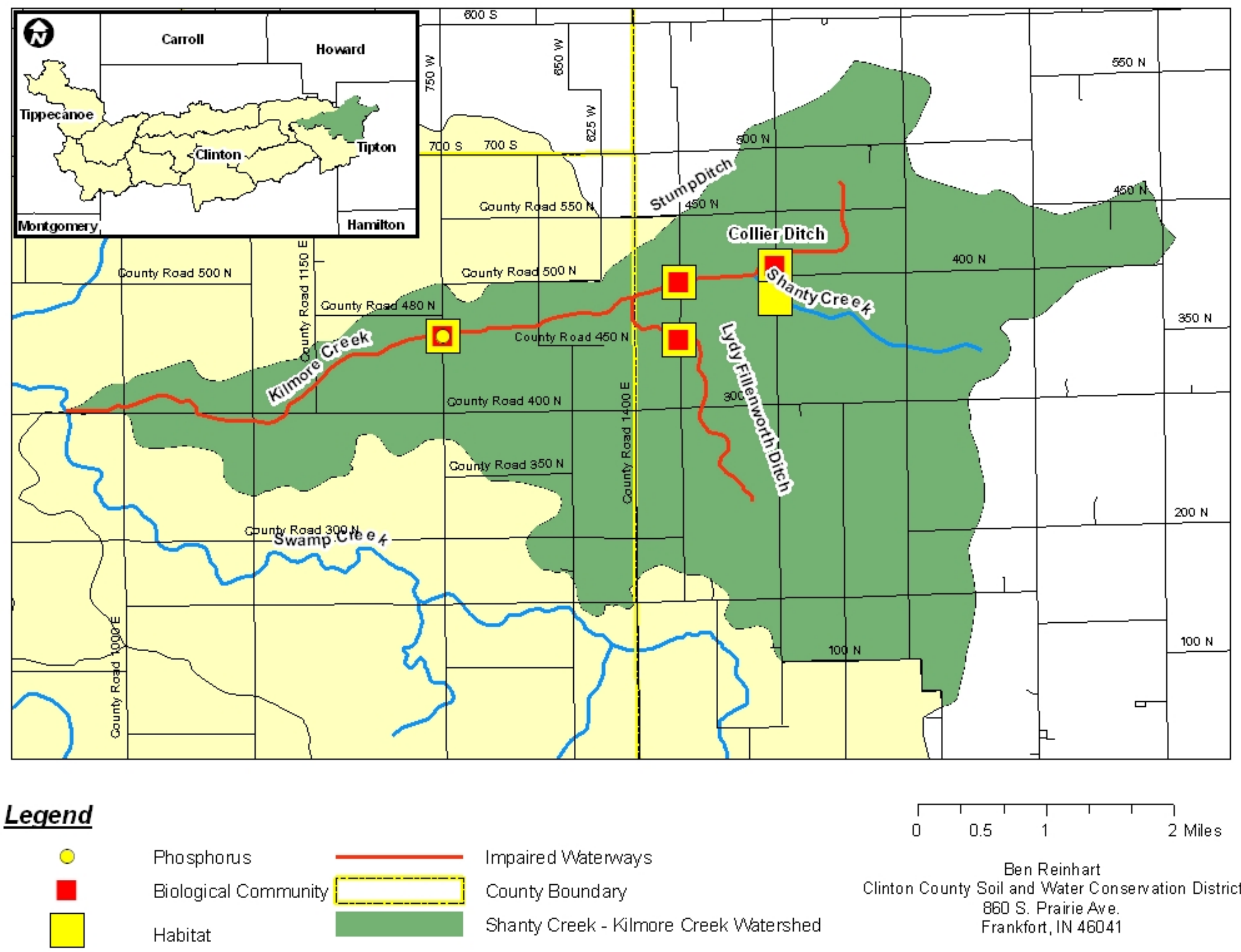


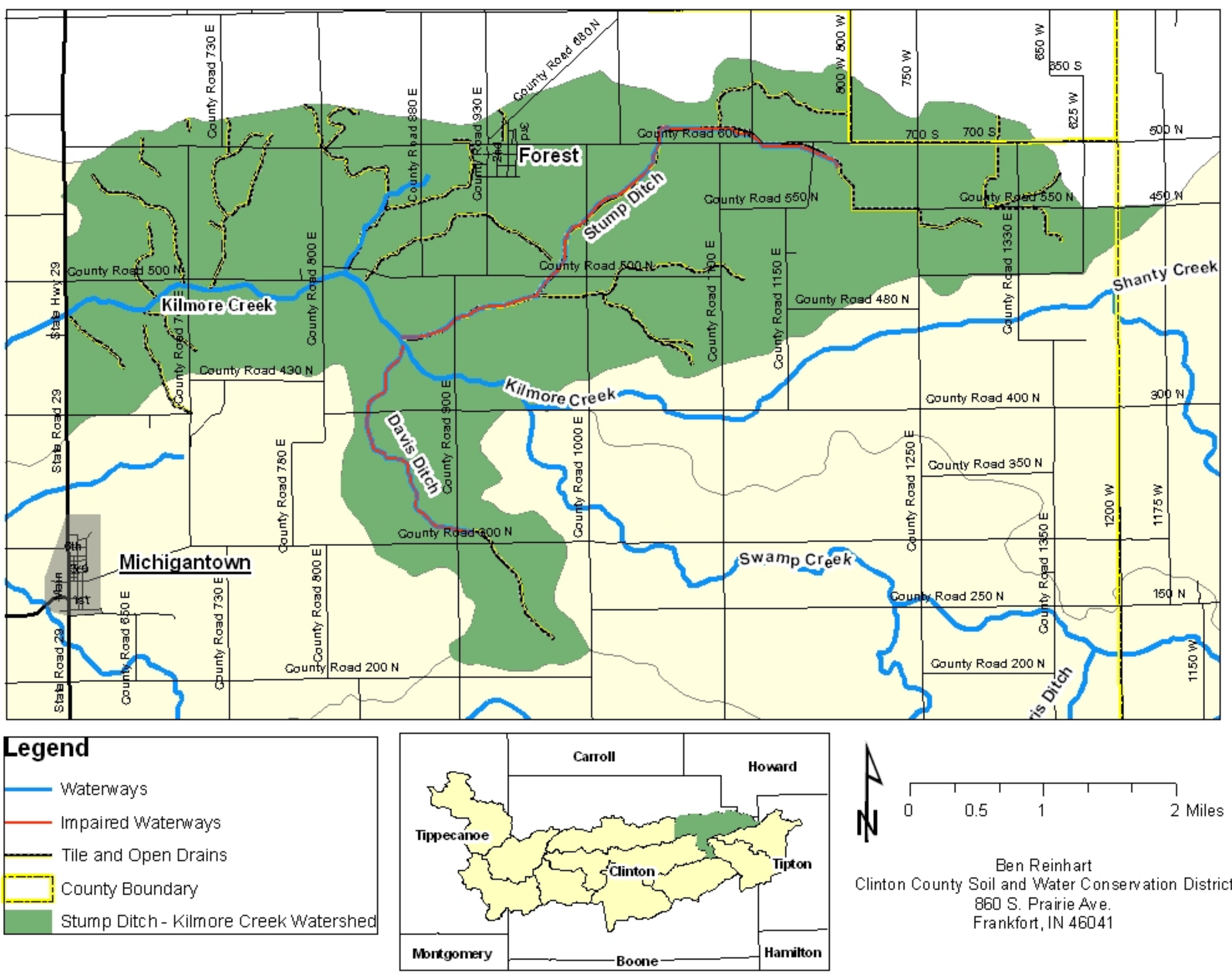
Figure 34. Shanty Creek-Kilmore Creek Water Quality Impairments

4.3 Stump Ditch – Kilmore Creek (HUC: 051201070303)

Land Use Information

The Stump Ditch-Kilmore Creek subwatershed lies along the northern boundary of the South Fork Wildcat Creek Watershed draining almost 10,587 acres. With its boundaries mostly within Clinton County, the Stump Ditch-Kilmore Creek subwatershed also drains a small, isolated corner of Howard County. This subwatershed contains just over 11.5 miles of natural waterways with over half (6.2 miles) being listed as impaired waterways (Figure 35). Waterways include Stump Ditch, Davis Ditch, and Kilmore Creek. Virtually all of Stump Ditch is managed as an open drain.

Figure 35. Stump Ditch-Kilmore Creek Waterways and Drainage



Slightly half of the land area (46%) within the Stump Ditch-Kilmore Creek subwatershed can be classified as having soil properties that are somewhat hydric in nature. Approximately 37% of lands within the drainage area can be classified as PHEL whereas only about 72 acres of land can be classified as HEL. The majority of the PHEL and HEL lands occur along the primary waterways (Figure 36).

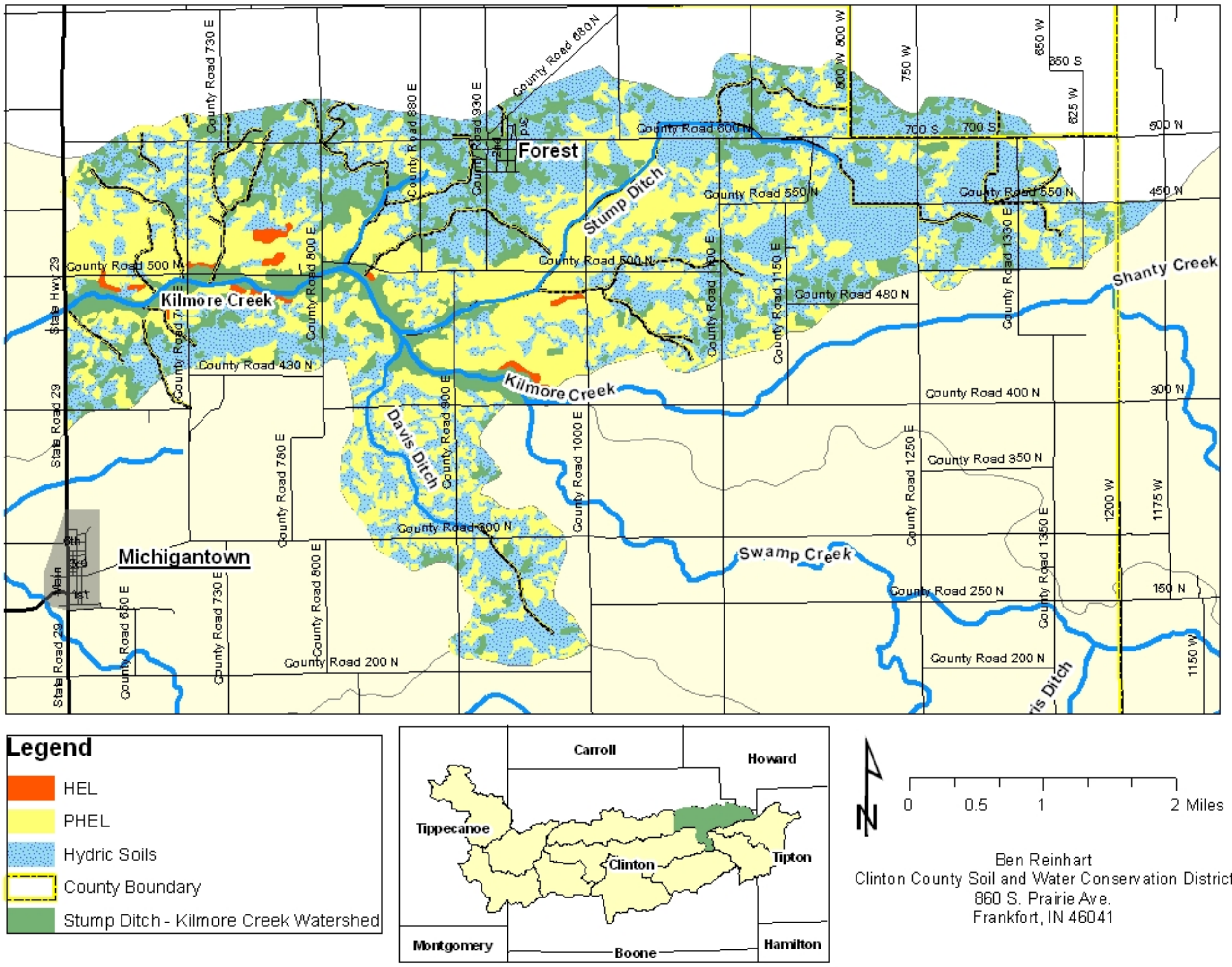


Figure 36. Stump Ditch-Kilmore Creek Soils

Similar to many of the other subwatersheds across the South Fork Wildcat Creek drainage, the Stump Ditch-Kilmore Creek Watershed is almost entirely compromised of cultivated crops. Other relatively minor land uses included grasslands and wooded areas which are heavily fragmented and scattered throughout the area. The primary area of development within this watershed is represented by the Town of Forest along the northern boundary of the drainage area (Figure 37).

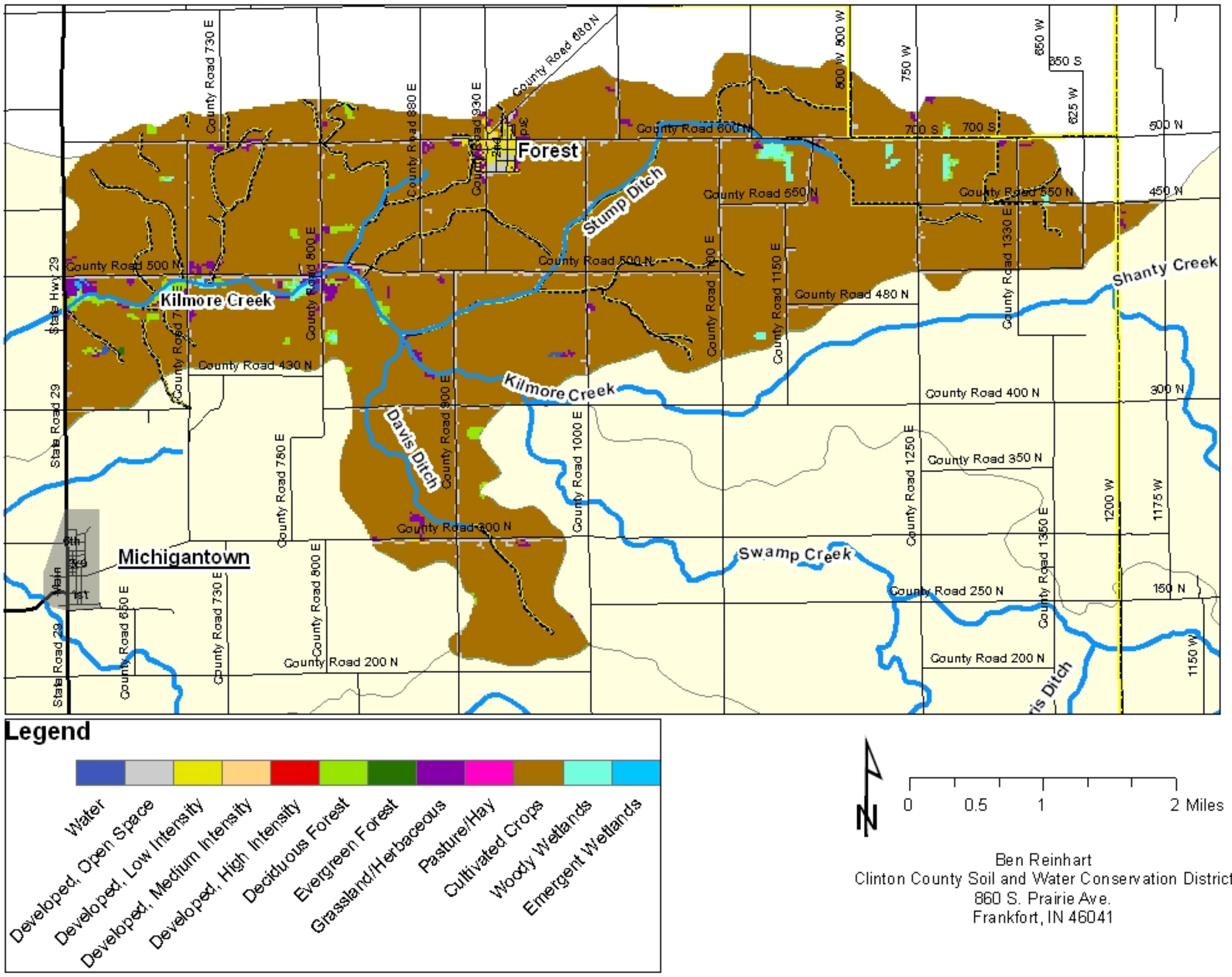


Figure 37. Stump Ditch-Kilmore Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

One unsewered community, the Town of Forest, is located within the Stump Ditch-Kilmore Creek drainage area. Also, six Confined feeding operations are located within the watershed boundaries with all of them being listed as Active (Figure 38). Volunteers from the windshield inventory indicated inadequate riparian zones being located primarily along Stump Ditch and other smaller tributaries of the main branch of Kilmore Creek.

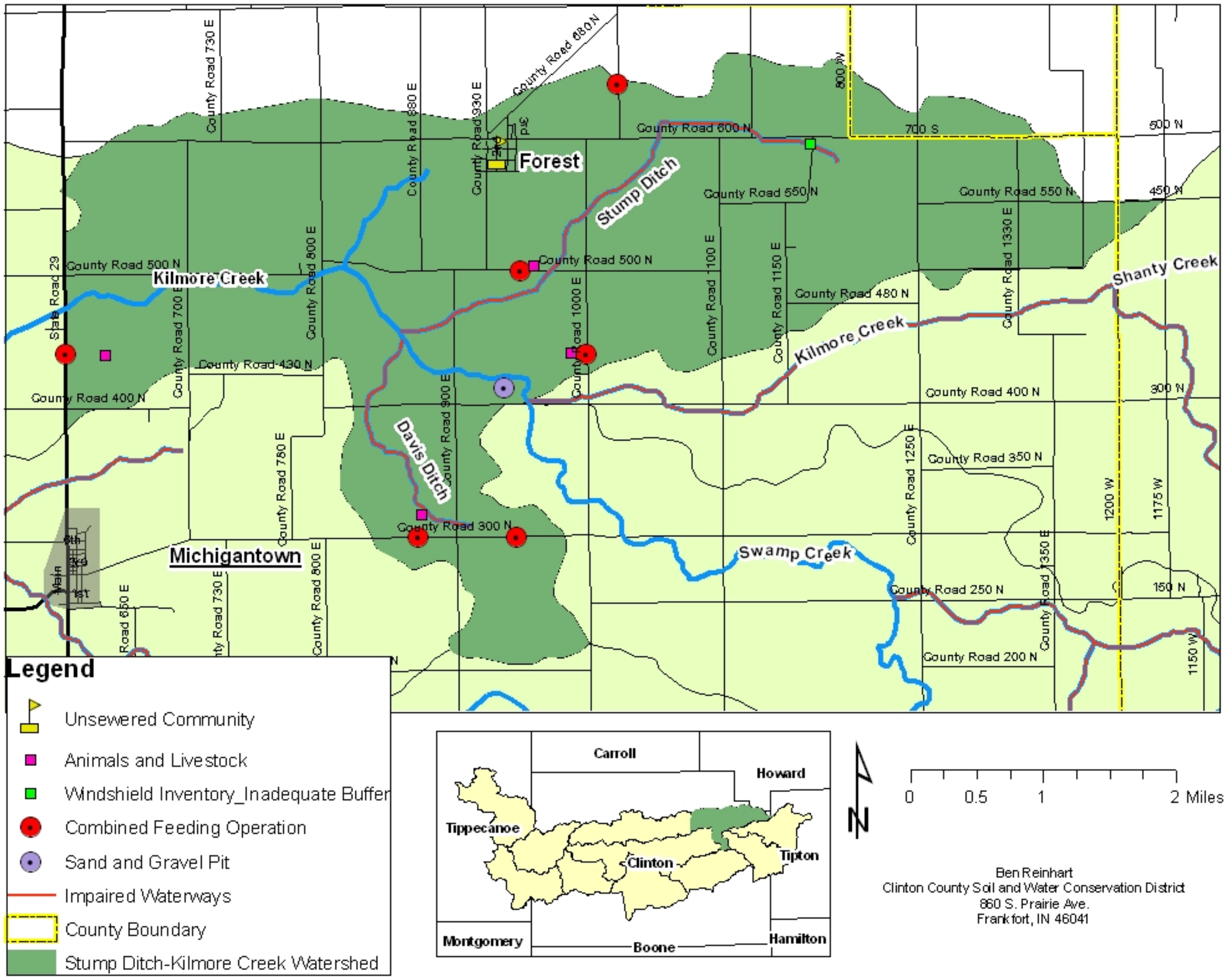


Figure 38. Stump Ditch-Kilmore Creek Source Investigation

Desktop Surveys

Approximately 17% of lands within the designated floodplain and riparian buffer zones can be classified as natural land types (e.g. wooded areas, grasslands, or wetlands). The remaining land areas within these designated zones consist of land uses such as cultivated fields and livestock pastures. Virtually all buffered land area occurs along the main body of Kilmore Creek while Stump Ditch and Davis Ditch are almost entirely unbuffered (Figure 39).

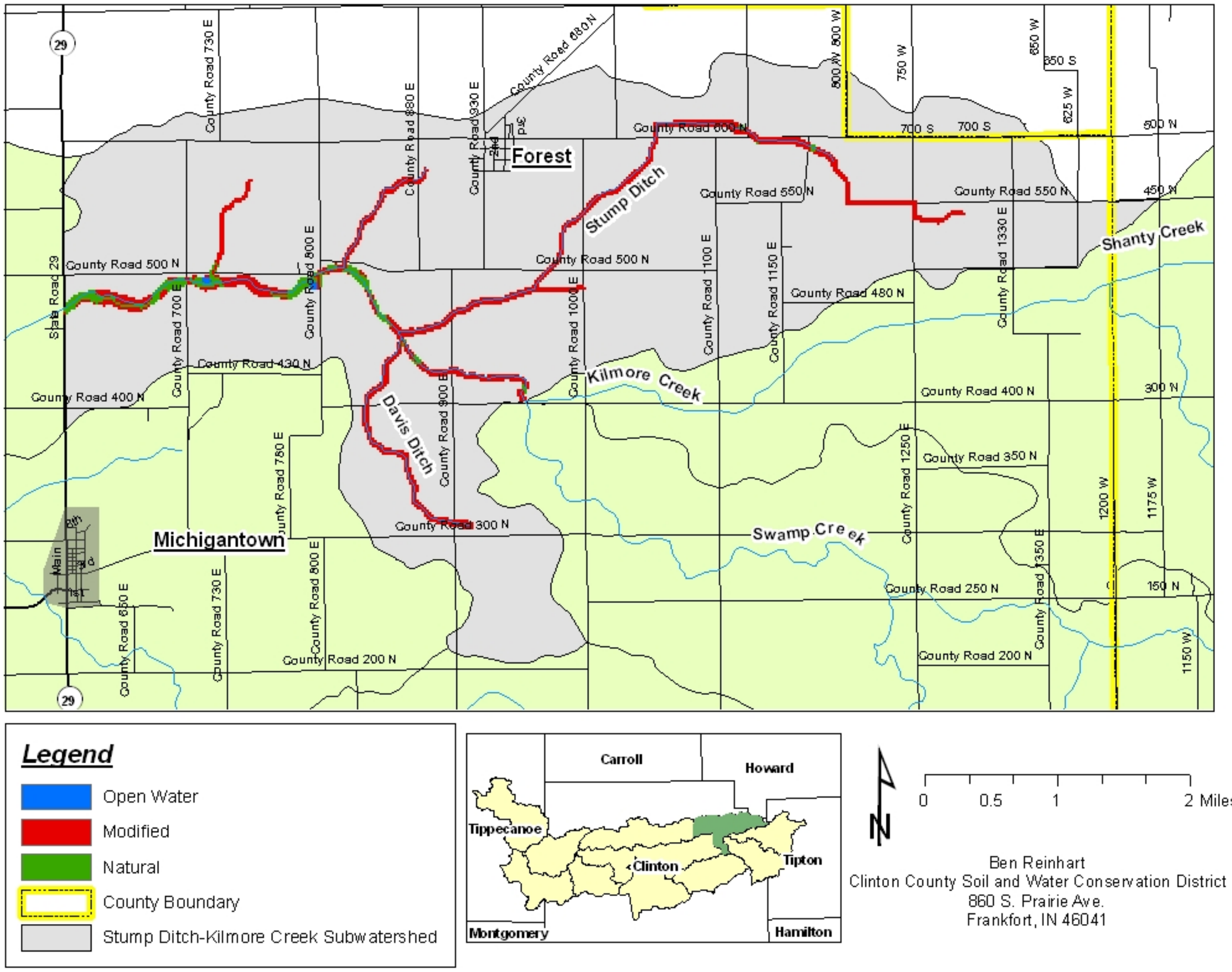


Figure 39. Stump Ditch-Kilmore Creek Riparian Lands Survey

The Stump Ditch-Kilmore Creek subwatershed ranks third lowest in regards to percent of subwatershed area receiving conservation practices with only 8.6%, compared to a 18.3% average across the South Fork Wildcat Creek drainage. The most common practices applied are Conservation Crop Rotation and residue and tillage management. The occurrence of developed Pest and/or Nutrient Management Plans is slightly more common within this subwatershed compared to others such as the Shanty Creek-Kilmore Creek and Swamp Creek subwatersheds.

Water Quality Information

IDEM 305(b)/303(d)

Within the Stump Ditch-Kilmore Creek subwatershed both Stump Ditch and Davis Ditch are listed as hosting impaired biotic communities (Figure 40). Other sections of Kilmore Creek itself are grouped into Category 2 which means that water quality is generally good but more data should be collected.

Hoosier Riverwatch

As part of the Hoosier Riverwatch database only two sampling events were recorded in the Stump Ditch-Kilmore Creek subwatershed. Water Quality Index scores were pretty good with scores over 70. Habitat evaluations were quite low at these sites with scores of 28 and 36. Generally a score of 60 is considered conducive for warmwater species.

AIMS

Two locations were sampled within the Kilmore Creek-Stump Ditch subwatershed for *E. coli* as part of a 1998 TMDL study. Neither site exceeded accepted standards. Sites on Kilmore Creek at County Road 500 North and upstream of 700 East exceeded accepted standards for aquatic habitat and fish communities. The highest scores were recorded at County Road 500 North during sampling events in 2003 and 2004. Sites on Davis Ditch, Stump Ditch, and upstream sites on Kilmore Creek did not meet accepted standards for habitat quality. Sampling locations on Davis Ditch and Stump Ditch also did not meet accepted standards for fish communities whereas all sites on Kilmore Creek met biological standards for fish communities with relatively high scores. The sampling location on Kilmore Creek at County Road 500 North showed some elevated nitrate-nitrite levels approaching accepted standard levels during sampling in 2003.

Current Data

As part of the South Fork Wildcat Creek Assessment, two sampling locations were located within the Stump Ditch-Kilmore Creek subwatershed. Habitat analysis on Stump Ditch showed scores that were only slightly above accepted standards while macroinvertebrate sampling resulted in scores slightly below accepted standards. Similar analysis done upstream of the Kilmore Creek and Stump Ditch confluence showed habitat scores four points below accepted standards. Also, biological measurements of macroinvertebrate communities were not completed due to lack of adequate flow at the time of sampling.

Two sampling locations occurred within this drainage area, one on Stump Ditch and another on Kilmore Creek upstream of its confluence with Stump Ditch. While isolated exceedances occurred for nutrients and TSS (total suspended solids), average concentrations at both sites met this project's water quality targets except for *E. coli*. *E. coli* levels showed isolated exceedances during low flow sampling while routinely exceeding target levels during high flows. Measurements exceeding accepted target levels were documented during high flows for TSS, total phosphorus, and nitrate-nitrite. Average total phosphorus concentrations also approached target levels, and exceeded targets during isolated sampling events, during low flows at the Stump Ditch sampling site.

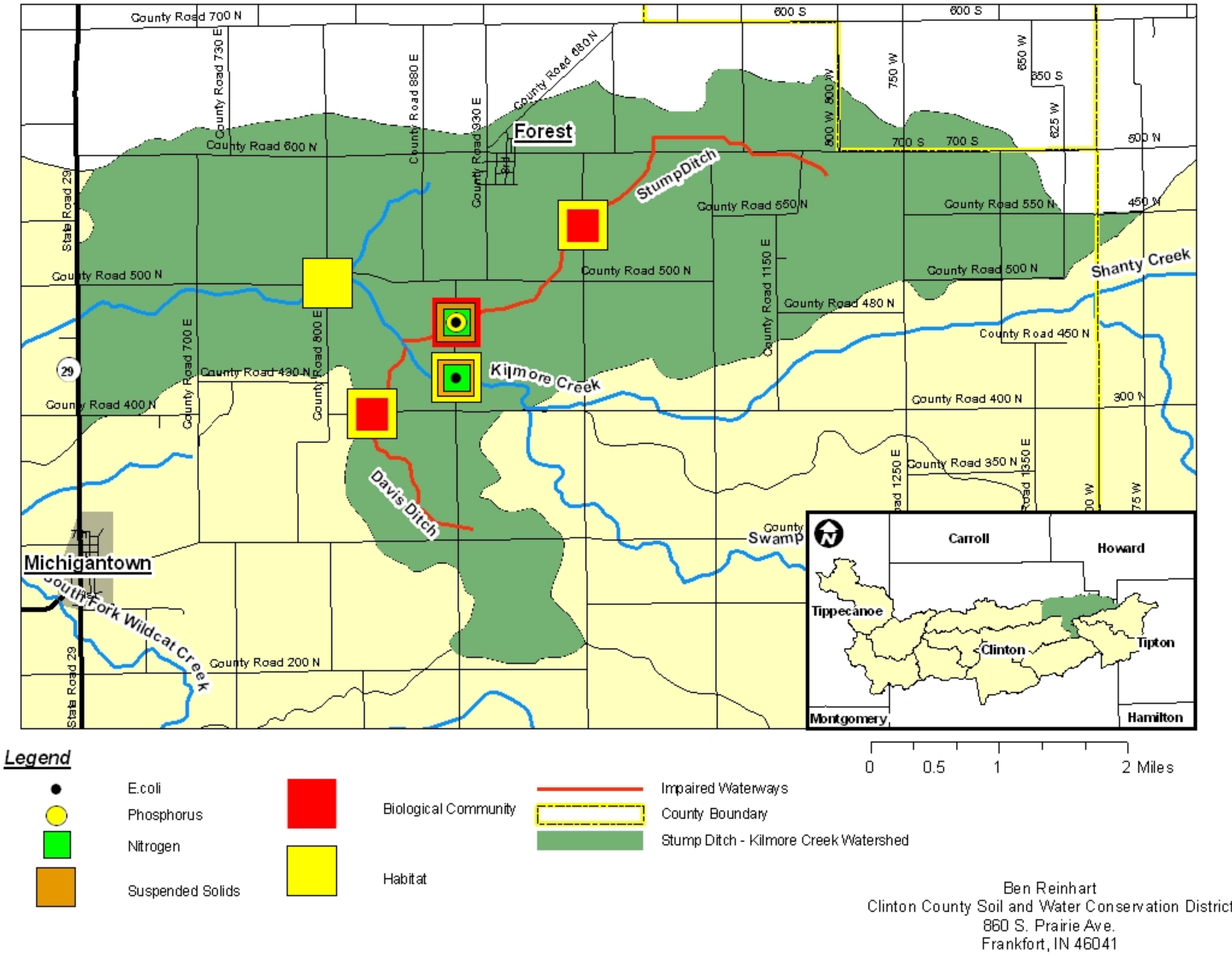


Figure 40. Stump Ditch-Kilmore Creek Water Quality Impairments

4.4 Talbert Ditch – South Fork Wildcat Creek (HUC: 051201070304)

Land Use Information

The Talbert Ditch-South Fork Wildcat Creek subwatershed is located along the southeastern edge of the South Fork Wildcat Creek Watershed and makes up the headwaters of the South Fork Wildcat Creek. This subwatershed drains approximately 13,107 acres of east-central Clinton County. Of the 18 total miles of waterways, roughly one-third are declared as impaired waterways (Figure 41). Primary waterways located within this subwatershed include Talbert Ditch, Kent Ditch, Dunn Ditch, and the South Fork Wildcat Creek. Almost all of these waterways are also managed as open drains by the Clinton County Surveyor.

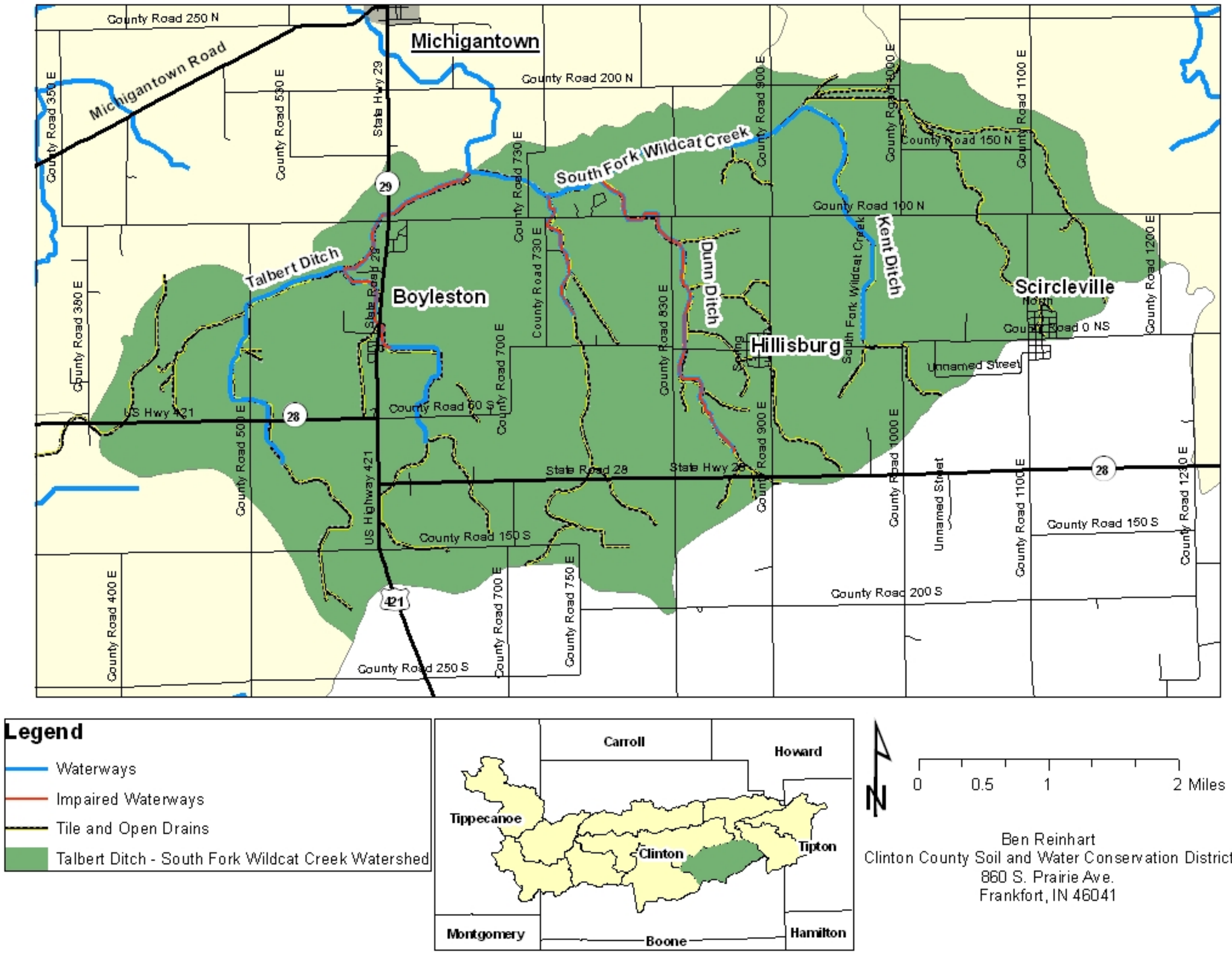


Figure 41. Talbert Ditch-South Fork Wildcat Creek Waterways and Drainage

Similar to the other subwatersheds within the headwater areas of the South Fork Wildcat Creek Watershed, the Talbert Ditch subwatershed contains a high occurrence of soils with hydric properties (Figure 42). Almost 52% of land area within this drainage fall under this classification. Also common within the Talbert Ditch subwatershed are PHEL lands with almost 42% of lands carrying this classification. Only about 64 acres within this drainage area are considered to be HEL.

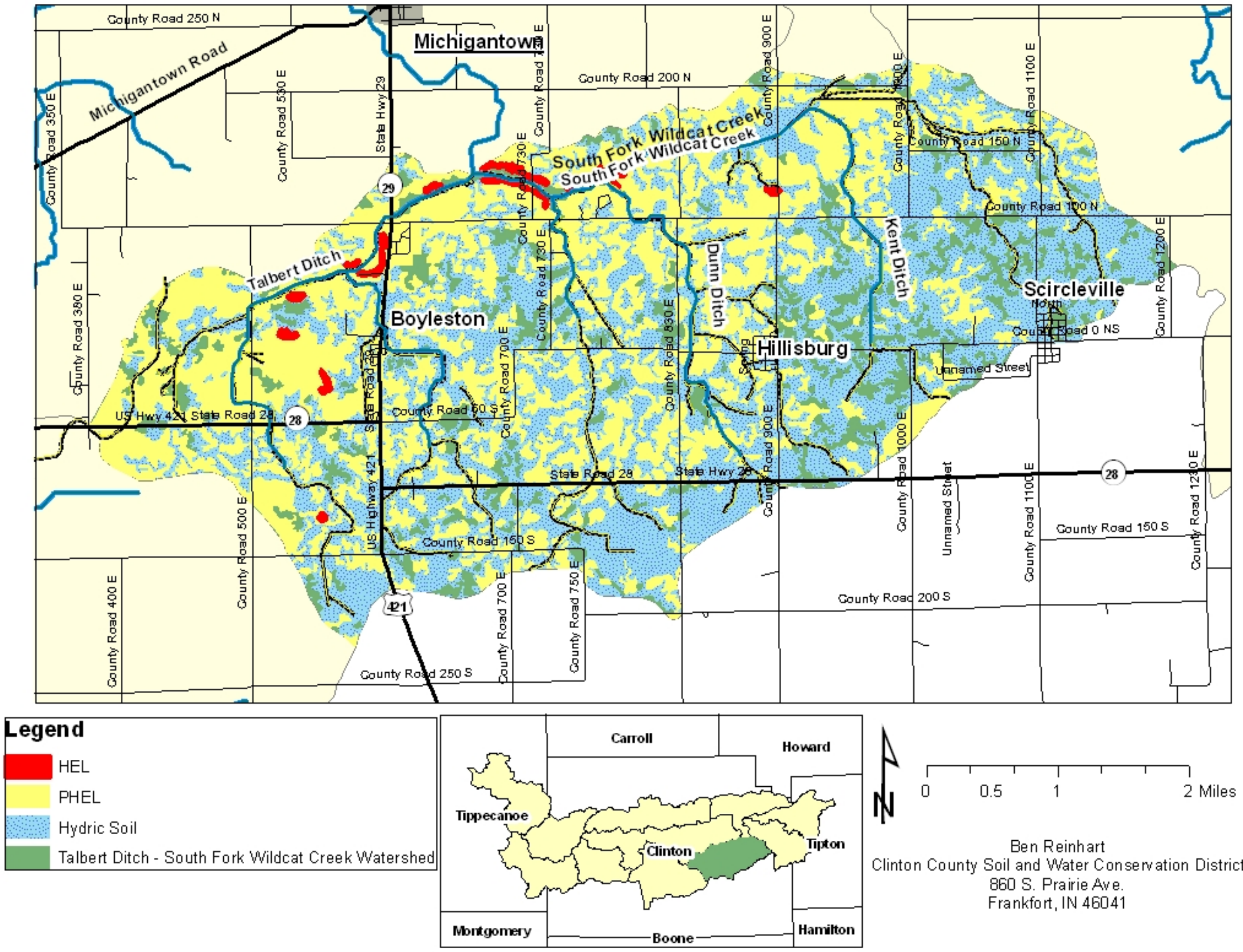


Figure 42. Talbert Ditch-South Fork Wildcat Creek Soils

The Talbert Ditch-South Fork Wildcat Creek Watershed contains scattered developed areas represented by the small developments of Boyleston, Hillisburg, and Scircleville. However, other low- to medium-intensity developments can be seen along State Road 29 south and east of Boyleston. The remaining areas of the watershed are dominated by cultivated crops with scattered grasslands and wooded areas (Figure 43).

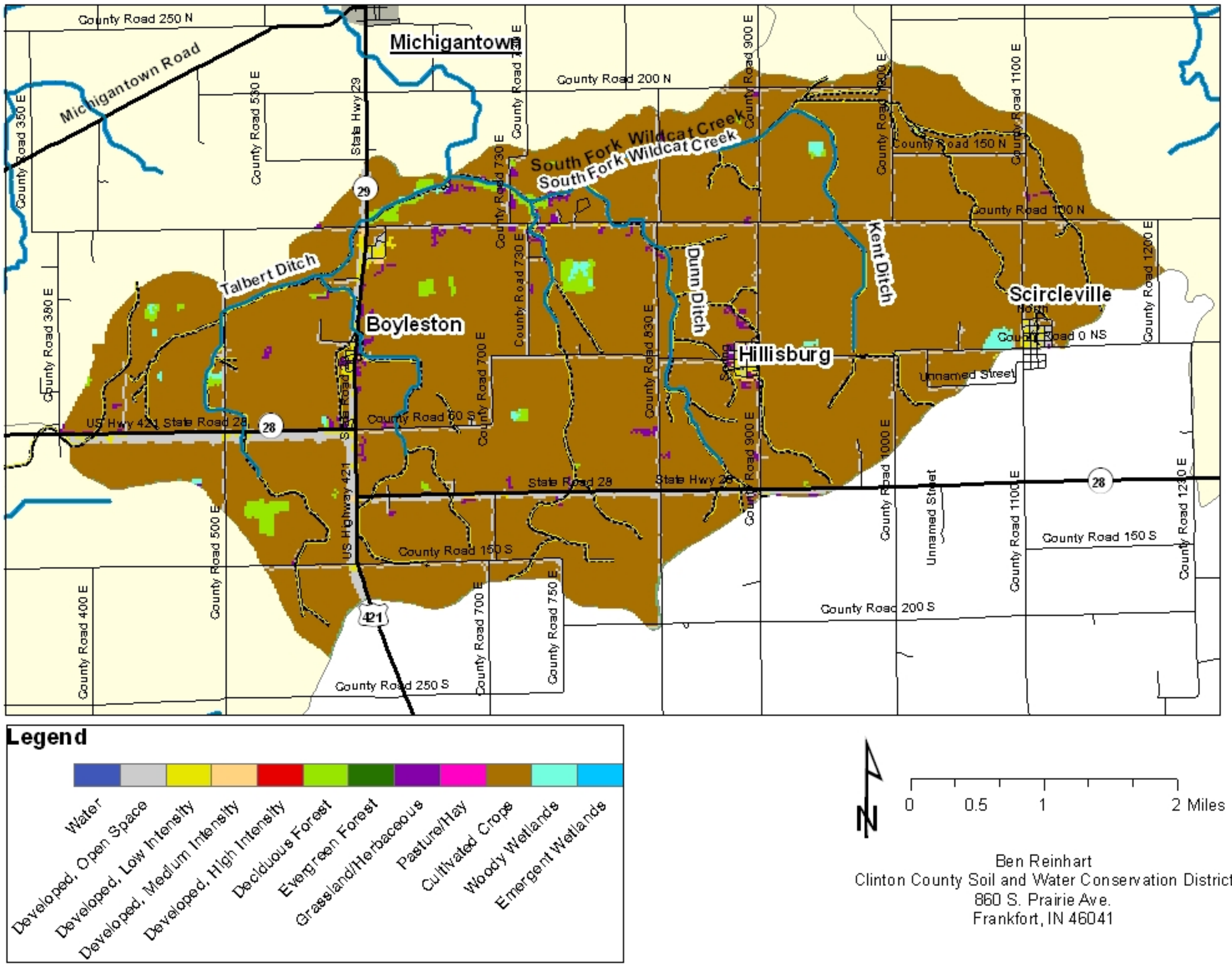


Figure 43. Talbert Ditch-South Fork Wildcat Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

The Talbert Ditch-South Fork Wildcat Creek subwatershed contains three unsewered communities, Boyleston, Hillisburg, and Scircleville (Figure 44). Also, a total of five Confined feeding operations were identified within the drainage area with all being classified as Active. Two other animal operations were identified by volunteers during windshield inventories of the drainage area. Volunteers also took note of inadequate riparian buffers and active erosion occurring on upstream sections of local waterways. No data was available through IDEM's Virtual File Cabinet on the State Cleanup Site located near Hillisburg. GIS attribute data documented this project in June of 2008.

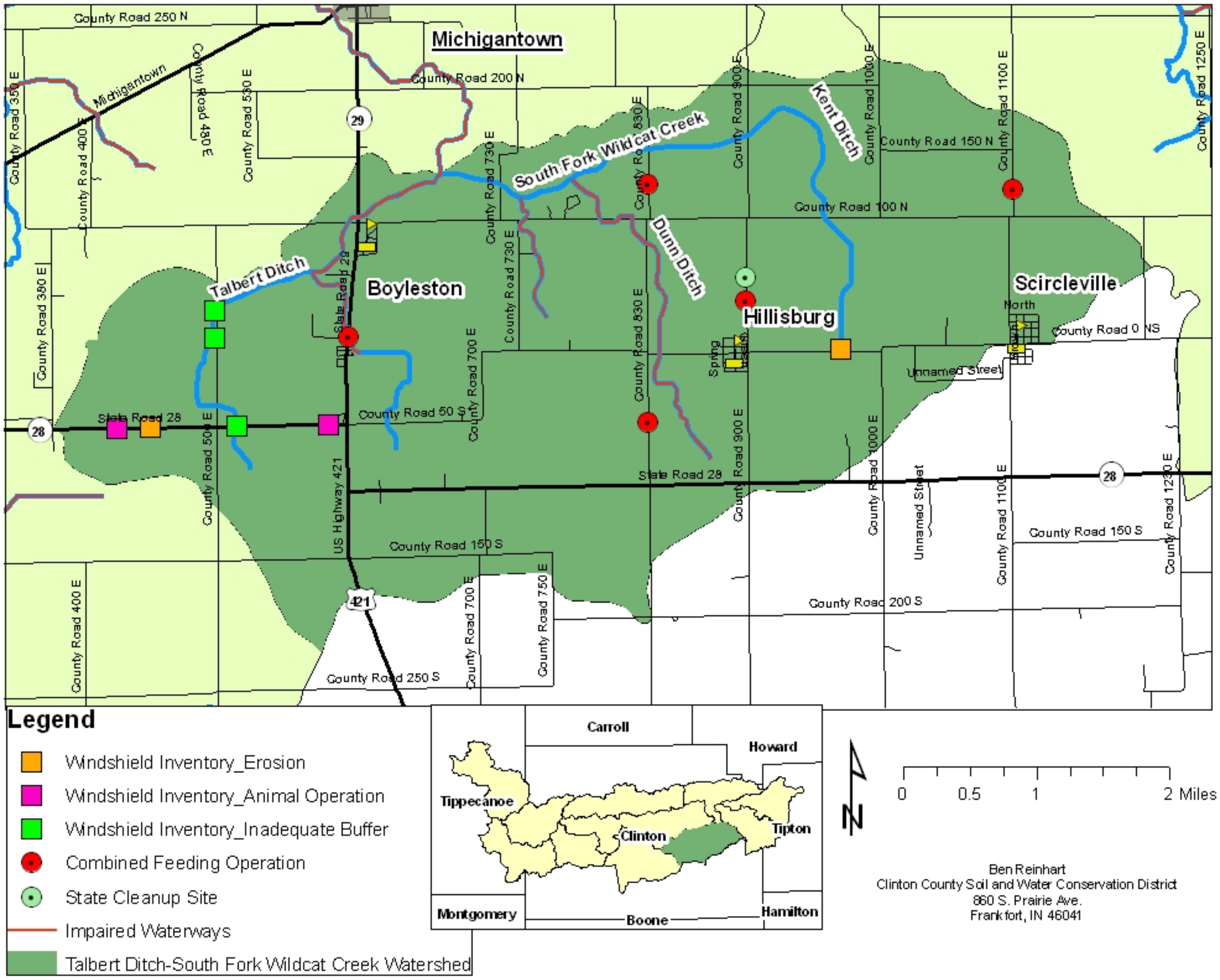


Figure 44. Talbert Ditch-South Fork Wildcat Creek Source Investigation

Desktop Surveys

The Talbert Ditch subwatershed ranks as the second lowest in percentage of lands containing buffered areas along primary waterways. Only about 8% of floodplain and riparian zones contain natural land uses. These buffered areas are located primarily in lower sections of the drainage area. Virtually all remaining land area is focused on agriculture (Figure 45).

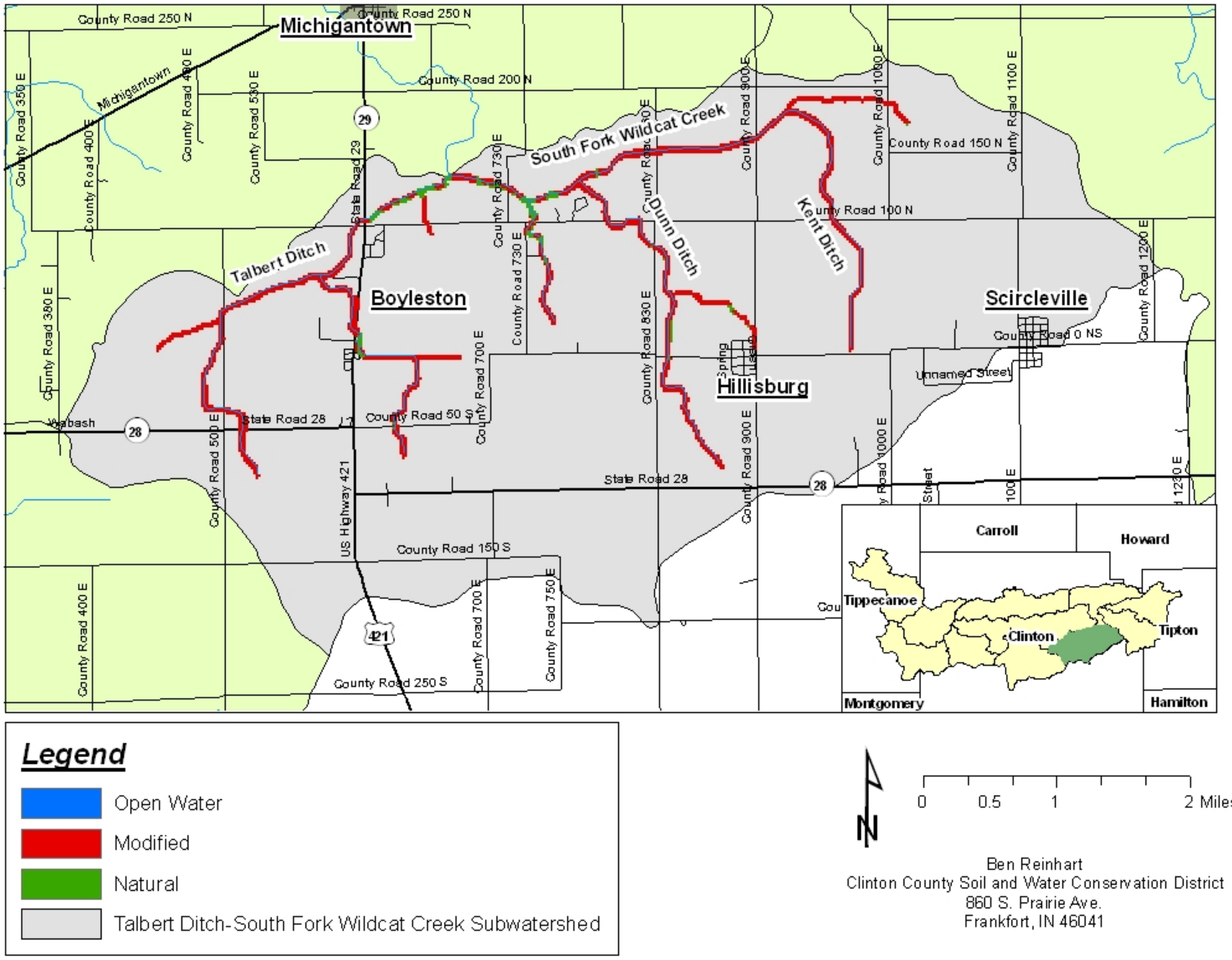


Figure 45. Talbert Ditch-South Fork Wildcat Creek Riparian Lands Survey

The Talbert Ditch-South Fork Wildcat Creek ranks second highest in regards to percent of the subwatershed area having applied conservation practices. Roughly 35.4% of lands within this subwatershed have had applied conservation practices compared to an average of 18.3% across the South Fork Wildcat Creek drainage. Much of the lands within the subwatershed have had a developed Pest and/or Nutrient Management Plan to help guide applications of various chemicals and soil amendments. Also, a number of acres have practiced various forms of residue and tillage management. There have been waste management practices applied as well within the subwatershed although less widespread than the previously mentioned conservation practices.

Water Quality Information

IDEM 305(b)/303(d)

Talbert Ditch-South Fork Wildcat Creek subwatershed contains three waterways listed as having impaired biotic communities (Figure 46). Also, one section of the South Fork Wildcat Creek is listed due to mercury and/or polychlorinated biphenyls (PCBs) being present in fish tissues. It has been determined that insufficient data is present for other waterways in this subwatershed to detail threats to designated uses such as recreation and fishing.

AIMS

2004 habitat assessments occurred at five locations throughout the Talbert Ditch-South Fork Wildcat Creek subwatershed. Only one of the five sites met accepted standards for aquatic habitat quality. This site was located on South Fork Wildcat Creek at County Road 730 East. Three of the five sites met standards for fish communities which included one location on Talbert Ditch and two sites on South Fork Wildcat Creek. One site on South Fork Wildcat Creek at County Road 830 East showed relatively high fish community scores despite lower habitat scores. Sites near Boyleston and Dunn Ditch did not meet accepted standards for either aquatic habitat quality or fish communities.

South Fork TMDL

Two sites within the Talbert Ditch-South Fork Wildcat Creek subwatershed were utilized when assessing total suspended solids levels. Samples collected from Cripe Ditch and Walker Ditch showed necessary reductions of 32% and 14% respectively.

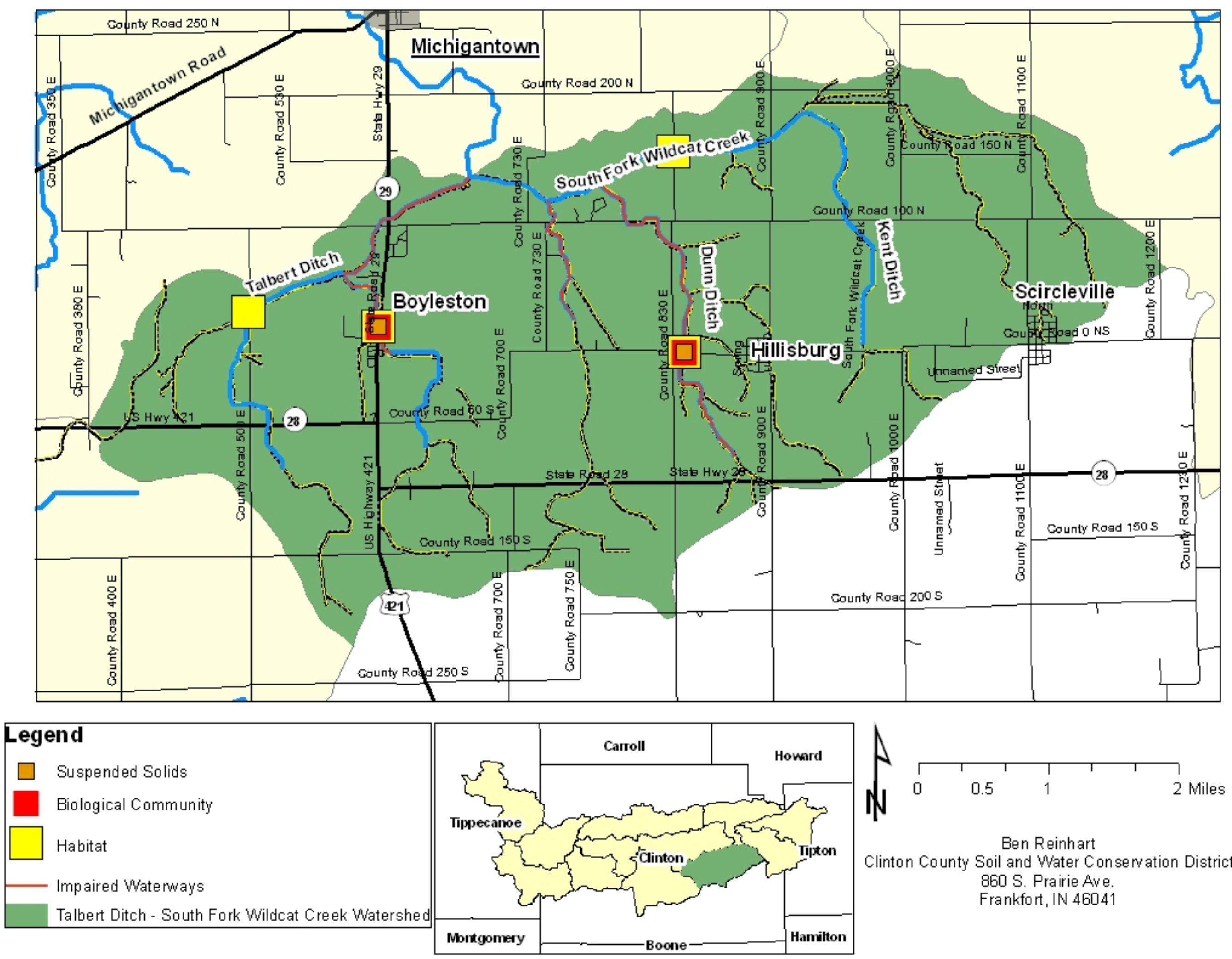


Figure 46. Talbert Ditch-South Fork Wildcat Creek Water Quality Impairments

4.5 Prairie Creek (HUC: 051201070305)

Land Use Information

The Prairie Creek subwatershed lies along the southern boundary of the South Fork Wildcat Creek Watershed and contains the eastern two-thirds of the City of Frankfort (Figure 47). In all, Prairie Creek drains roughly 17,178 acres containing approximately 21 miles of waterways. The primary waterways include Mann Ditch and Prairie Creek. Virtually all of Mann Ditch and the section of Prairie Creek draining into the City of Frankfort are listed as impaired waterways. In total this adds up to roughly 10.8 miles of impaired waterways. All open waterways within the Prairie Creek subwatershed are classified as open drains.

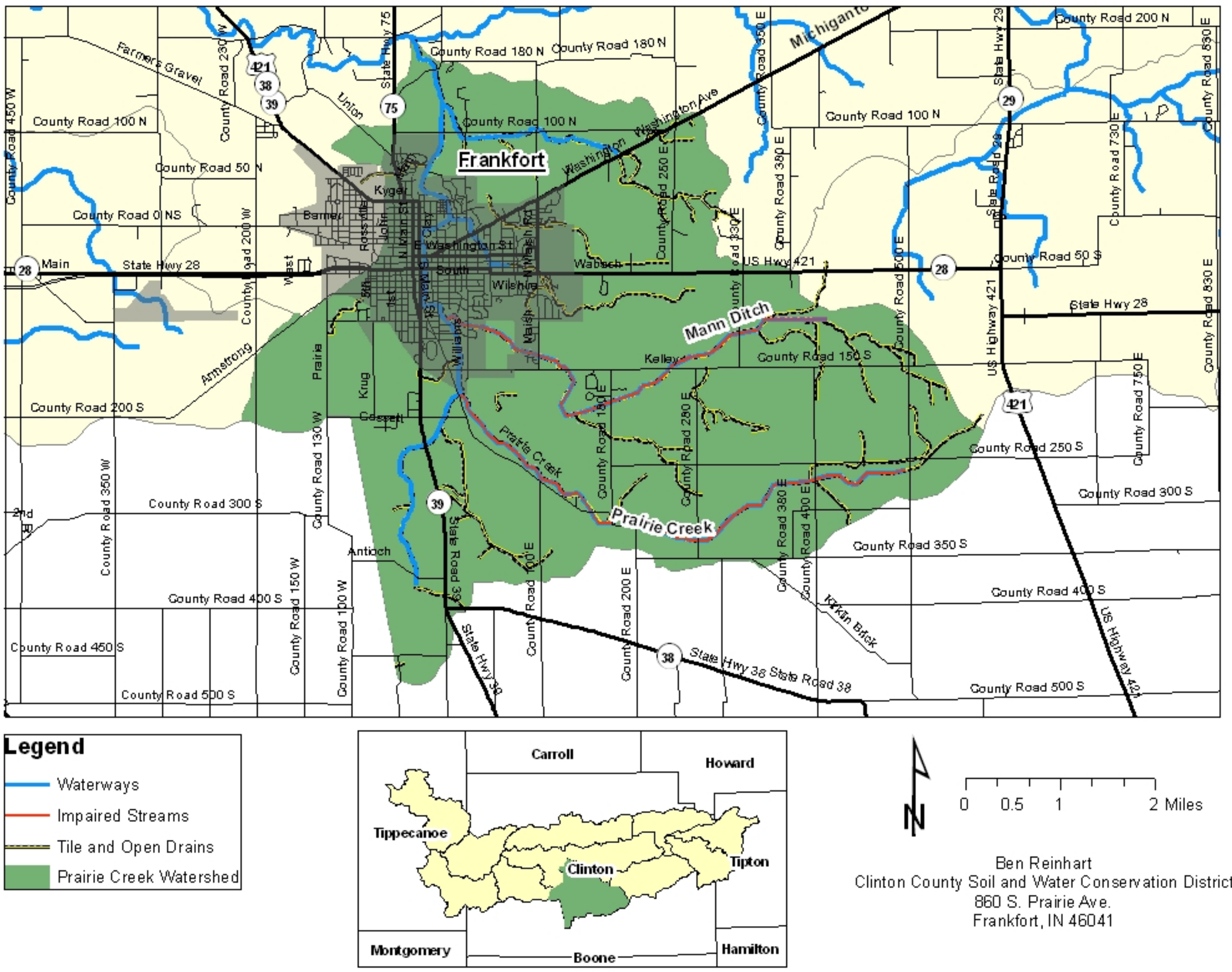


Figure 47. Prairie Creek Waterways and Drainage

Roughly 40% of lands within the Prairie Creek subwatershed can be classified as either having soil with somewhat hydric properties and/or PHEL (Figure 48). The vast majority of lands classified as PHEL are focused on the eastern part of the drainage area whereas soils with somewhat hydric properties are relatively common throughout the entire Prairie Creek drainage area. A relatively low amount of HEL area is found within this subwatershed with only about 56 acres total be listed.

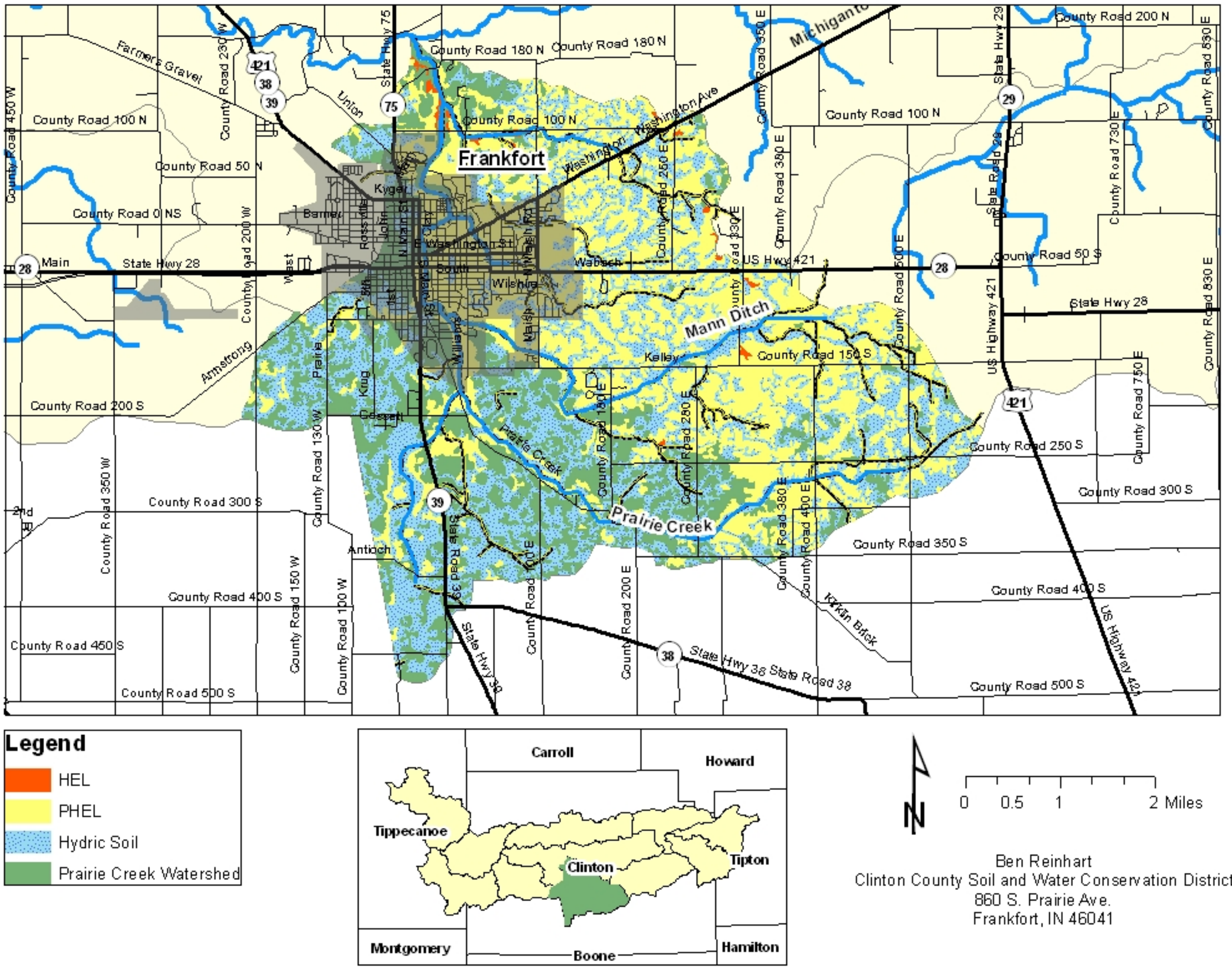


Figure 48. Prairie Creek Soils

The Prairie Creek Watershed contains the majority of developed areas associated with the City of Frankfort. Much of this development is located directly in or adjacent to the city limits. However, additional areas along well-traveled county roads and highways are also becoming more developed with time (Figure 49). The remaining areas within this drainage constitute cultivated cropland with small scattered acreages of woodlands and grassland areas.

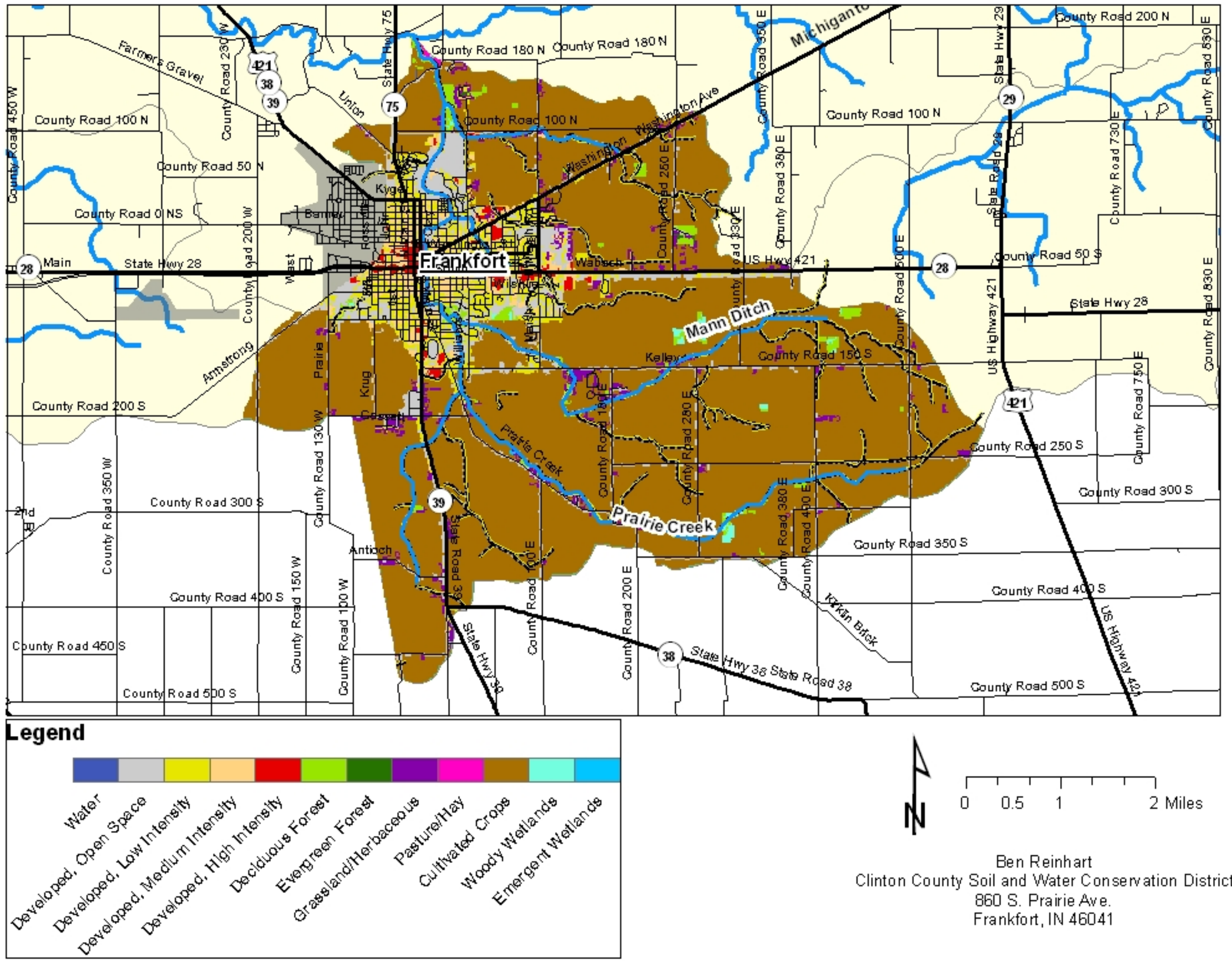


Figure 49. Prairie Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

The Frankfort Municipal Wastewater Treatment Plant (WWTP) and the City of Frankfort's combined sewer system are both active NPDES permits within the Prairie Creek subwatershed. The Frankfort WWTP has recorded seven effluent exceedances in the past three years where water being released from the facility exceeded certain state water quality standards. Exceedances were noted for *E. coli*, Ammonia, and Phosphorus with the most recent exceedances occurring in November 2010 and March 2011 for Ammonia and Phosphorus, respectively. The Frankfort plant also recorded sewer bypasses during 2005 and 2006 totaling an estimated two million gallons. A total of five Confined feeding operations are located within the Prairie Creek subwatershed. However, two of these CFOs have voided permits and two have expired permits. There are 28 Underground Storage Tanks (UST) with another 34 that have been identified as Leaking Underground Storage Tanks (UST/L). Virtually all of these sites are located within the City of Frankfort.

Volunteers that participated in the windshield inventory identified a number of locations within the drainage area where active erosion was occurring (Figure 50). Also noted throughout areas of the subwatershed were small, hobby-sized farms where livestock or animals were being raised and a general lack of riparian vegetation along many of the waterways.

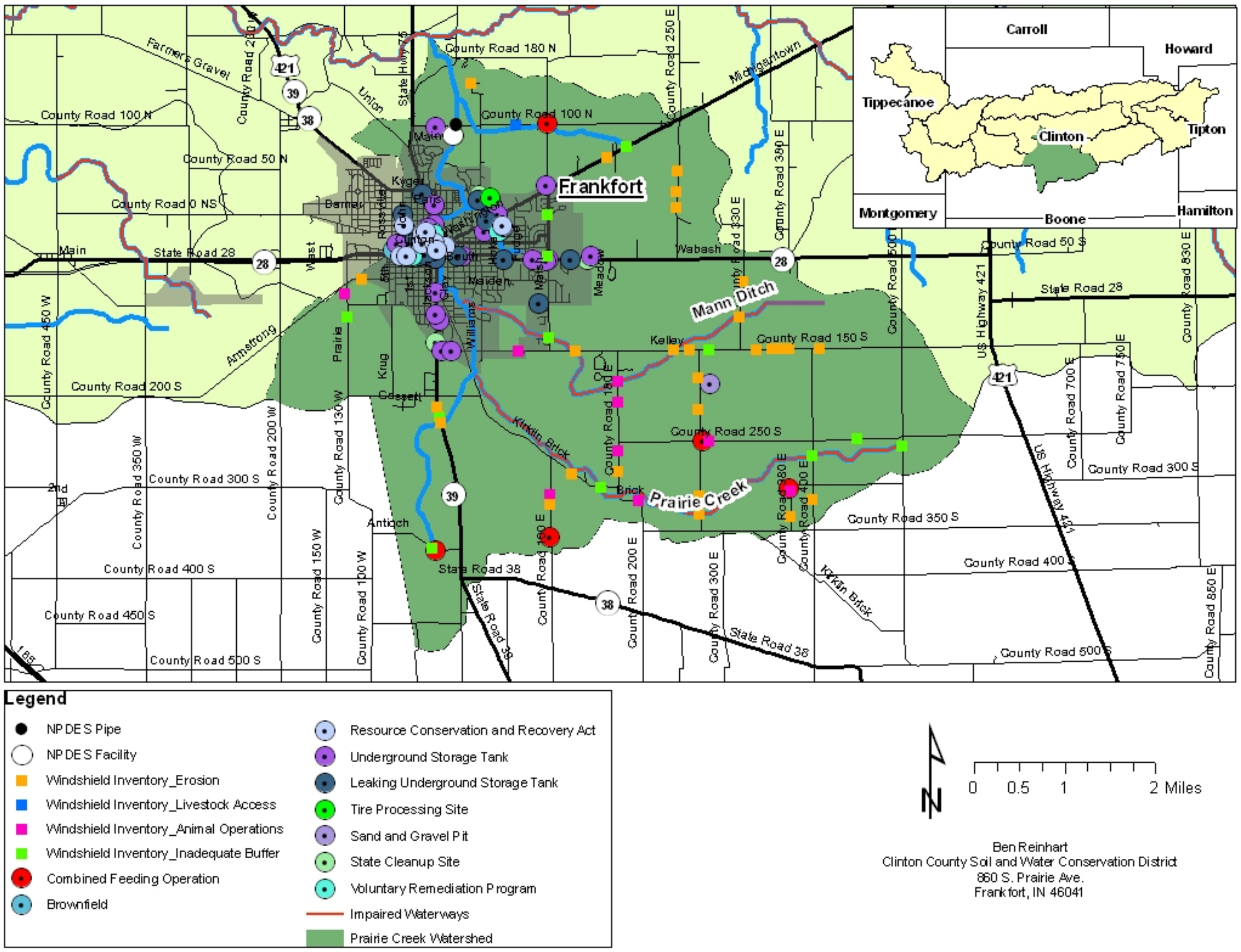


Figure 50. Prairie Creek Source Investigation

Desktop Surveys

Approximately 17% of land area within the designated floodplains and riparian zones were natural land cover types such as wooded areas, grasslands, and wetlands. The remaining lands within the designated zones consisted of land cover types that focused on some type of disturbance such as cultivated crops, livestock pasture, or development. This amounted to almost 18 miles of unbuffered waterways (Figure 51). Virtually all areas within the City of Frankfort appeared to not have suitable land cover types for riparian buffers. One exception to this was one area located east of Clay St. and south of Harvard St. in Frankfort.

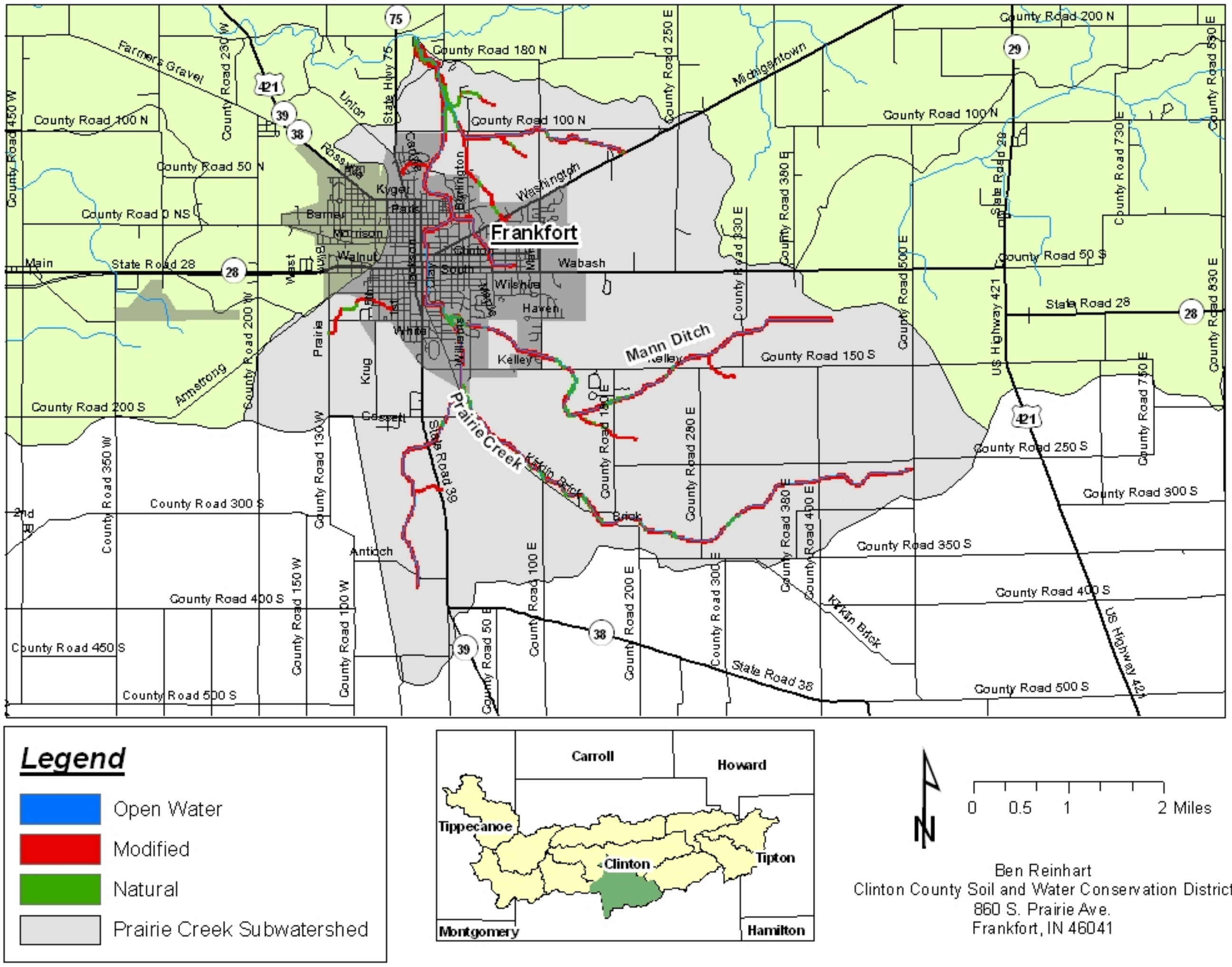


Figure 51. Prairie Creek Riparian Lands Survey

The Prairie Creek subwatershed ranks the lowest of all subwatersheds within the South Fork Wildcat Creek drainage area for applied conservation practices. Only 6.9% of the land area within the Prairie Creek subwatershed has had conservation practices applied on them. Some of this may be explained by the presence of a highly developed area in the City of Frankfort occurring within the subwatershed and acknowledging that NRCS conservation programs are for the most part only applicable to working agricultural lands. However, the land use within the Prairie Creek subwatershed is still largely agriculture. The primary conservation practices occurring within this subwatershed are Conservation Crop Rotation and residue and tillage management.

Water Quality Information

IDEM 305(b)/303(d)

Both Mann Ditch and the headwaters of Prairie Creek are listed for impaired biotic communities (Figure 52). The remaining waterways within the Prairie Creek subwatershed are documented as having too little water quality data to determine detailed impairments on other designated uses such as recreation and fishing.

Hoosier Riverwatch

Four separate sampling points from the Hoosier Riverwatch database were located within the Prairie Creek subwatershed. Three of these sites were located on Prairie Creek and one site was located on Mann Ditch. Sampling on Prairie Creek and Mann Ditch was completed in the late summer/fall of 2001 and 2002. Water quality at these sites was considered average with habitat scores in Prairie Creek falling below 60 which is the score considered conducive for general warmwater species. Pollution Tolerance Index scores at Mann Ditch were found to be very low which would indicate an impaired biotic community.

Stream Reach and Characterization Report

Habitat scores showed average to good habitat for aquatic organisms. Generally, habitat increased in quality with increasing distance downstream from Frankfort. Sampling of fish and macroinvertebrate communities also followed this trend with slightly higher quality communities being found farther away from Frankfort. Despite these differences, no significant changes of aquatic communities were seen downstream of the Frankfort CSO. Sedimentation was suspected to be the most likely cause in relatively low fish and macroinvertebrate communities across all sites. One concerning finding was a relatively high occurrence of tumors on collected fish samples. However, this finding was seen both above and below the Frankfort CSO.

AIMS

Two sampling locations within the Prairie Creek subwatershed exceeded *E. coli* standards during a 1998 sampling effort. Both sites were located on Prairie Creek at County Road 150 South and Kyger Street. Evaluations of habitat quality and fish communities were completed in 2004 at 10 sites within the Prairie Creek subwatershed. The highest quality sites, in terms of habitat quality and fish communities, were found on Prairie Creek at County Road 150 South and upstream of Green Street. Many of the sampled tributaries of Prairie Creek failed to meet accepted standards for habitat quality. A sampling location on Mann Ditch at County Road 150 South and on Prairie Creek at County Road 180 East did not meet accepted standards for fish communities. One location at the discharge from the Frankfort Wastewater Treatment Plant showed nitrate-nitrite levels exceeding accepted standards during a 1998 sampling event. Two other sites on Prairie Creek at County Road 150 North showed nitrate-nitrite levels approaching but not exceeding accepted standards during 1998 and 2004 sampling events.

South Fork TMDL

Water quality data from sites on both Prairie Creek and Mann Ditch were utilized in calculations for total suspended solids. These sites required reductions of 33% and 39% respectively.

IDEM Frankfort Area Watershed of the South Fork Wildcat Creek Source Identification Study

Results did show elevated phosphorus levels most likely originating from the Frankfort WWTP. Discharge from the Frankfort WWTP tested more than three times higher than the accepted standard of 0.3mg/L total phosphorus. This contributed to elevated phosphorus levels downstream to CR 580W on

South Fork Wildcat Creek. Even higher levels were seen downstream of the Frankfort WWTP later during the summer. Water levels were lower which means less water for diluting discharged effluent and higher in-stream phosphorus levels.

Despite high phosphorus levels, no gross increase of algae or other aquatic plants were seen during sampling efforts. These plants can sometimes grow out of control in high-phosphorus environments and can impair local aquatic habitats. Also, no explicit impairments for dissolved oxygen or direct inputs of sewage or waste were seen. Ultimately, this led IDEM to determine that there was no significant nutrient impairment within the drainage area.

Current Data

Three sampling locations were included as part of the South Fork Wildcat Creek Assessment. Two sites were located upstream of the City of Frankfort while one sampling location on Prairie Creek was located downstream of Frankfort, prior to the confluence with South Fork Wildcat Creek. Both upstream locations (Prairie Creek and Mann Ditch) scored slightly below accepted standards for aquatic habitat. Mann Ditch scored slightly above accepted standards during macroinvertebrate sampling, but contained a large abundance of sediment-tolerant organisms while a low occurrence of more pollution-intolerant species. The Prairie Creek site downstream of Frankfort showed average habitat quality, achieving accepted standards, while macroinvertebrate scores were just above accepted standards. Macroinvertebrate communities here were dominated by sediment-tolerant species such as midges.

Water chemistry and *E. coli* were sampled downstream of Frankfort prior to the confluence with South Fork Wildcat Creek. This location routinely exceeded target levels for both total phosphorus and *E. coli* during both high and low flows. Average nitrate-nitrite levels were documented to be approaching target levels during high and low flow events. Average TSS also was found to be approaching target levels during high flows.

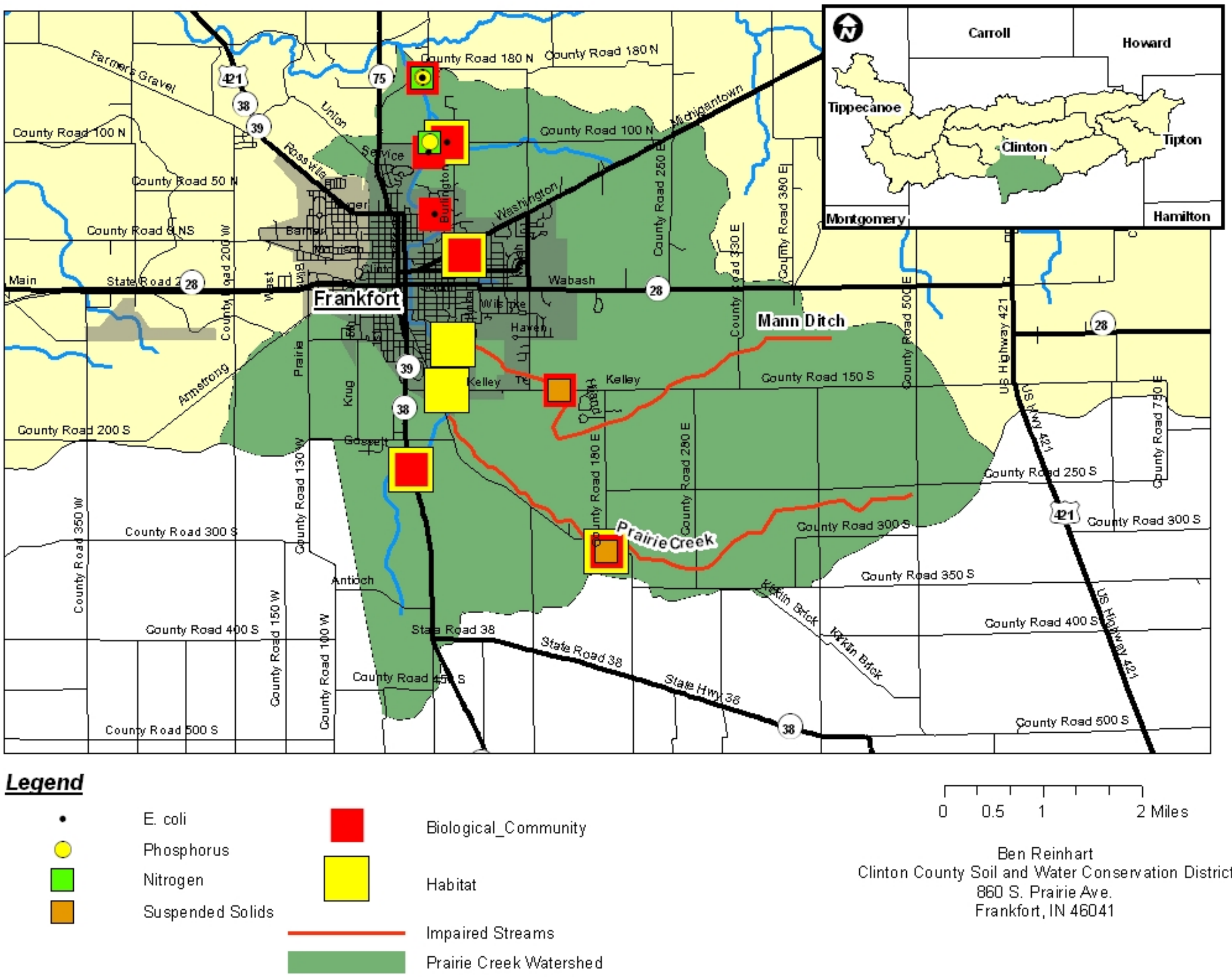


Figure 52. Prairie Creek Water Quality Impairments

4.6 Kilmore Creek (HUC: 051201070306)

Land Use Information

The Kilmore Creek subwatershed is located along the northern edge of the South Fork Wildcat Creek Watershed and drains approximately 17,410 acres of central Clinton County. The primary waterways include Kilmore Creek and Boyles Ditch making up around 21.5 miles of natural waterways (Figure 53). Almost 14.3 miles of waterways in the Kilmore Creek subwatershed are listed as impaired waterways including all of Boyles Ditch and downstream portions of Kilmore Creek. The headwater areas of Boyles Ditch are classified and managed as open drains.

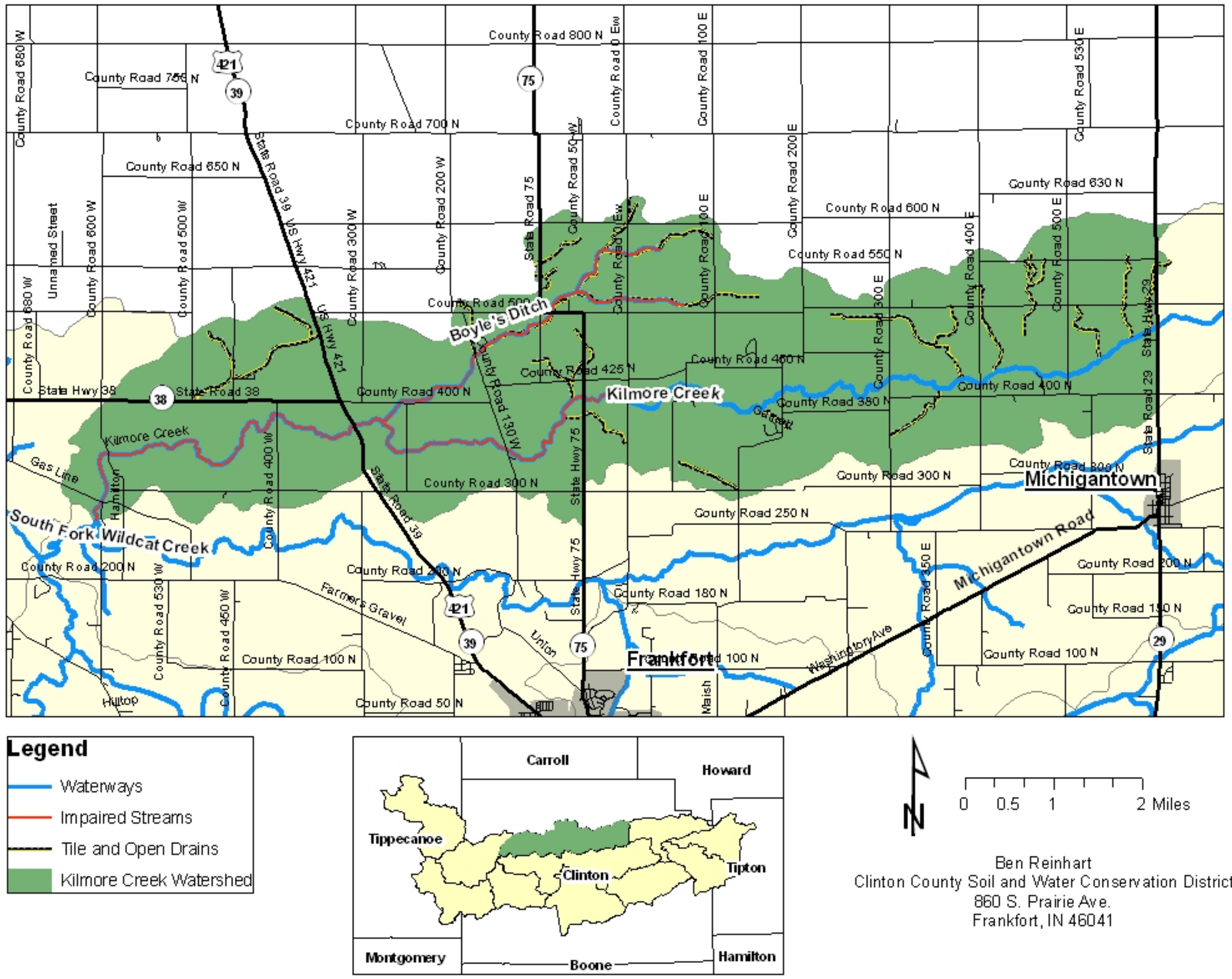


Figure 53. Kilmore Creek Waterways and Drainage

The Kilmore Creek subwatershed contains the third fewest number of lands (21%) with soil properties that are hydric in nature. However, the Kilmore Creek subwatershed maintains the highest occurrence of lands being classified as PHEL (56%). Approximately 6% of land area within this drainage area can be classified as HEL with the majority of this land being located along Kilmore Creek in lower portions of the watershed (Figure 54).

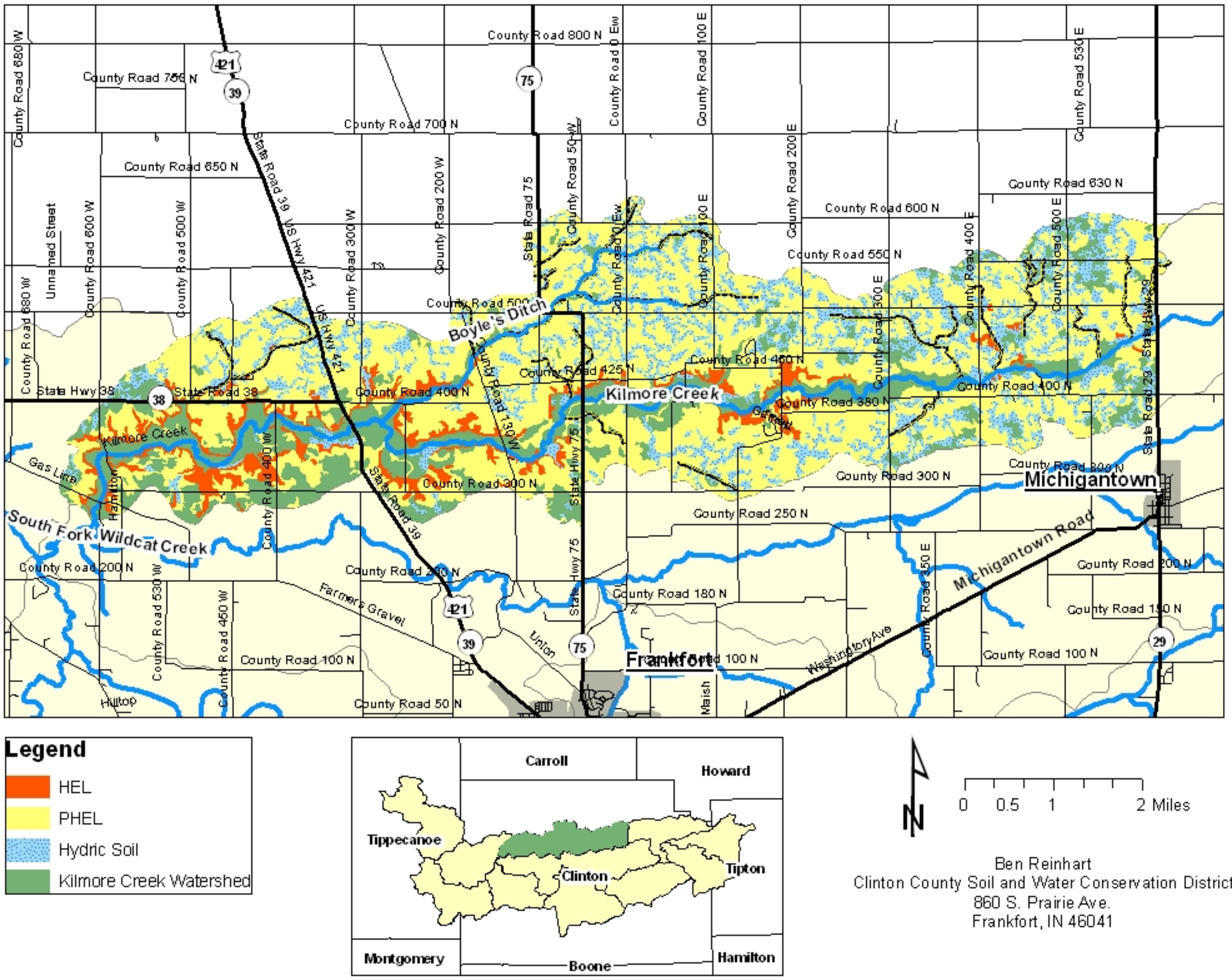


Figure 54. Kilmore Creek Soils

The Kilmore Creek Watershed contains very few developed areas. Deciduous woodlands and pasture areas are common along the Kilmore Creek, especially in downstream sections of the drainage area (Figure 55). The remaining, and dominating, land use across the Kilmore Creek Watershed is cultivated cropland.

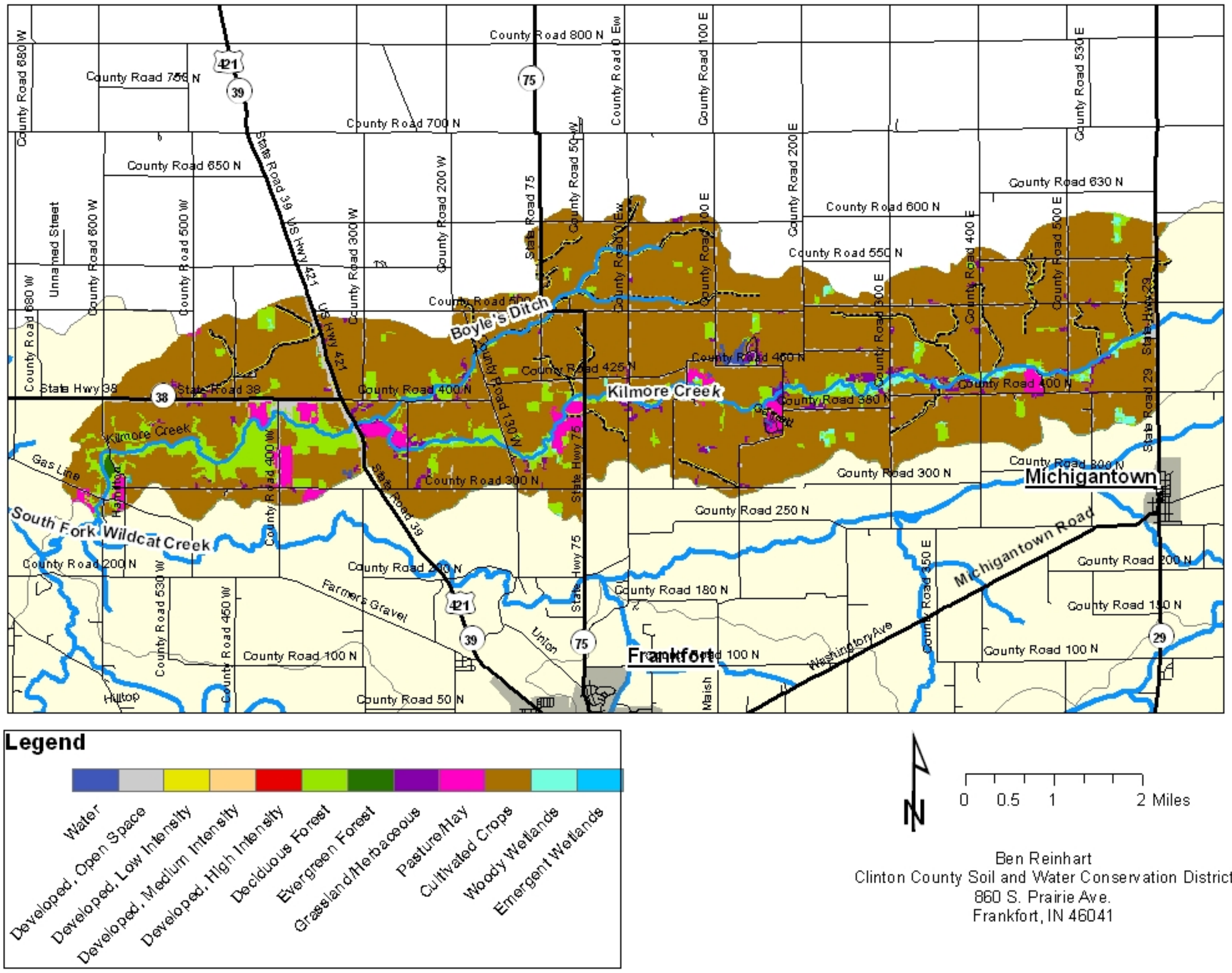


Figure 55. Kilmore Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

A total of 14 Confined feeding operations were located within the Kilmore Creek drainage area. Six CFOs are listed as Active, seven are voided, and one is marked as Expired. A number of other smaller, unregulated livestock or hobby farms were identified within the subwatershed during windshield inventories (Figure 56). Other issues noted during the volunteer windshield inventory included actively eroding sites, livestock access to waterways, and areas of trash dumping. Many of these were identified in upstream reaches of Kilmore Creek and Boyle’s Ditch. One unsewered community, Town of Kilmore, was also identified.

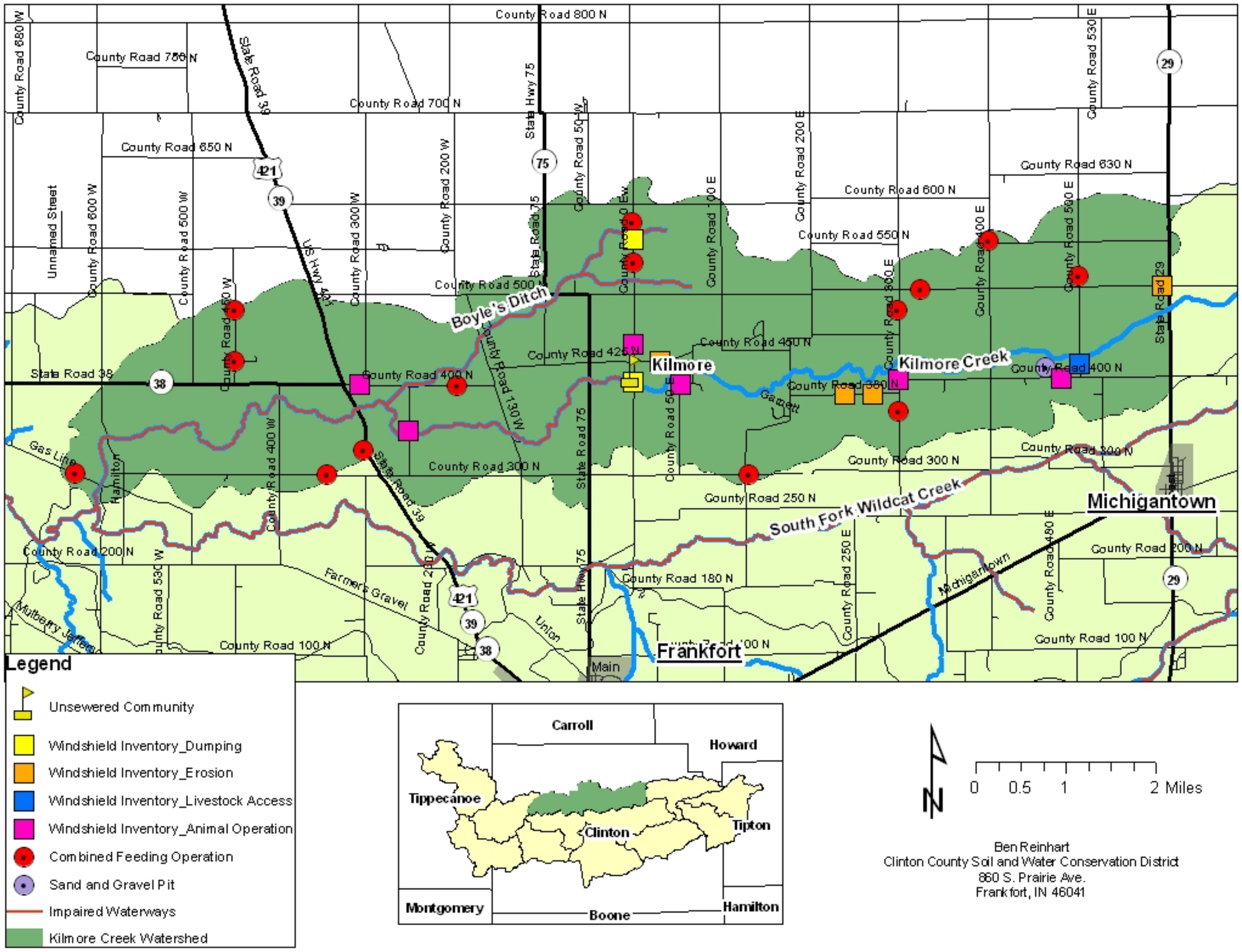


Figure 56. Kilmore Creek Source Investigation

Desktop Surveys

The Kilmore Creek subwatershed ranks third among all subwatersheds for the amount of natural land uses within the designated floodplain and riparian zones. However, the majority of these natural cover types are located along the main body of the Kilmore Creek. Upstream tributaries, such as Boyles Ditch, remain largely unbuffered (Figure 57).

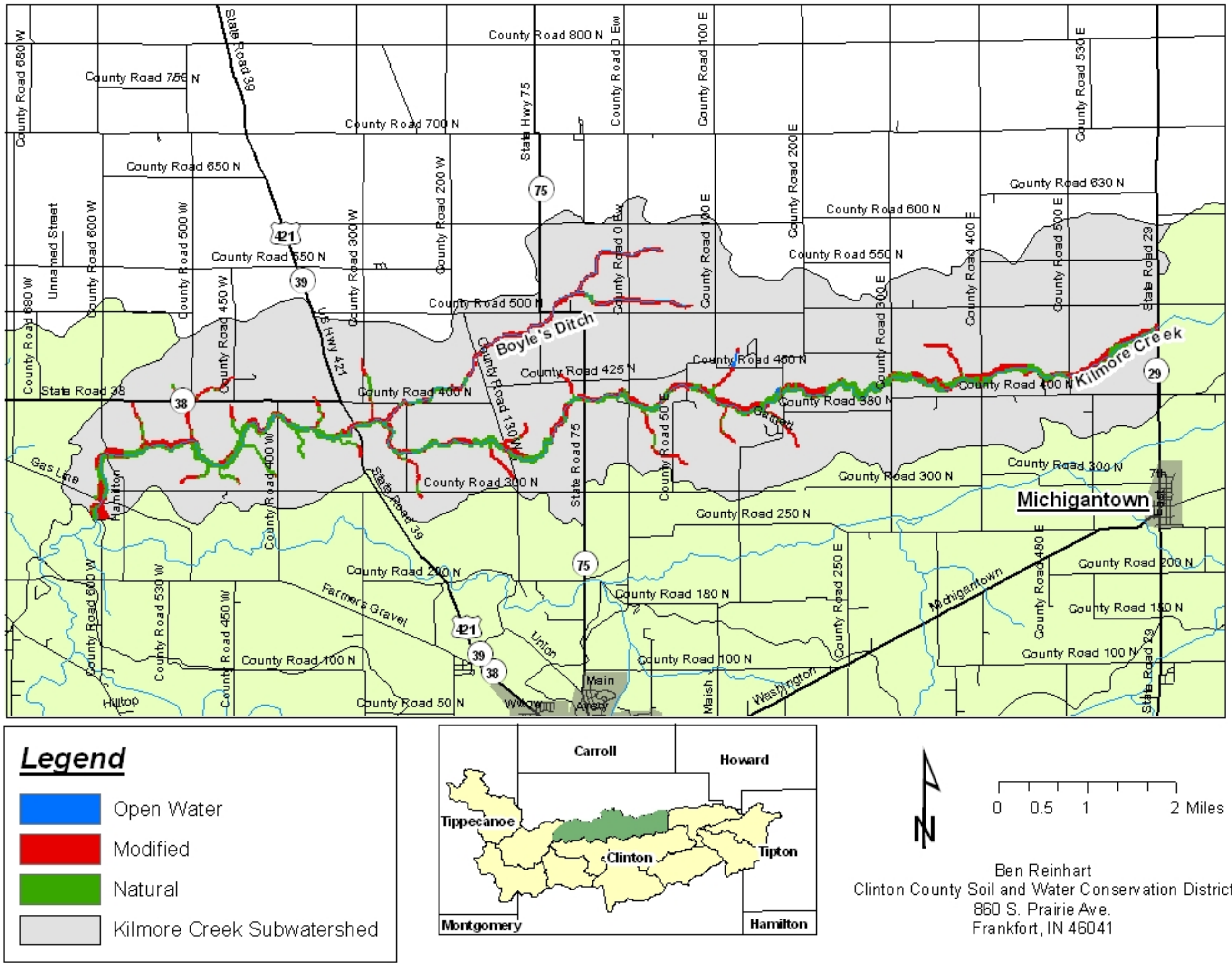


Figure 57. Kilmore Creek Riparian Lands Survey

The Kilmore Creek subwatershed ranks third highest among all subwatersheds for the percent land area having applied conservation practices and ranks highest in terms of the total number of individual practices applied. Almost 26% of the land area in this subwatershed has seen conservation practices applied compared to an average of 18.3% across the South Fork Wildcat Creek drainage. Practices seen within other subwatersheds such as Conservation Crop Rotation and residue and tillage management are common within the Kilmore Creek subwatershed. However, a large portion of the applied practices also focus on Pest and Nutrient Management Plans, waste management practices, and pasture and livestock management.

Water Quality Information

IDEM 305(b)/303(d)

Boyle's Ditch is listed as being impaired for recreational uses and as well having impaired biotic communities (Figure 58). Kilmore Creek is listed for impairments to recreational uses (i.e. high *E. coli* levels).

Hoosier Riverwatch

Three sampling sites were found in the Hoosier Riverwatch database for the Kilmore Creek subwatershed. Water Quality Index scores were consistently above 70 which indicates relatively good water quality. Pollution Tolerance Index scores varied widely from 2001-2006. However, average scores were around 19 which indicate a good biological community. Habitat evaluations were consistently high with an average CQHEI score of 84

Kilmore Creek-Boyle's Ditch Watershed Plan

Habitat along Kilmore Creek was classified as "good" habitat for aquatic organisms. However, scores began to decrease as sampling moved farther upstream Boyle's Ditch. Macroinvertebrate studies showed that pollution-intolerant caddisflies and mayflies were relatively diverse within Kilmore Creek relative to other local waterways. These studies showed lower scores within Boyle's Ditch but this is most likely due to the lack of adequate habitat.

Atrazine levels were highly variable across all sites and time of sampling. Boyle's Ditch showed wide variations in dissolved oxygen levels throughout the sampling periods, generally seeing low levels during late summer and fall. Overall, the water quality within Kilmore Creek was within accepted standards. Deviations of these standards almost always occurred within Boyle's Ditch and/or during high flow periods.

AIMS

One sampling location on Kilmore Creek at County Road 600 West recorded *E. coli* levels exceeding accepted standards in a series of 1998 sampling events. 2004 evaluations of habitat quality and fish communities sampled at eight sites within the Kilmore Creek subwatershed. Sites on Boyle's Ditch failed to meet accepted standards for habitat quality and biological (fish and macroinvertebrates) communities. The site on Kilmore Creek at CR400E failed to meet habitat quality standards but showed higher scores for fish communities, exceeding accepted standards. Higher scores for habitat quality and fish communities were recorded across remaining Kilmore Creek sampling locations.

South Fork TMDL

E. coli samples from two separate sites within the Kilmore Creek subwatershed were used. Based on available samples, load reductions required at these sites were 34% for the most upstream site and 45% downstream.

Nitrate-Nitrite samples were available at two separate sites within the Kilmore Creek subwatershed. Based on available samples, load reductions required were 17% in Boyle's Ditch and 23% in Kilmore Creek.

Measurements for total phosphorus were compiled from two separate sampling sites within the Kilmore Creek subwatershed. Based on these samples a 32% reduction was required in Boyle's Ditch while a 25% reduction was noted in Kilmore Creek.

Samples for total suspended solids were collected from two sites along Boyle's Ditch. These samples required reductions of 32% and 52%.

Two separate assessment locations were used within the Kilmore Creek subwatershed to estimate existing pollutant loads and calculate necessary reductions. Total phosphorus, nitrate-nitrite, and total suspended solids were calculated based on data from Boyle's Ditch. *E. coli* calculations were made based on data from Kilmore Creek upstream of its confluence with the South Fork Wildcat Creek. Much of the water quality impairments were believed to originate mostly from agricultural runoff, livestock access to waterways, and streambank erosion however IDEM recommended additional sampling to further address pollutant sources.

Current Data

Two sampling sites were located within the Kilmore Creek subwatershed; one upstream and downstream of Boyle's Ditch. Upstream of Boyle's Ditch, aquatic habitat surveys classified the area as "fair". This was mostly due to a lack of an adequate riparian buffer. Biological sampling of macroinvertebrates also indicated only a marginal biological community with scores barely achieving accepted standards. However, these results changed drastically downstream of Boyle's Ditch. Habitat scores at this site was the third highest within the entire study and macroinvertebrate scores were the highest score across the watershed with various stoneflies, mayflies, and caddisflies being relatively abundant. This is likely a function of both improved water quality and riparian habitat along the main stem of Kilmore Creek compared to the Boyle's Ditch tributary.

Both sampling locations exceeded *E. coli* levels during high and low flows. Also, both sites exceeded TSS levels during high flows. Average nutrient levels (i.e. phosphorus and nitrogen) met target levels but were documented as periodically exceeding those targets during high flow periods.

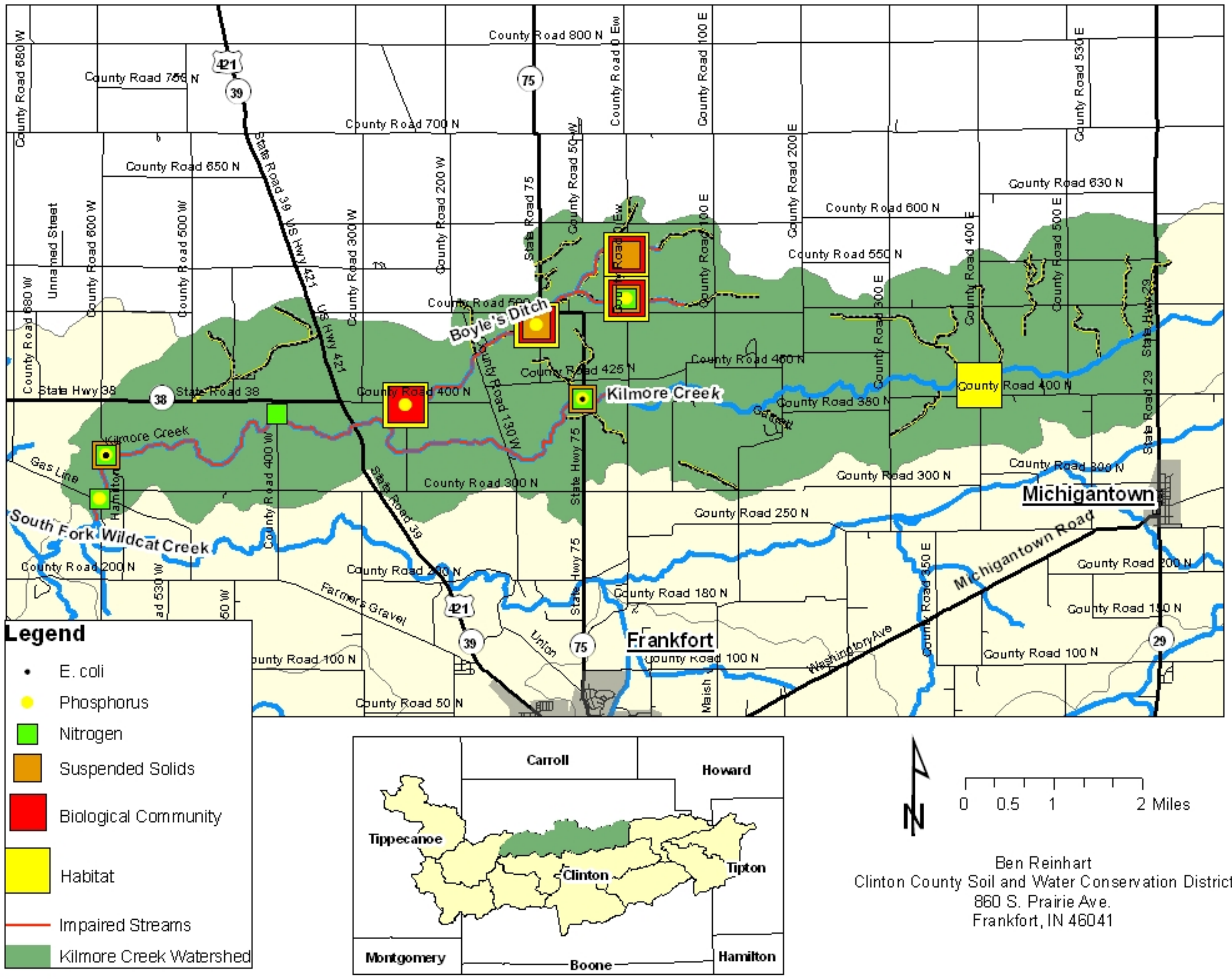


Figure 58. Kilmore Creek Water Quality Impairments

4.7 Spring Creek (HUC: 051201070307)

Land Use Information

The Spring Creek subwatershed is located directly west of the City of Frankfort, along the southern edge of the South Fork Wildcat Creek Watershed. This subwatershed drains approximately 10,210 acres in Clinton County. Primary waterways include Heavilon Ditch, Lick Run, and Spring Creek which ultimately empties into the South Fork Wildcat Creek just north of County Road 200 North (Figure 59). There are almost 14.5 miles of natural waterway within the Spring Creek subwatershed with only about three miles on Heavilon Ditch being listed as impaired. Portions of both Heavilon Ditch and Lick Run are classified as open drains, adding up to around 11.5 miles of maintained ditch.

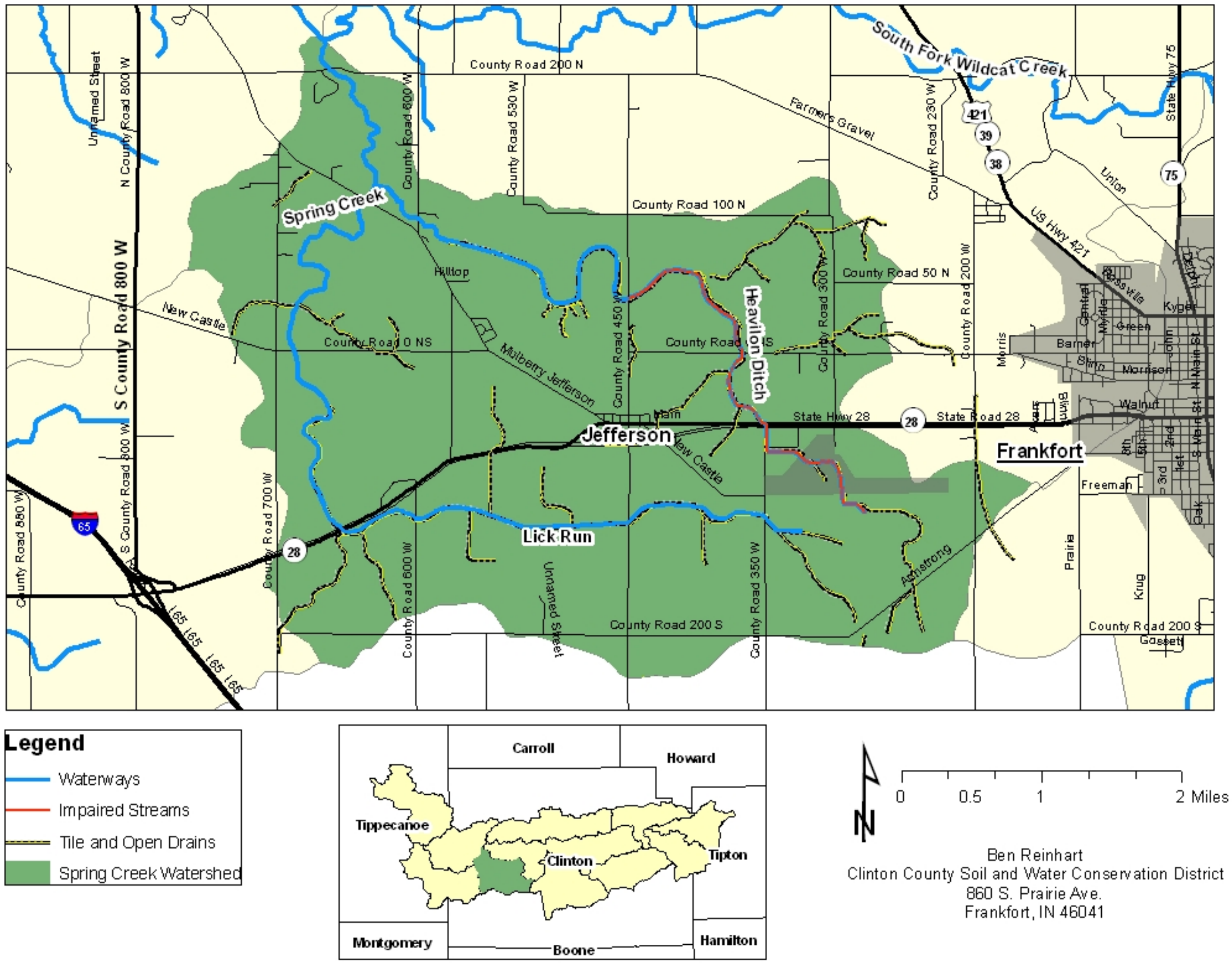


Figure 59. Spring Creek Waterways and Drainage

Roughly 39% of the lands within the Spring Creek subwatershed contain soils with hydric or somewhat hydric soil properties (Figure 60). Approximately 20% of the lands within the Spring Creek subwatershed can be classified as PHEL. Most of these lands occur along the primary waterways within the drainage area. Around 6% of the lands within the Spring Creek subwatershed can be classified as HEL with these areas occurring almost entirely in lower portions of the drainage area along Spring Creek.

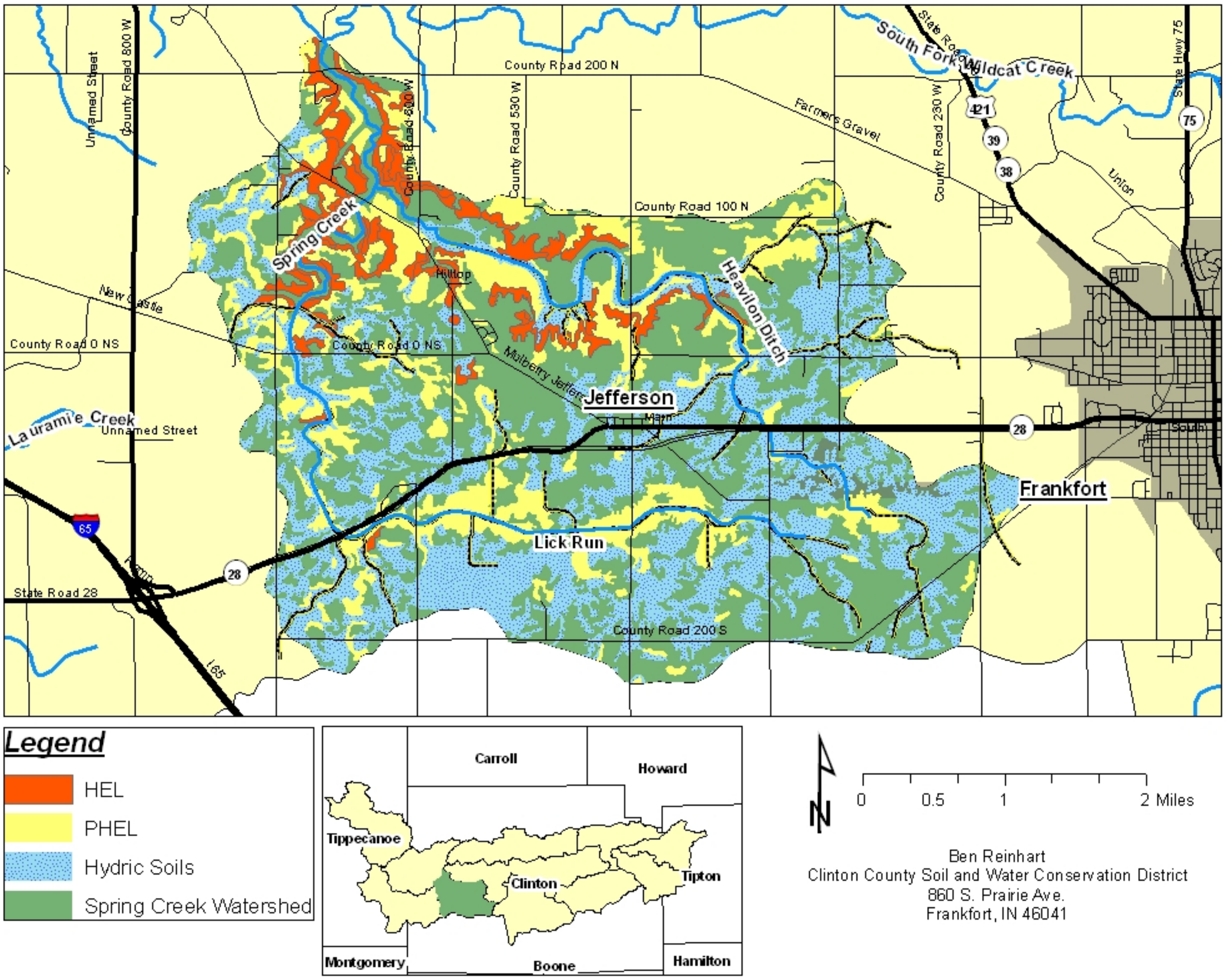


Figure 60. Spring Creek Soils

The dominating land use within the Spring Creek Watershed is cultivated cropland. However, this drainage area does see some developed areas represented by the Town of Jefferson, located on State Road 28 in the center part of the watershed, and sprawling development from the west side of Frankfort including various industries and the Frankfort Municipal Airport. Woodlands and pasture areas are common along waterways, especially in downstream portions of the Spring Creek Watershed (Figure 61).

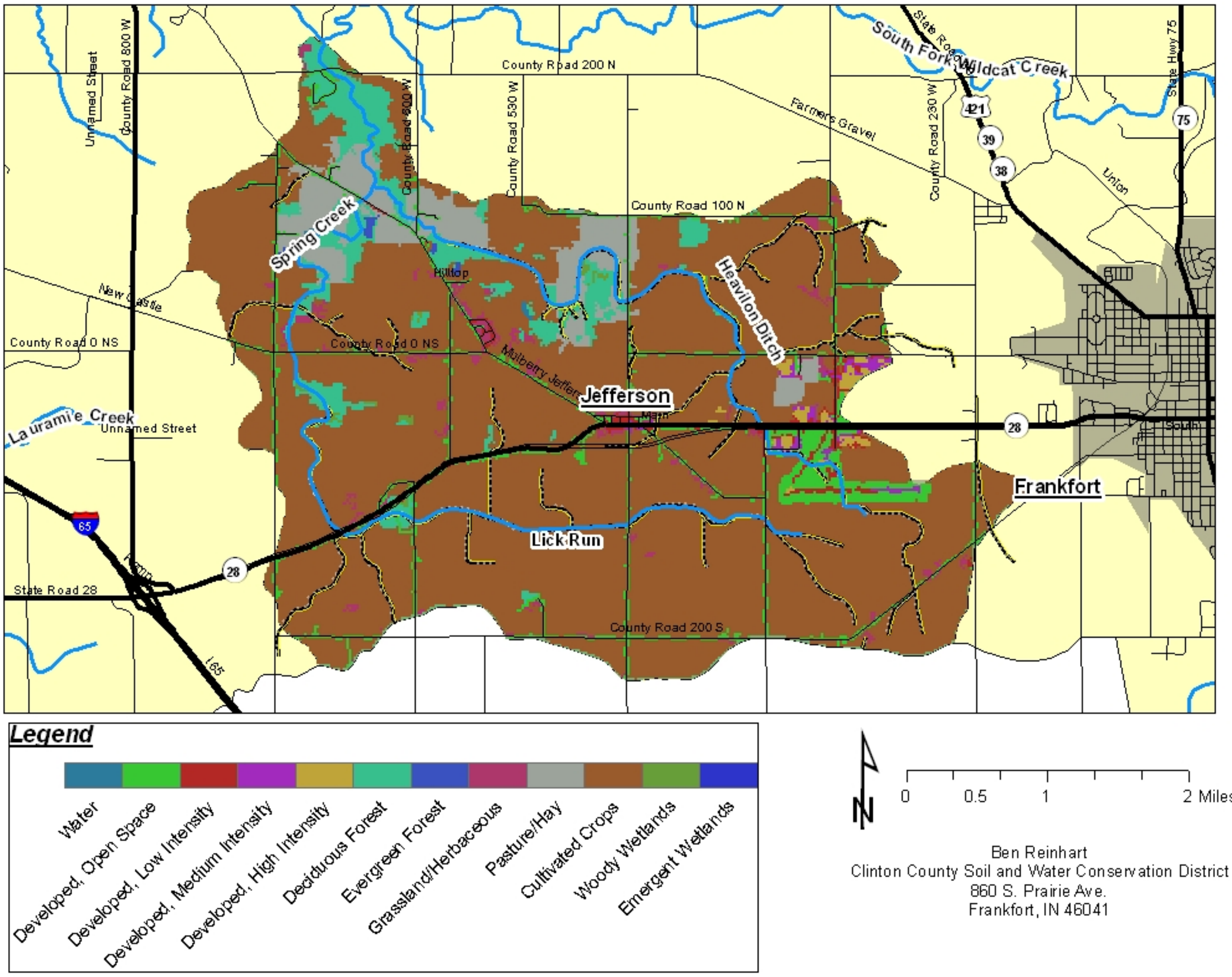


Figure 61. Spring Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

A total of three NPDES facilities permits and two pipe permits are located within the Spring Creek drainage area. One location, near the Frankfort Municipal Airport, is classified as a remediation site. C.F. Industries Inc., located in the western portion of the subwatershed, has recorded one effluent exceedance for oil and grease in January of 2009. Frito Lay has recorded three effluent exceedances for Total Suspended Solids with the most recent being in July of 2010. Of the two Confined feeding operations, only one is listed as Active. Six Underground Storage Tanks and six Leaking Underground Storage Tanks were identified in the subwatershed. During windshield inventories, volunteers noted a number of areas lacking adequate riparian vegetation, most notably in areas along Lick Run (Figure 62).

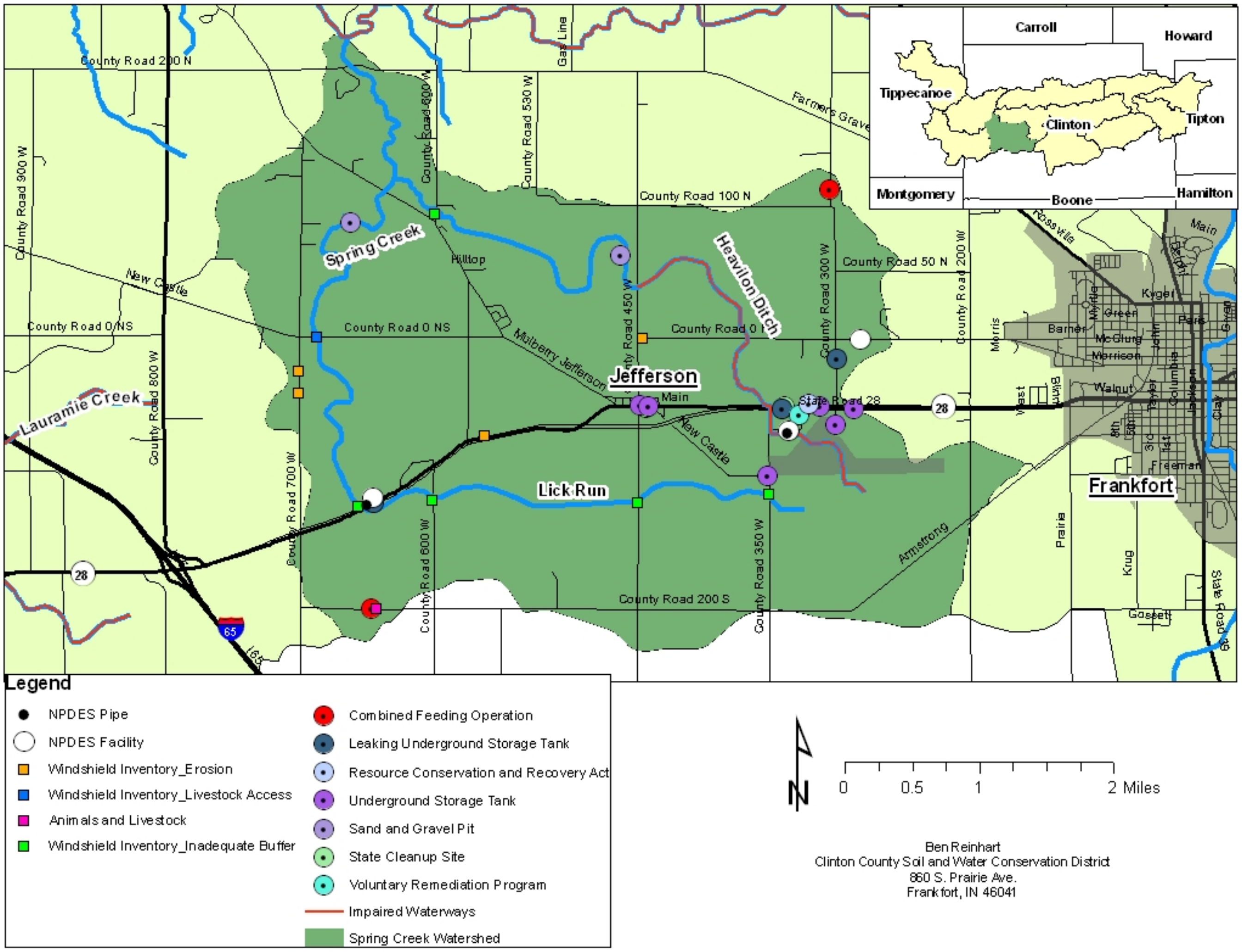


Figure 62. Spring Creek Source Investigation

Desktop Surveys

Around 74% of the land area within the designated floodplain and riparian zones consist of land cover types such as cultivated crops, livestock pasture, and/or developed areas. This makes up almost 11 miles of unbuffered waterways within the Spring Creek subwatershed. The majority of buffered waterways occur in the lower parts of the subwatershed along the main body of Spring Creek (Figure 63). A large part of this buffered area consists within Camp Cullom, a local nature park, which is located near the confluence of Spring Creek and the South Fork Wildcat Creek.

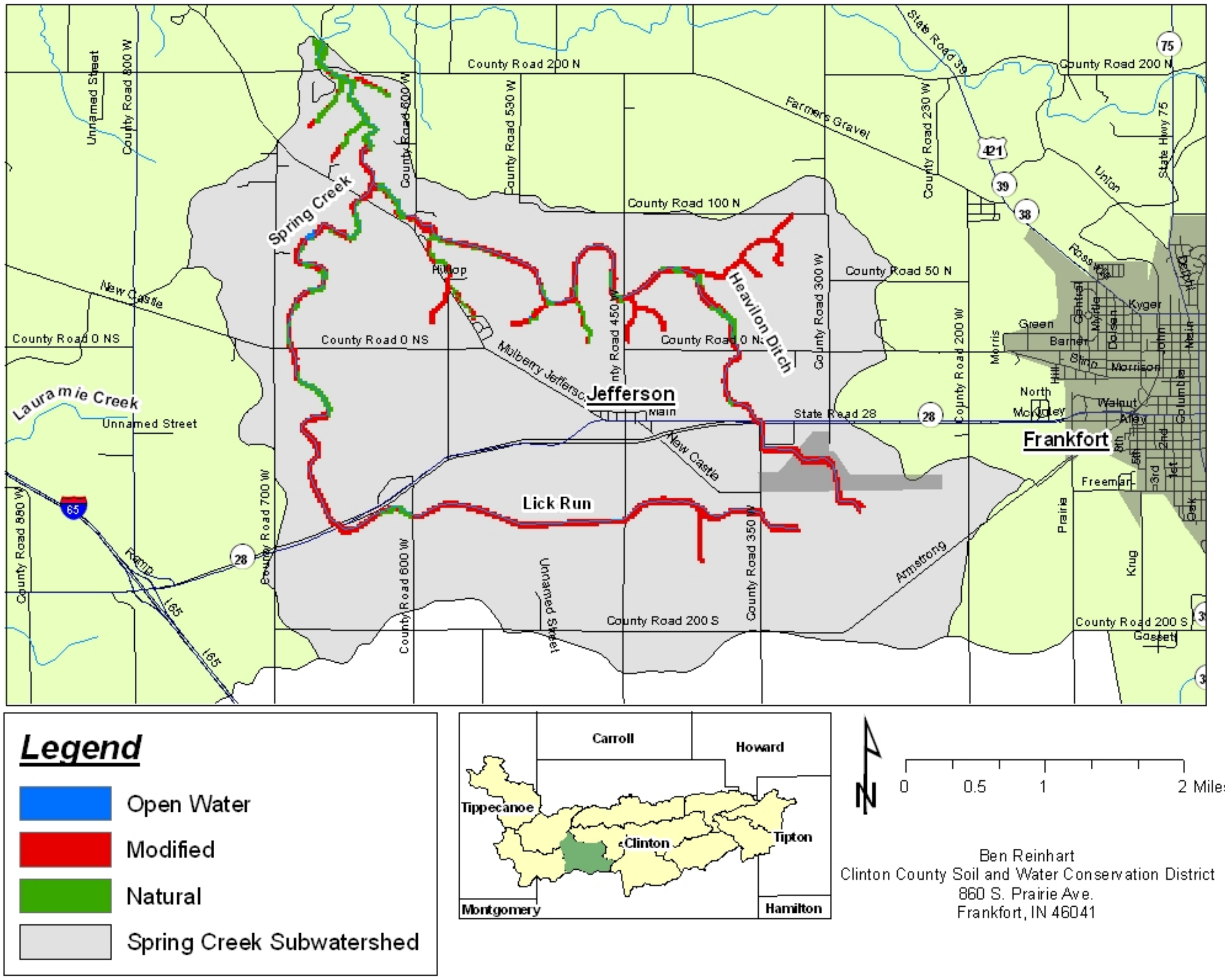


Figure 63. Spring Creek Riparian Lands Survey

The Spring Creek subwatershed ranks the highest of all subwatersheds in regards to the percent of land area having applied conservation practices. Just over 38% of the Spring Creek subwatershed has had conservation practices applied compared against an average of 18.3% across the South Fork Wildcat Creek drainage. The application of conservation practices has included primarily Conservation Crop Rotation, residue and tillage management, and a high occurrence of implemented Pest and Nutrient Management Plans.

Water Quality Information

IDEM 305(b)/303(d)

The headwaters of Heavilon Ditch are the only waterway within the Spring Creek subwatershed that is listed as part of the 2008 state 303(d) list (Figure 64). However, Heavilon Ditch is listed as having two impairments; one for impaired biotic communities and another for recreational uses. Spring Creek and Lick Run are mentioned in the 305(b) report as needing additional water quality data to adequately determine impairments but maintain fairly good water quality.

Hoosier Riverwatch

Two Hoosier Riverwatch sampling sites were located on Spring Creek with sampling being completed in 2001 and 2002. Sampling in 2001, completed during August at only one site, indicated average chemical and biological data with Water Quality Index scores at almost 68 and Pollution Tolerance Index of 13. Sampling in 2002 occurred at two sites in June. Water Quality Index scores at both sites were good to excellent with scores of 85 and 90. Biological and habitat data however varied between the two sites considerably with one site showing below average Pollution Tolerance Index and CQHEI scores while the other site showed above average scores.

SCLR Watershed Plan

Sampling done by IDEM in 1998 showed three sites as having *E. coli* levels higher than state standards. These sites included Heavilon Ditch, Lick Run, and Spring Creek. The highest *E. coli* levels were seen in Heavilon Ditch near the Town of Jefferson. At this same site, low dissolved oxygen levels were noted. However, since then Jefferson has been brought online with the City of Frankfort sewer and water systems.

AIMS

Six locations were sampled within the Spring Creek-Lick Run subwatershed for *E. coli* as part of a 1998 TMDL study. Sites on Heavilon Ditch, Lick Run, and Spring Creek showed *E. coli* levels exceeding accepted standards. The sampling location on Heavilon Ditch at County Road 0 showed the highest levels with a reading of 610 CFU/100mL. Two sites on Lick Run failed to meet accepted habitat quality standards during a 2004 sampling effort. Remaining sites on Spring Creek and Heavilon Ditch met habitat quality standards with the highest scores being recorded on Spring Creek at County Road 200 North in 1991 and again in 2004. Sites on Spring Creek, Heavilon Ditch, and Lick Run all met accepted standards for fish communities, again with the highest scores being recorded on Spring Creek at County Road 200 North. Three sites showed elevated levels of nitrate-nitrite above accepted standards during a 2003 sampling event. Two of these locations were on Lick Run at State Road 28 and Mulberry-Jefferson Road. Another site was located on Heavilon Ditch at County Road 350 West. Another location on Heavilon Ditch at County Road 0 showed levels approaching but not exceeding accepted standards. This site at Heavilon Ditch also showed somewhat elevated ammonia levels in 1998 and 2003.

South Fork TMDL

Sampling sites on Heavilon Ditch were used for *E. coli* load calculations, estimates for nitrate-nitrate loads, as well as total phosphorus. For *E. coli* Heavilon Ditch showed required reductions of 80% while for nitrate-nitrite reductions of 9% were seen. Necessary reductions for total phosphorus were 46%.

One assessment location was located on Heavilon Ditch. The Frito Lay Inc. discharge did not appear to contribute towards *E. coli*, nitrate-nitrite, or total phosphorus levels. Another important consideration is that part of the City of Frankfort's MS4 area drains to Heavilon Ditch.

Current Data

The Spring Creek subwatershed had one sampling location included as part of the South Fork Wildcat Creek Assessment. Evaluations of habitat at this location showed relatively high scores when compared to other locations across the watershed. Biological sampling of macroinvertebrate communities also followed this trend with pollution-intolerant species being relatively abundant.

The sampling location near CR 200N exceeded target levels for *E. coli* during both high and low flow periods. Average total phosphorus, nitrate-nitrite, and TSS levels met target levels during high and low flows. Only one exceedance for total phosphorus and TSS was documented at CR 200N during the 2010-2011 sampling period and this occurred during a high-flow period.

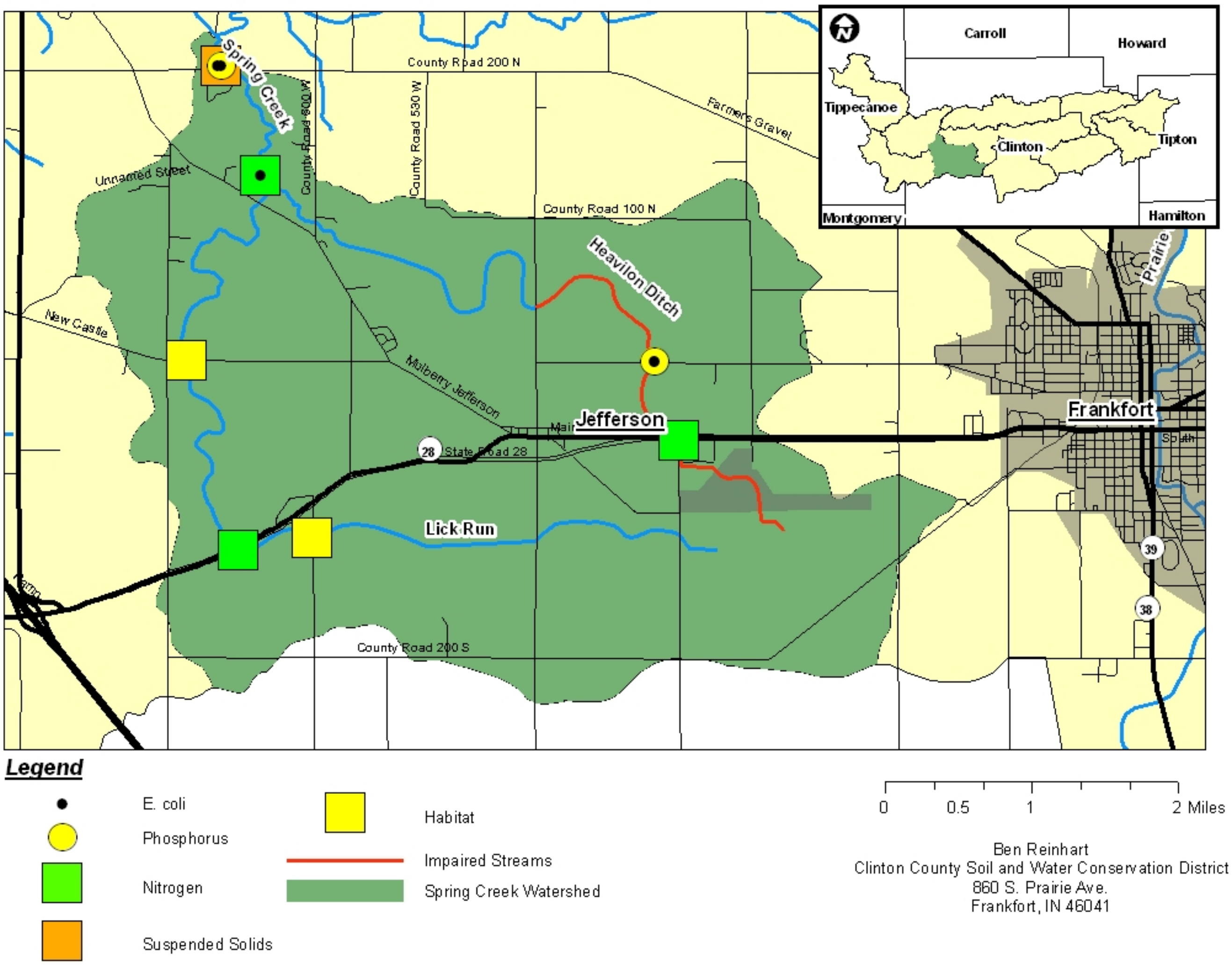


Figure 64. Spring Creek Water Quality Impairments

4.8 Jenkins Ditch – South Fork Wildcat Creek (HUC: 051201070308)

Land Use Information

The Jenkins Ditch-South Fork Wildcat Creek subwatershed runs east to west through the center of the South Fork Wildcat Creek Watershed. This subwatershed drains almost 22,800 acres making it the largest subwatershed within the South Fork Wildcat Creek drainage. Over 26.5 miles of waterways run through the Jenkins Ditch-South Fork Wildcat Creek subwatershed being primarily made up of the South Fork Wildcat Creek and Jenkins Ditch (Figure 65). Of these 26.5 miles, 23.5 of them are listed as impaired waterways including virtually all stretches of Jenkins Ditch and the South Fork Wildcat Creek within the subwatershed boundary. The entire length of Jenkins Ditch is classified as an open drain by the Clinton County Surveyor.

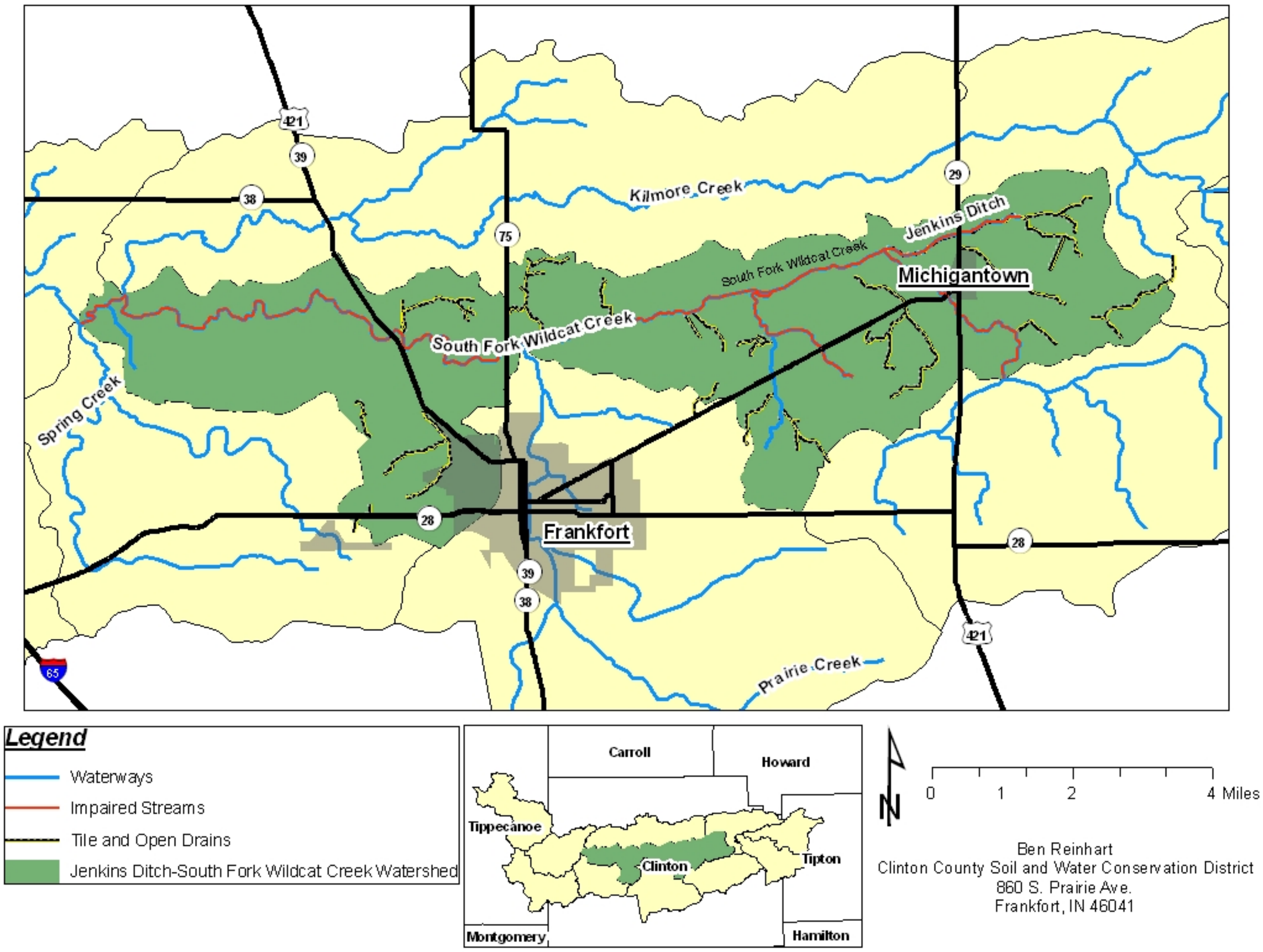


Figure 65. Jenkins Ditch-South Fork Wildcat Creek Waterways and Drainage

The Jenkins Ditch-South Fork Wildcat Creek subwatershed contains approximately 26% and 43% of lands that can be classified either as containing soils with hydric properties and/or PHEL, respectively. However, the majority of these lands occur in upper portions of the watershed (Figure 66). One exception to this is the area around Blinn Ditch which contains a concentration of lands that can be classified as having soils with hydric or somewhat hydric properties. Just over 5% of the land within this drainage area can be classified as HEL with most of these areas occurring in lower portions of the subwatershed along the South Fork Wildcat Creek.

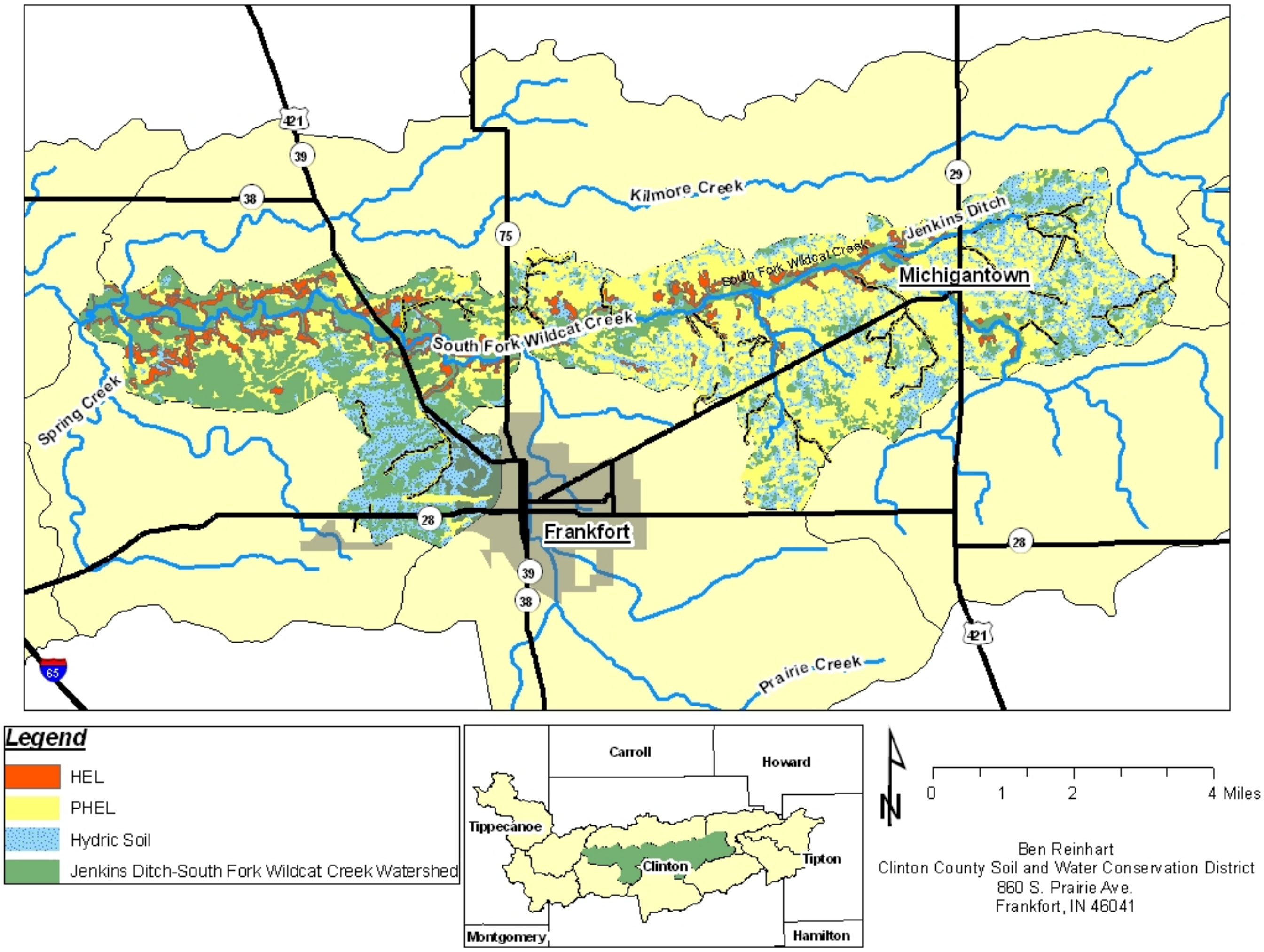


Figure 66. Jenkins Ditch-South Fork Wildcat Creek Soils

The Jenkins Ditch-South Fork Wildcat Creek Watershed is a diverse drainage area. Upstream of where Prairie Creek empties into the South Fork Wildcat Creek, the watershed contains little development outside of Michigantown and is heavily dominated by cultivated crops. Some wooded areas can be found scattered around with the majority of them being located alongside the South Fork Wildcat Creek (Figure 67). Downstream of the Prairie Creek and South Fork Wildcat Creek confluence you begin to see changes in land use. More development and industry can be seen on the west side of Frankfort and in proximity to Blinn Ditch. You also begin to see much more wooded lands and pasture adjacent to the South Fork Wildcat Creek.

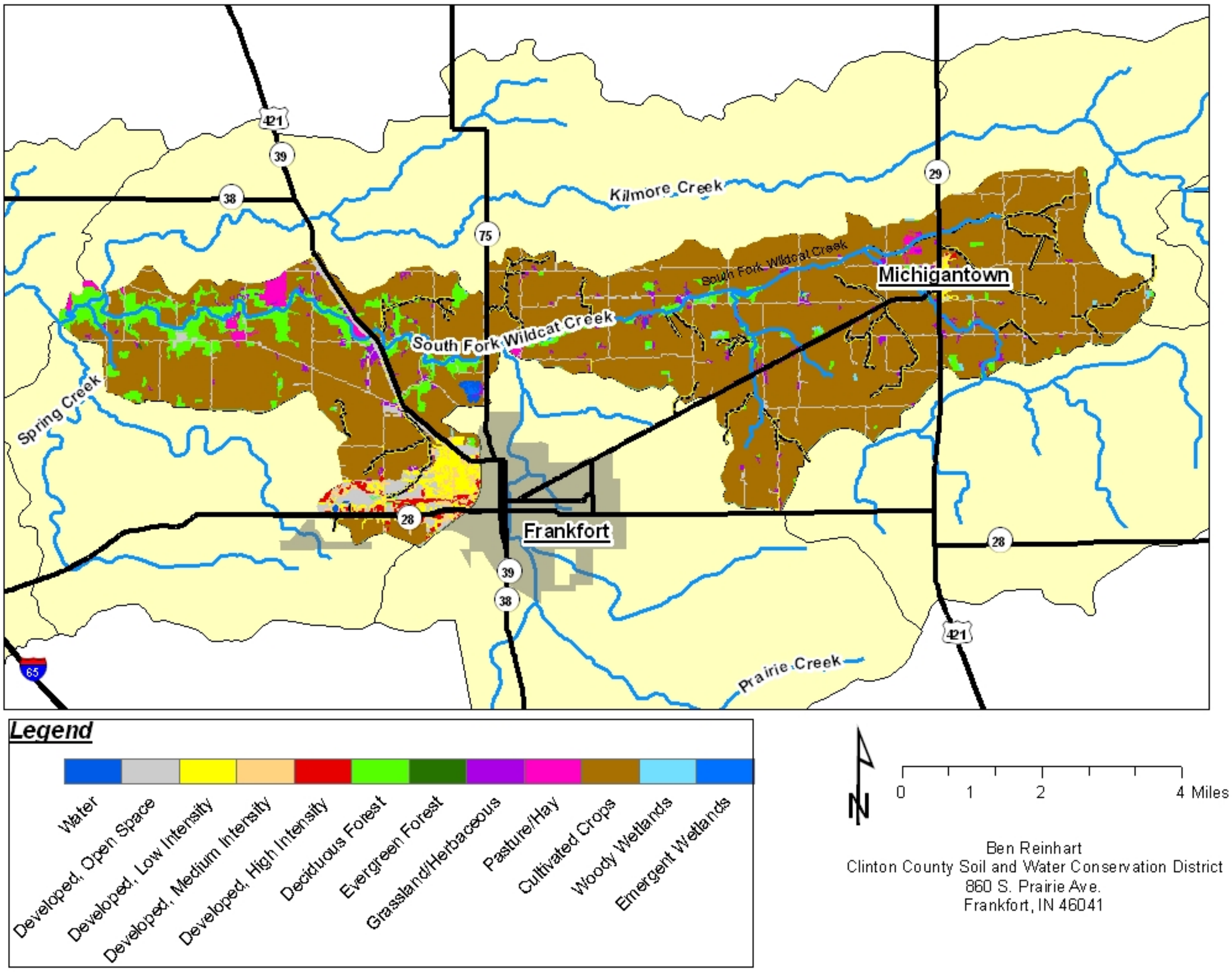


Figure 67. Jenkins Ditch-South Fork Wildcat Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

The Michigantown WWTP is the lone NDPES facility permit within the Jenkins Ditch subwatershed. There is also an NPDES pipe permit located in the western portion of the drainage area which is associated with the Frito Lay facility. The Michigantown WWTP has recorded four effluent exceedances with the most recent being for Ammonia in March of 2011. Currently, this site has been issued an official Notice of Noncompliance. A total of 11 Confined feeding operations were identified within the drainage area with six of these being listed as Active. Fourteen Underground Storage Tanks and 20 Leaking Underground Storage Tanks were located, primarily around the western side of Frankfort and Michigantown. Four Abandoned Landfills where identified with all of these occurring west of State Road 75. Volunteers completing the windshield inventory identified a number of areas of active erosion, small livestock and animal operations, and locations were livestock had free access to local public waters (Figure 68). The majority of these were located in the eastern, upstream portion of the Jenkins Ditch subwatershed.

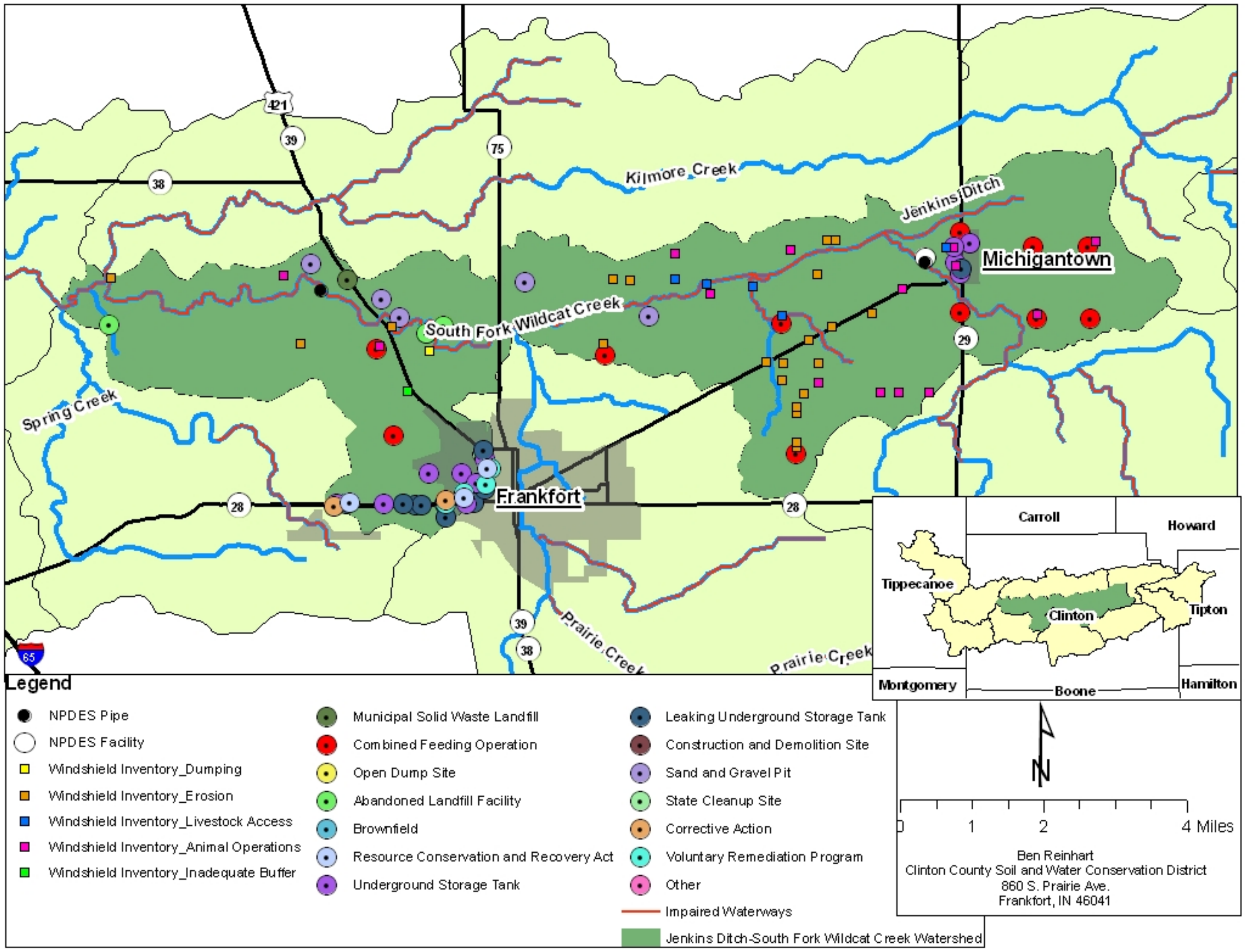


Figure 68. Jenkins Ditch-South Fork Wildcat Creek Source Investigation

Desktop Surveys

Around 44% of lands within the designated floodplains and riparian zone consist of land cover types compatible with use as buffer areas (e.g. wooded lands, grasslands, wetlands, etc.). This ranks as the fourth highest amount of all drainage areas of the South Fork Wildcat Creek Watershed. Areas of buffered waterways are much more common in lower portions of this subwatershed than more upstream locations such as waterways near Michigantown (Figure 69).

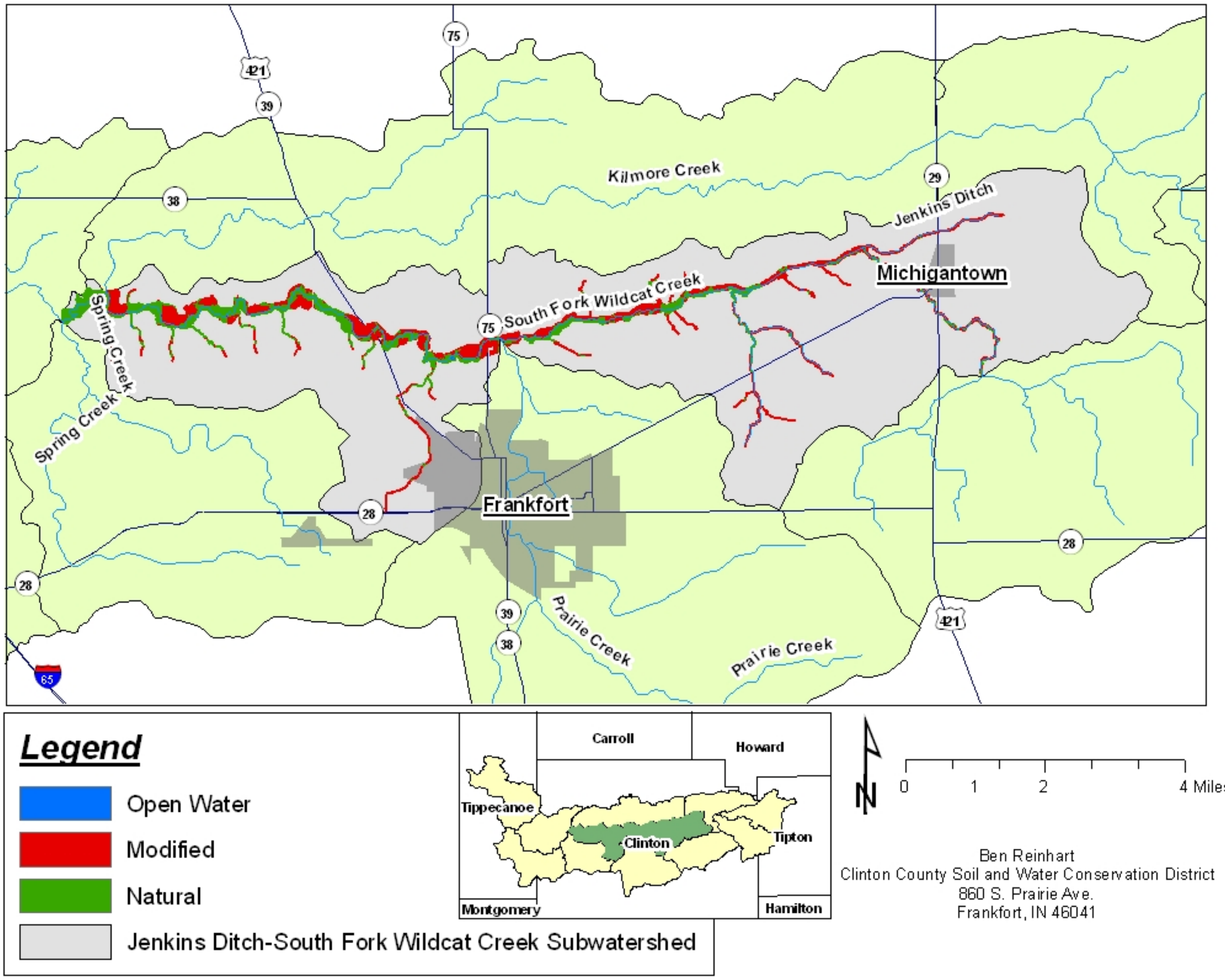


Figure 69. Jenkins Ditch-South Fork Wildcat Creek Riparian Lands Survey

The Jenkins Ditch-South Fork Wildcat Creek subwatershed falls slightly above average in regards to the percent of land area having applied conservation practices. Just over 20% of the subwatershed has seen implemented conservation practices compared to an average of 18.3% across the South Fork Wildcat Creek drainage. However, there has been almost double the number of individual practices applied within the Jenkins Ditch-South Fork Wildcat Creek subwatershed when compared against the average across all subwatersheds within the South Fork Wildcat Creek drainage. The majority of these applied practices are similar to other subwatersheds with Conservation Crop Rotation, residue and tillage management, and Pest and Nutrient Management Plans being implemented. However, waste management practices, filter and buffer strips, and habitat management practices are also documented.

Water Quality Information

IDEM 305(b)/303(d)

The Jenkins Ditch-South Fork Wildcat Creek subwatershed contains a number of impaired waterways (Figure 70). The main channel of the South Fork Wildcat Creek contains impairments to recreational uses and well as the presence of mercury and/or PCBs in fish tissues. Waterways further upstream such as Jenkins Ditch contain impaired biotic communities.

South Fork Wildcat-Blinn Ditch Watershed Plan

Aquatic habitat was rated as "good" within the South Fork Wildcat Creek sites but began to decrease as sampling moved upstream into Blinn Ditch. However, habitat within Blinn Ditch was still classified as "fair". Macroinvertebrate studies showed a higher abundance of sediment-tolerant and algae-consuming organisms compared to more pollution-intolerant species such as caddisflies and mayflies. Within Blinn Ditch, scores were low given the available habitat and no glaring water quality impairments.

Atrazine levels were highly variable across all sites and time of sampling. There were a number of total phosphorus measurements seen exceeding accepted standards along the South Fork Wildcat Creek throughout the sampling period and across sites. Despite this, no phosphorus measurements exceeding standards were recorded on Blinn Ditch. Measurements for total suspended solids and nitrate-nitrite exceeding accepted standards were recorded during high flow events but were generally not seen as a significant problem during base flow.

AIMS

A number of sites between 1991 and 1998 were sampled within the Jenkins Ditch-South Fork Wildcat Creek subwatershed for *E. coli*. A total of 23 water quality samples across seven sampling locations were recorded showing exceedances of accepted *E. coli* standards. The highest *E. coli* levels were recorded at areas on the South Fork Wildcat Creek at County Road 200 North and 600 West. Evaluations of habitat quality and fish communities were completed at 15 sites with most sampling efforts being completed in 2004. Sites on Jenkins Ditch and a tributary of South Fork Wildcat Creek at County Road 250 North failed to meet accepted standards for habitat quality and fish communities. Locations with the highest quality habitats included sites on the South Fork Wildcat Creek at County Road 200 North, 300 West and 580 West as well as a smaller tributary at County Road 600 West. Locations with the highest quality fish communities also matched these sites. Sampling efforts on the South Fork Wildcat Creek at County Road 200 North consistently showed elevated nitrate-nitrite levels from 1991 to 2007 as well as higher ammonia levels compared to other local stretches. A sampling location on the South Fork Wildcat Creek at County Road 500 West showed similar trends to a lesser extent.

South Fork TMDL

Two sampling sites were located within the Jenkins Ditch-South Fork Wildcat Creek subwatershed to contribute to *E. coli* load estimates. Reductions were estimated at 65% downstream of Prairie Creek and 62% upstream of Prairie Creek. The sampling site upstream of Prairie Creek was also used for load estimates of total suspended solids. Based on that sample a reduction of 57% was required.

One sampling location, near the confluence of Kilmore and South Fork Wildcat Creeks, was used for total phosphorus estimates. Based on these samples reductions of 69% are necessary.

Two assessment locations were located within the subwatershed boundaries. *E. coli* loads and reductions were calculated at sampling locations below and above the Prairie Creek confluence. The remaining parameters were calculated only at a site above the Prairie Creek confluence. It was noted that the Frankfort WWTP and CSO could be contributing to high *E. coli* loads. Unfortunately, no water quality data was available to estimate *E. coli* loads for the Frankfort CSO. The Michigantown WWTP has historically discharged effluent that has consistently exceeded their allowable *E. coli* tolerances. Also, at the time of this study, the Michigantown WWTP had no permit levels for nitrate-nitrite or phosphorus so estimates on actual pollutant loads in effluent was not available. Part of the Frankfort MS4 (~6.5% of drainage area at this point) also may be impacting water quality downstream of the Prairie Creek confluence.

Frankfort Area Source Identification Study

Frito Lay Inc. which was suspected of being a potential source of elevated phosphorus levels showed effluent below the 0.3mg/L target which may be in part due to recent upgrades for their treatment facilities.

Another suspected source of pollutants was the large junkyard located at the confluence of Prairie Creek and South Fork Wildcat Creek. There were many compounds detected both upstream and downstream of the junkyard but few were actually above detectable limits. No significant link could be established between any toxic organic compounds or metal compounds and the large junkyard.

Current Data

Four total locations for the South Fork Wildcat Creek Assessment were within the Jenkins Ditch-South Fork Wildcat Creek subwatershed. One of these sites, located on Blinn Ditch, was sampled only for aquatic habitat and biological communities and served as a replacement location for Site 3 (Stump Ditch) where biological sampling was not completed due to lack of flow. The site farthest upstream, near Michigantown, showed scores for habitat quality and biological community only slightly above accepted standards. Site 13 was located just upstream of the Prairie Creek and South Fork Wildcat Creek confluence. This site showed an improvement of habitat quality but lower quality biological community which can indicate problems with low water quality. Site 14 farther downstream showed a relatively drastic increase in habitat scores while only a marginal increase in biological index scores. The replacement site on Blinn Ditch did not achieve standards for habitat quality. Macroinvertebrate communities at Blinn Ditch scored just above accepted biological standards.

All three sampling locations on the South Fork Wildcat Creek exceeded *E. coli* and TSS target levels during high flows. Site 14 also exceeded *E. coli* loads during low flow periods. Average nitrate-nitrite levels were seen approaching, periodically exceeding, target levels during high flows at all three locations. Average high flow concentrations of total phosphorus exceeded target levels at Site 13 and 14.

At the request of the Steering Committee, three additional sampling events took place on the South Fork Wildcat Creek downstream of an old landfill site, north of Frankfort. This site was previously noted during watershed inventories as a source of trash and debris being exposed through bank erosion. The committee also wanted to document if any nutrient or chemical leaching was occurring from past land filled materials. Average concentrations for TSS and nitrate-nitrite exceeded target levels. Also, total phosphorus samples were seen approaching target water quality standards during both high and low flow periods. However, while still an eyesore, nutrient and sediment levels during sampling dates were similar to upstream locations and impairments are likely inherited from upstream sources rather than entirely driven by the landfill site.

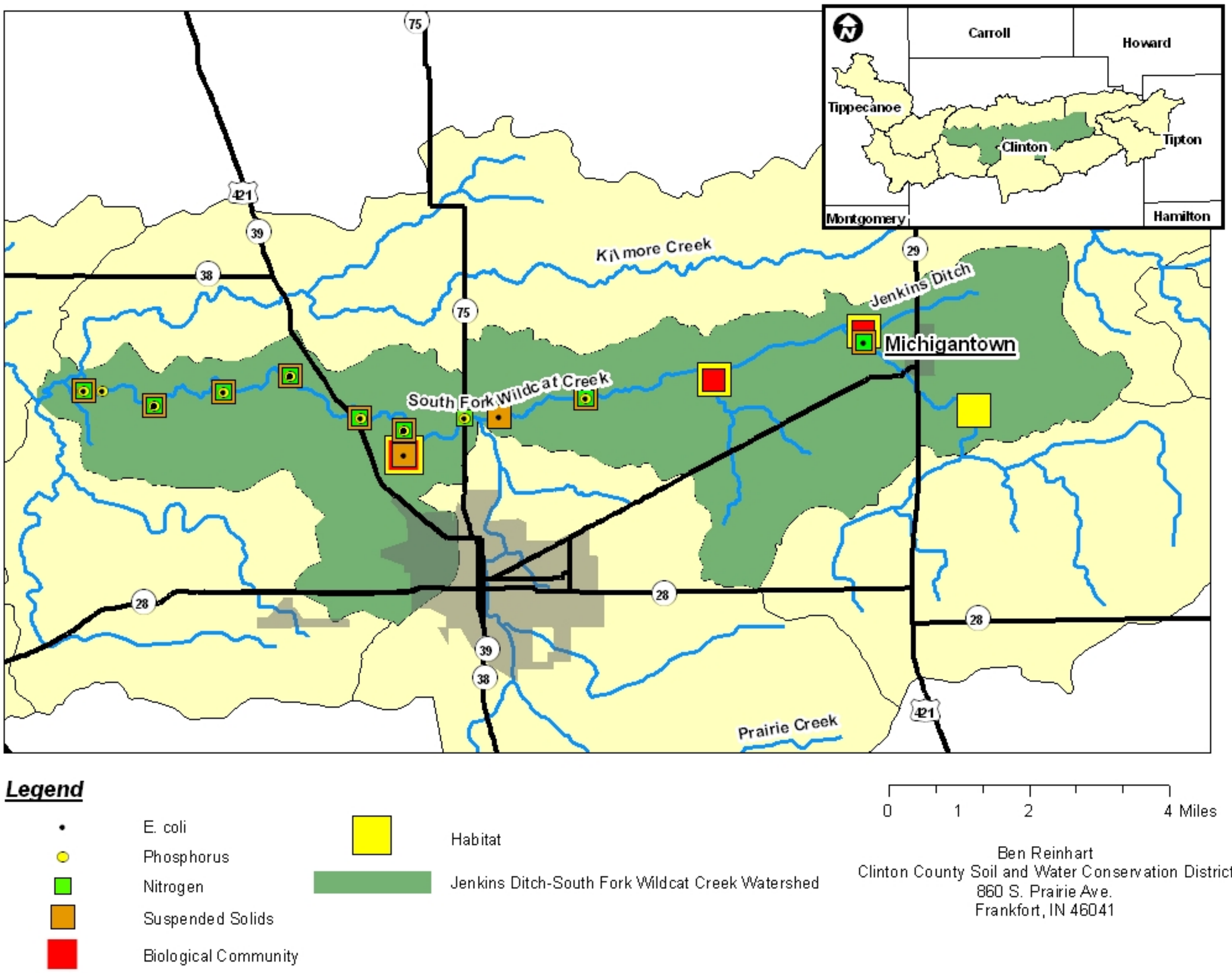


Figure 70. Jenkins Ditch-South Fork Wildcat Creek Water Quality Impairments

4.9 Lauramie Creek (HUC: 051201070309)

Land Use Information

The Lauramie Creek subwatershed lies in the southwest corner of the South Fork Wildcat Creek Watershed and drains almost 15,100 acres of west-central Clinton and southeastern Tippecanoe County. Within this area, approximately 18 miles of waterways, including Hentz Ditch, McClellan Fickle Ditch, Anderson Ditch, and Lauramie Creek, drain towards Lauramie Creek's confluence with the South Fork Wildcat Creek (Figure 71). Virtually all of these waterways have been declared as having impaired water quality. The majority of the tributaries and headwater areas of Lauramie Creek are classified as open drains.

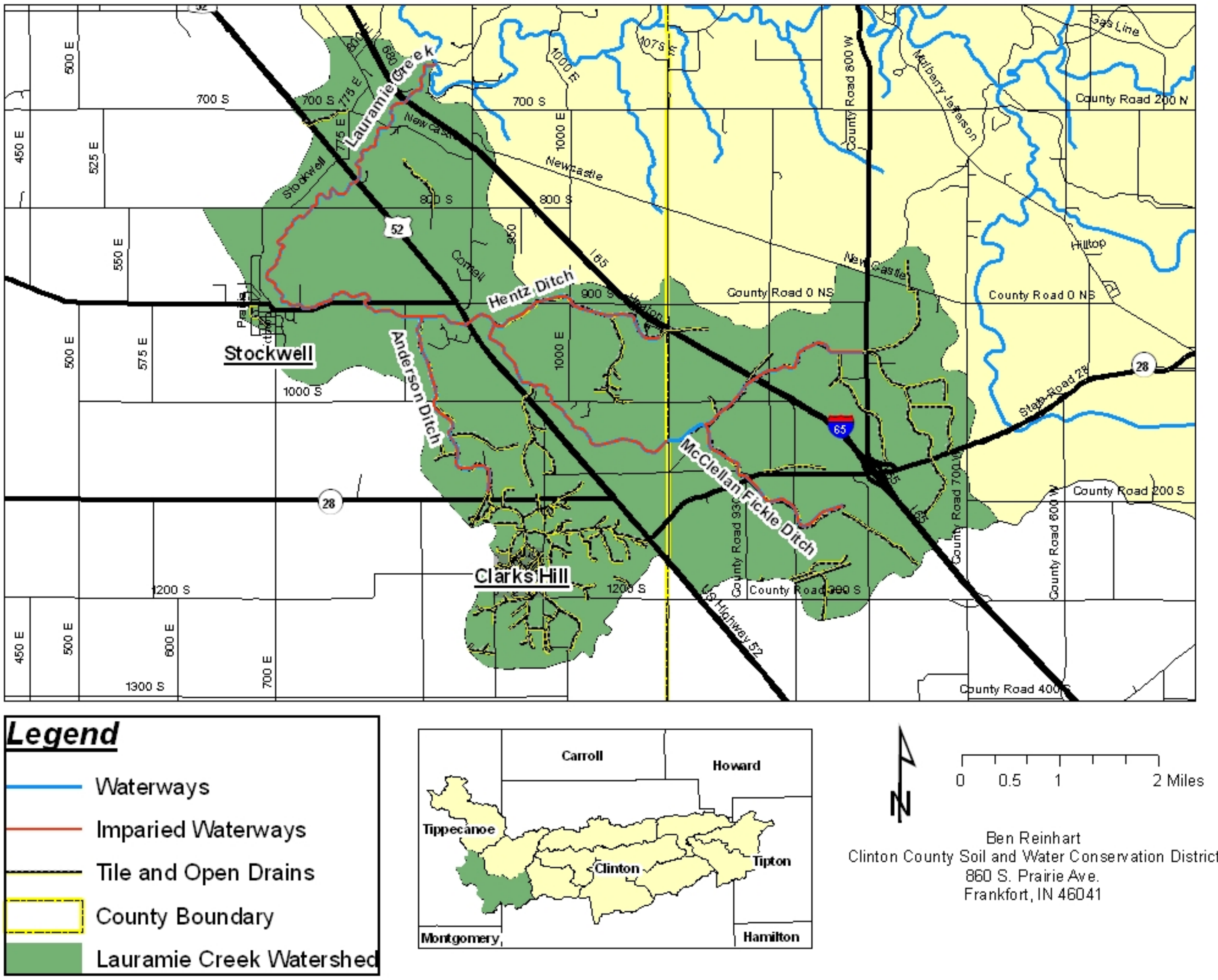


Figure 71. Lauramie Creek Waterways and Drainage

Roughly 36% of lands within the Lauramie Creek subwatershed can be classified as having soils with hydric or somewhat hydric properties. These areas are much more common in upper portions of this drainage (Figure 72). A very low percentage of lands are classified as PHEL (4.5%) and second highest percentage of lands classified as HEL (13%). Virtually all of these areas occur along the primary waterways within the Lauramie Creek subwatershed. The relatively high occurrence of HEL to PHEL lands may be attributed to differing classification systems between Clinton and Tippecanoe County. However, these lands also do generally have greater changes in topography when compared to other subwatersheds in the South Fork Wildcat Creek Watershed. This change in elevation creates sloping lands which are generally considered more erosive than the flatter lands seen within other areas.

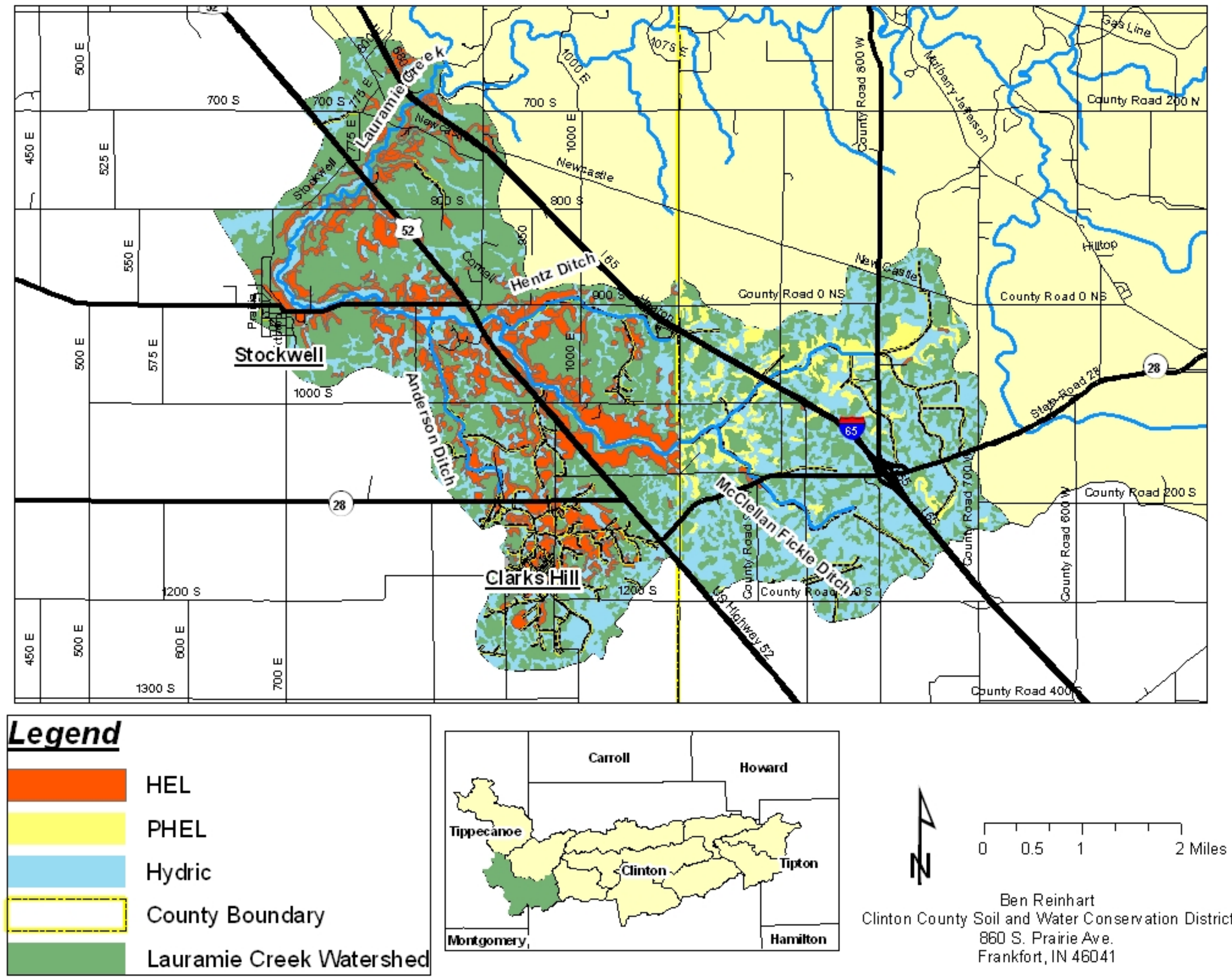


Figure 72. Lauramie Creek Soils

The Lauramie Creek Watershed contains primarily cultivated cropland. Developed areas are located around places such as Clarks Hill, Stockwell, and small establishments along well-traveled transportation routes. Woodlands and pasture/grasslands are scattered throughout the drainage area and are common along downstream sections of Lauramie Creek (Figure 73).

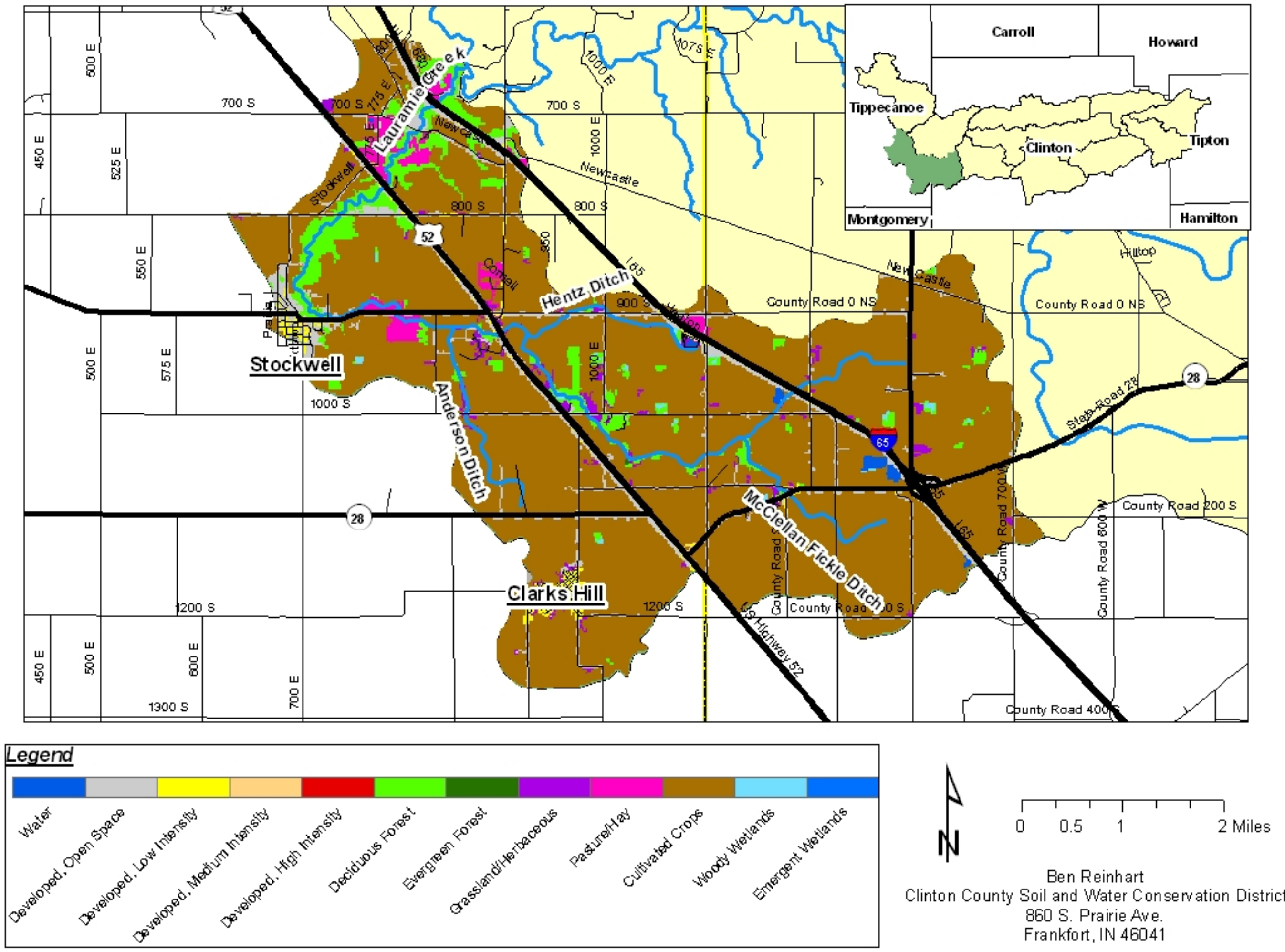


Figure 73. Lauramie Creek Land Use

Watershed Inventory

Windshield Survey & Source Identification

One NPDES facility and pipe permit lies within the Lauramie Creek subwatershed. The Wainwright Middle School has recorded eight effluent exceedances for Ammonia, Total Suspended Solids, and Biochemical Oxygen Demand (BOD). BOD is a measure of the required amount of dissolved oxygen needed within the stream to properly function. The most recent exceedances recorded were for Ammonia in late 2010 and early 2011. Three of the four Confined feeding operations identified were listed as Active. Five Underground Storage Tanks and six Leaking Underground Storage Tanks were located within the drainage area. The majority of these were identified around the developments of Stockwell and Clarks Hill as well as Interstate 65. During windshield inventories, volunteers identified a general lack of adequate riparian vegetation in upstream portions of Lauramie Creek as well as areas where livestock had access to public waterways (Figure 74).

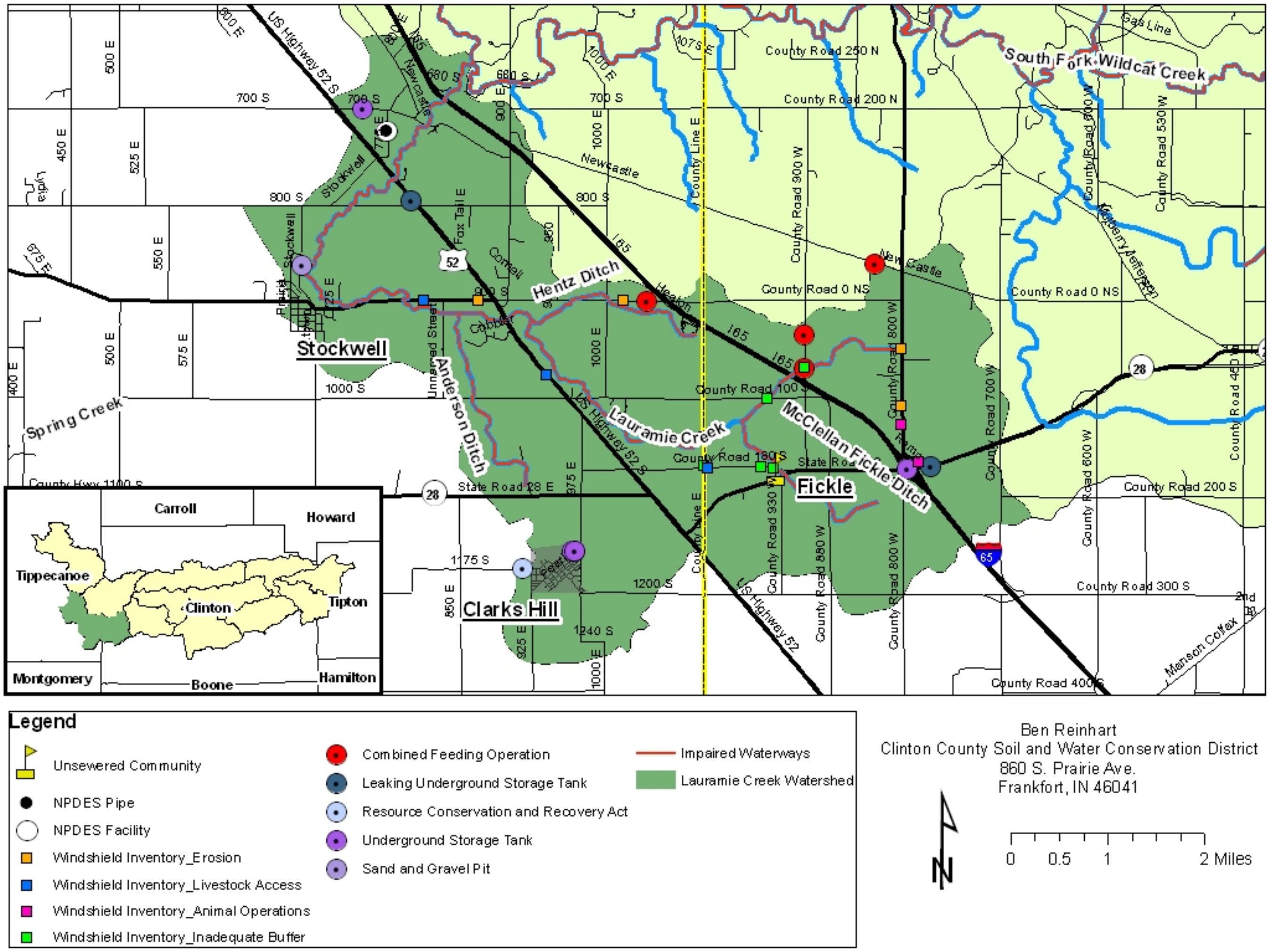


Figure 74. Lauramie Creek Source Investigation

Desktop Surveys

Approximately 40% of lands within the designated floodplain and riparian zones consist of natural land cover types such as wooded areas, grasslands, or wetlands. The remaining land areas are made up of more managed cover types such as cultivated fields, livestock pastures, or developed areas. Similar to some other subwatersheds, the majority of buffered waterways are located in lower sections of the drainage area while more upstream segments remain unbuffered (Figure 75).

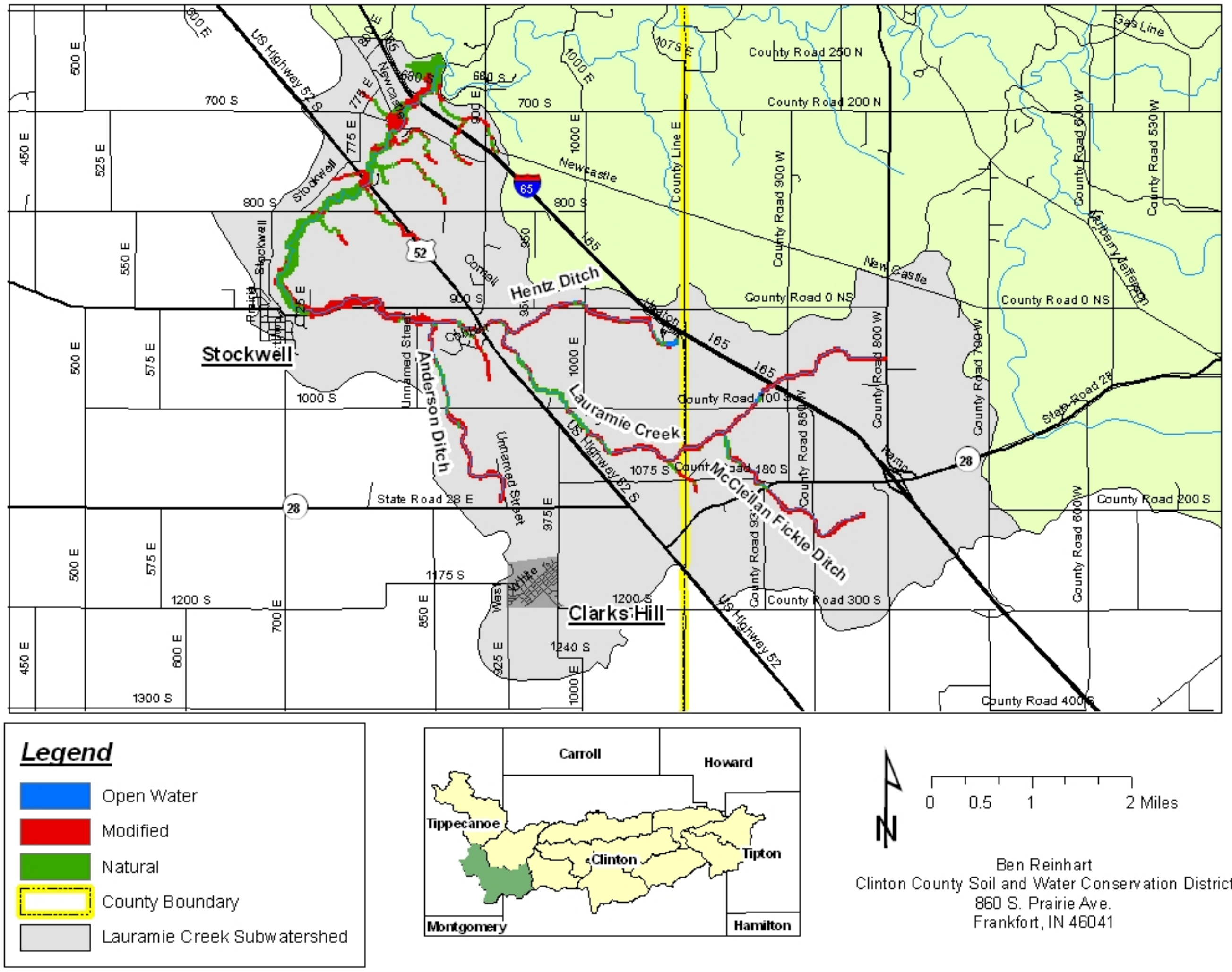


Figure 75. Lauramie Creek Riparian Lands Survey

The Lauramie Creek subwatershed is slightly below average in regards to the percent land area having had conservation practices applied. Roughly 17% of the land area within the subwatershed has seen applied practices compared to an average of 18.3% across the South Fork Wildcat Creek drainage. Including the normal practices such as Conservation Crop Rotation, residue and tillage management, and Pest and Nutrient Management Plans, habitat management practices such as Upland Wildlife Habitat have been applied during the last five years.

Water Quality Information

IDEM 305(b)/303(d)

Virtually all waterways within the Lauramie Creek subwatershed are listed as being impaired on the state 303(d) list (Figure 76). Both the McClellan-Fickle Ditch and the Clinton County portion of Lauramie Creek carry two impairments; one being impaired biotic communities and another being impaired recreational uses. The remaining waterways within the Lauramie Creek subwatershed are impaired for full contact recreational use.

Hoosier Riverwatch

Three sampling sites from the Hoosier Riverwatch database were found within the Lauramie Creek subwatershed. These sites contained water chemistry data from 2002-2005. Many of these sampling events showed high *E. coli* counts.

Lauramie Creek Watershed Plan

During 2003 IDEM conducted a TMDL study for the Lauramie Creek Watershed to evaluate *E.coli* loadings. Sampling results showed that, at every one of their sampling locations, 30-day geometric means exceeded Indiana water quality standards. Every site was more than twice the target level and a number of them were much higher than that. IDEM suggested field tiles, livestock with access to waterways, manure applications, and failing septic systems as likely contributors to elevated levels of *E. coli*.

A baseline water quality study was conducted in 2005 with one wet weather and one dry weather sampling period at seven locations throughout the Lauramie Creek drainage. Low oxygen levels were recorded during June of 2005 (dry weather period) on Hentz Ditch and Lauramie Creek near County Line Road as well as County Road 800 South. Phosphorus levels were found to be high at locations on JB Anderson Ditch, Hentz Ditch, and Lauramie Creek at County Road 725E. Forty-three percent of samples exceeded the Indiana water quality standard with Ammonia. However, only the JD Anderson Ditch, just downstream of Clarks Hill, exceeded ammonia standards during both wet and dry weather sampling periods. Also, a sampling location on Lauramie Creek downstream of the Lauramie Township Regional Sewer District plant showed ammonia levels above or approaching water quality targets during wet and dry weather sampling periods. Seventy-one percent of samples exceeded water quality standards for *E. coli* further supporting the 2003 IDEM-led TMDL study of *E. coli* issues in the watershed. Habitat evaluations ranged from poor to average across the sites with scores generally improving as sampling moved downstream.

AIMS

During 1998, six sites were sampled for *E. coli* at various areas throughout the Lauramie Creek subwatershed. Two sites on Lauramie Creek, one at U.S. 52 and another further downstream at County Road 900 South, showed extremely high *E. coli* levels. Another sampling location on Anderson Ditch, at County Road 1000 South, recorded levels exceeding accepted *E. coli* standards. Also in 1998, an agricultural ditch near Wainwright Middle School reported nitrate-nitrite levels exceeding accepted standards. The final discharge of the Clarks Hill POTW (Publicly Owned Treatment Works) showed elevated ammonia levels. In 2004, nine sites were evaluated for habitat quality and fish communities. Sites on Hentz Ditch, McClellan Fickle Ditch, and Lauramie Creek at County Road 900 West failed to meet accepted standards for habitat quality. However, the site on Hentz Ditch at County Road 900 South upstream of Stockwell did show relatively high scores for fish communities. Sampling locations on Lauramie Creek at County Road 800 and 900 South scored highest in both habitat quality and fish communities.

South Fork TMDL

Six sampling locations within the Lauramie Creek subwatershed were used for *E. coli* loads and calculations. Samples collected from Anderson Ditch had the lowest required reduction (60%). Other sites including Hentz Ditch, McClellan Fickle Ditch, and Lauramie Creek showed high reduction requirements between 72% and 88%. One sample collected from an agricultural ditch off of Lauramie Creek showed necessary reductions of 97%.

Water quality data from McClellan Fickle Ditch and Anderson Ditch was included on calculations for total phosphorus. Anderson Ditch showed necessary reductions of 31% while McClellan Fickle Ditch showed reductions of 48% being needed.

Sites from Lauramie Creek and Anderson Ditch were used in calculations for total suspended solids. Lauramie Creek had required reductions of 59% while Anderson Ditch required reductions of 36%.

One assessment location was included within the Lauramie Creek subwatershed. High levels of phosphorus, total suspended solids, and *E. coli* were most likely caused by agricultural runoff, livestock access to waterways, and streambank erosion. Failing on-site wastewater facilities (i.e. septic systems) may also be contributing but additional sampling is needed to better characterize these pollutant sources. Also, it was noted that any discharges from the Clarks Hill Municipal WWTP were well below allowable levels of *E. coli* and total suspended solids.

Current Data

Two sampling locations as part of the South Fork Wildcat Creek Assessment were located within the Lauramie Creek subwatershed. The most upstream sampling location achieved both habitat and biological standards. The downstream sampling location showed a relatively high quality habitat and biological community.

Water chemistry and *E. coli* were sampled at the most downstream location. Average *E. coli* levels exceeded water quality standards during both high and low flow periods. However, total phosphorus, nitrate-nitrite, and TSS levels were documented below water quality standards.

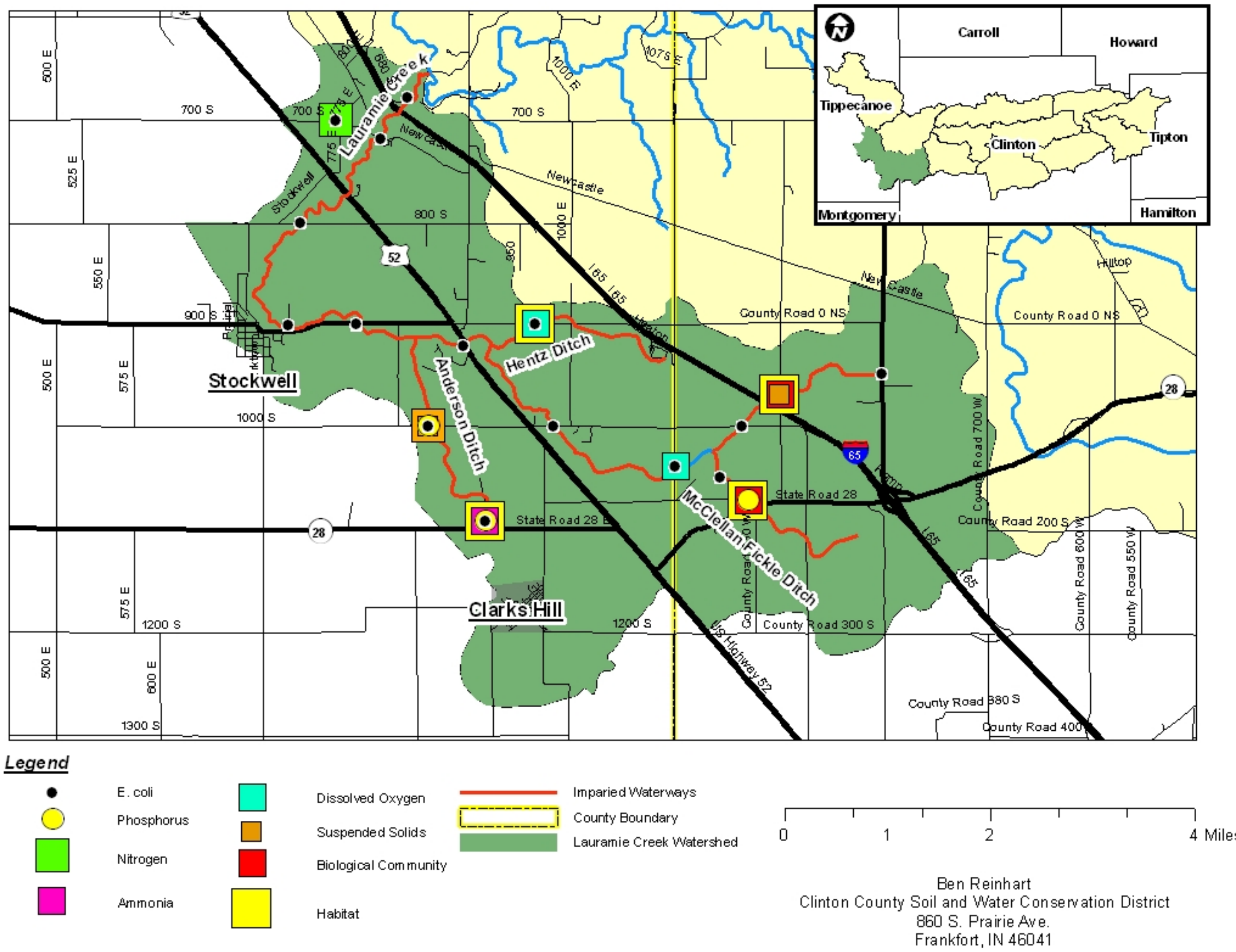


Figure 76. Lauramie Creek Water Quality Impairments

4.10 Town of Dayton – South Fork Wildcat creek (HUC: 051201070310)

Land Use Information

The Town of Dayton-South Fork Wildcat Creek subwatershed is the most downstream drainage area in the South Fork Wildcat Creek Watershed. This subwatershed area lies almost entirely in Tippecanoe County draining over 18,800 acres. Containing over 37.5 miles of waterways, the Dayton subwatershed contains the most natural waterways of any subwatershed in the South Fork Wildcat Creek drainage (Figure 77). Most of these miles lie along the main body of the South Fork Wildcat Creek. However, there are a number of smaller unnamed tributaries within the subwatershed that empty into the South Fork Wildcat Creek. Twenty-seven of these stream miles are listed for impaired water quality. Most of these impairments are documented along the South Fork Wildcat Creek itself, while other impairments have been documented within a larger tributary northeast of Dayton.

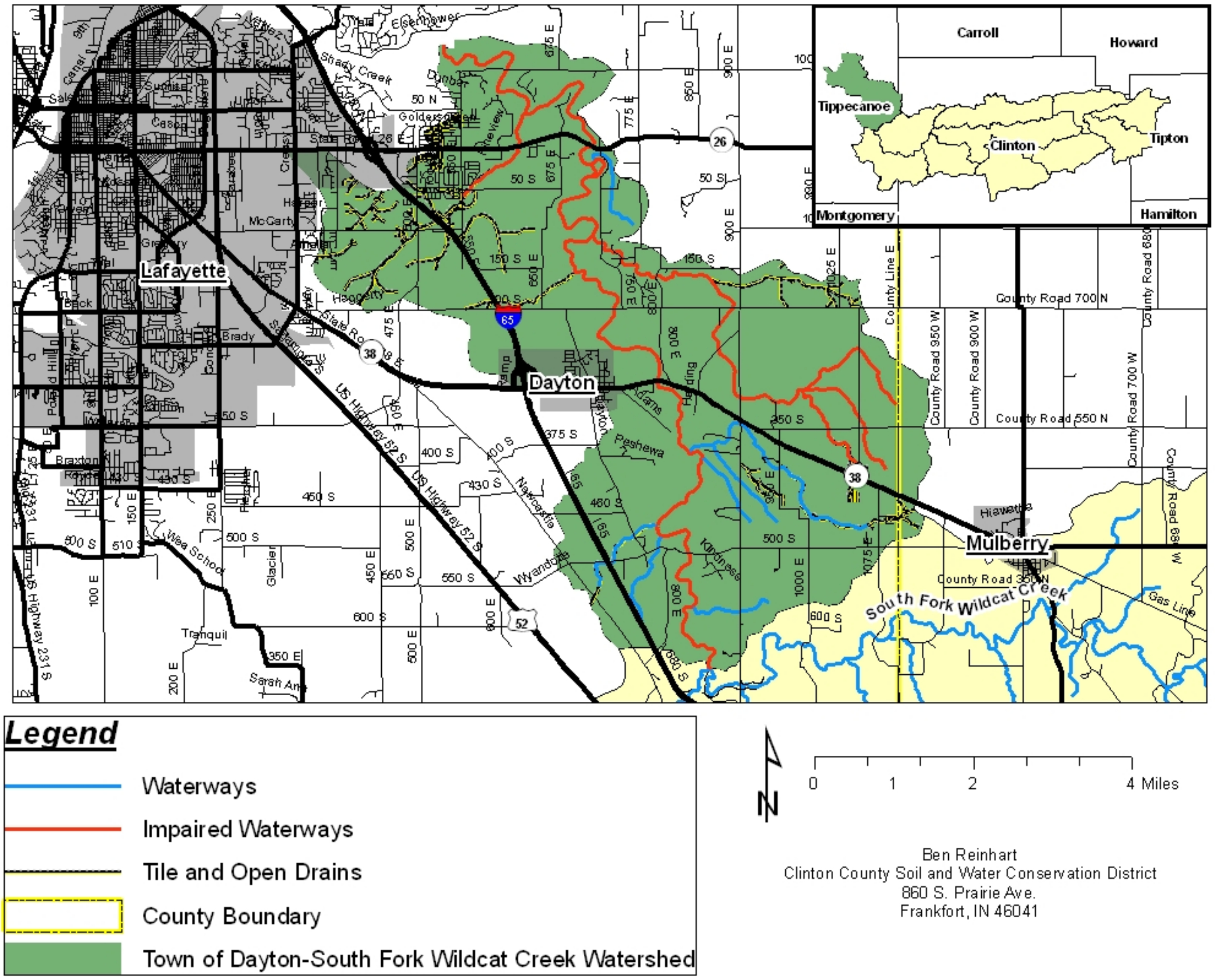


Figure 77. Town of Dayton-South Fork Wildcat Creek Waterways and Drainage

The Dayton subwatershed contains the lowest percentage of land classified with hydric soils (15%) and/or PHEL (2%) but the highest percentage of land classified as HEL (18%). Again, some of this may be attributed to differing classification systems between Clinton and Tippecanoe County (Figure 78). However, lands within the Dayton subwatershed are characterized by greater changes in topography when compared to other subwatersheds in the South Fork Wildcat Creek Watershed. This may help in explaining the increased occurrence of erodible lands and the lack of widespread hydric soils.

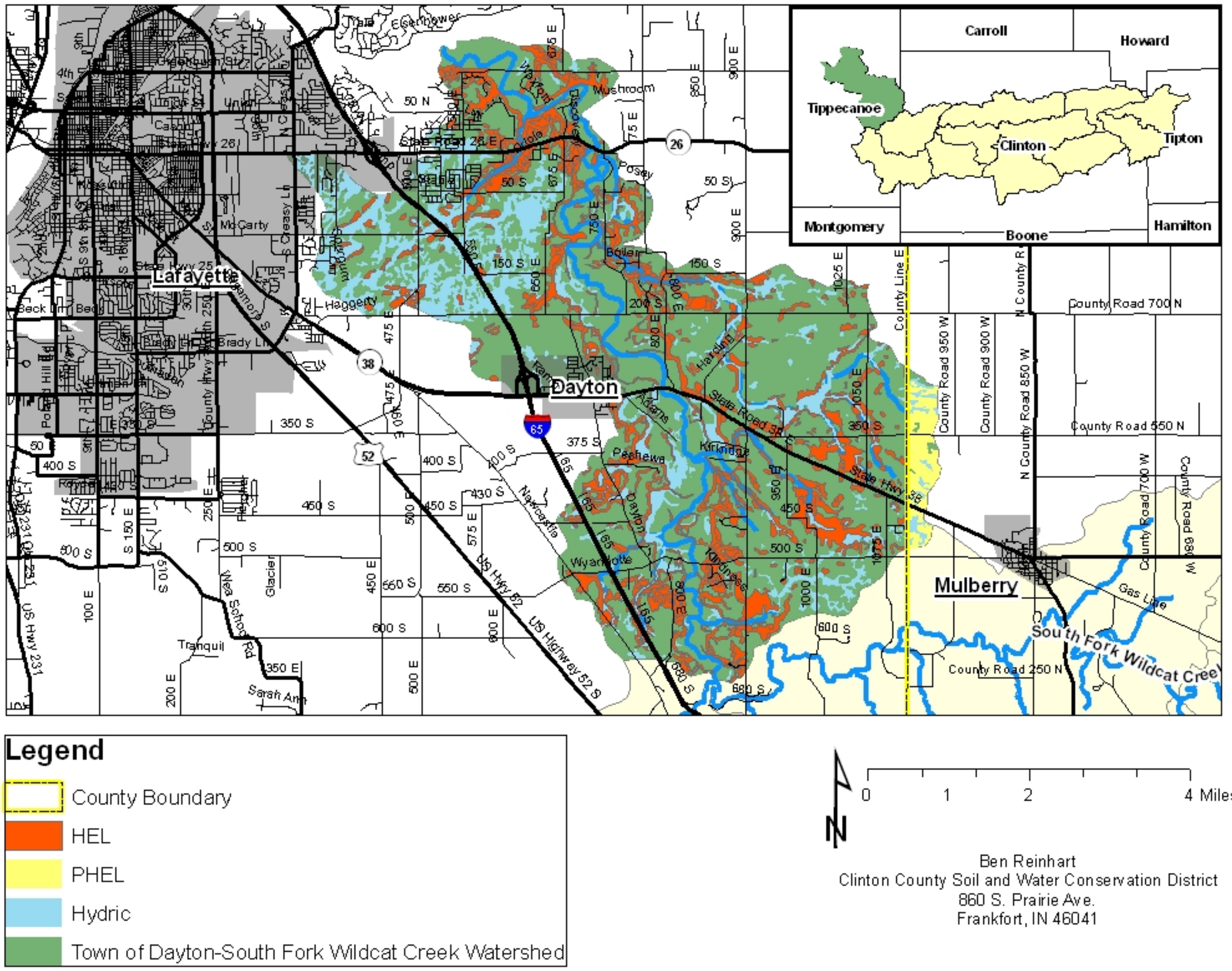


Figure 78. Town of Dayton-South Fork Wildcat Creek Soils

The most common land use in the Town of Dayton-South Fork Wildcat Creek Watershed is cultivated cropland. However, there are a number of acres of wooded lands and pasture in this watershed. These two land use types are commonly seen along the primary waterways in the drainage area (Figure 79). Developed land uses can be seen in and around the Town of Dayton and east of Lafayette along major travel routes such as Interstate 65.

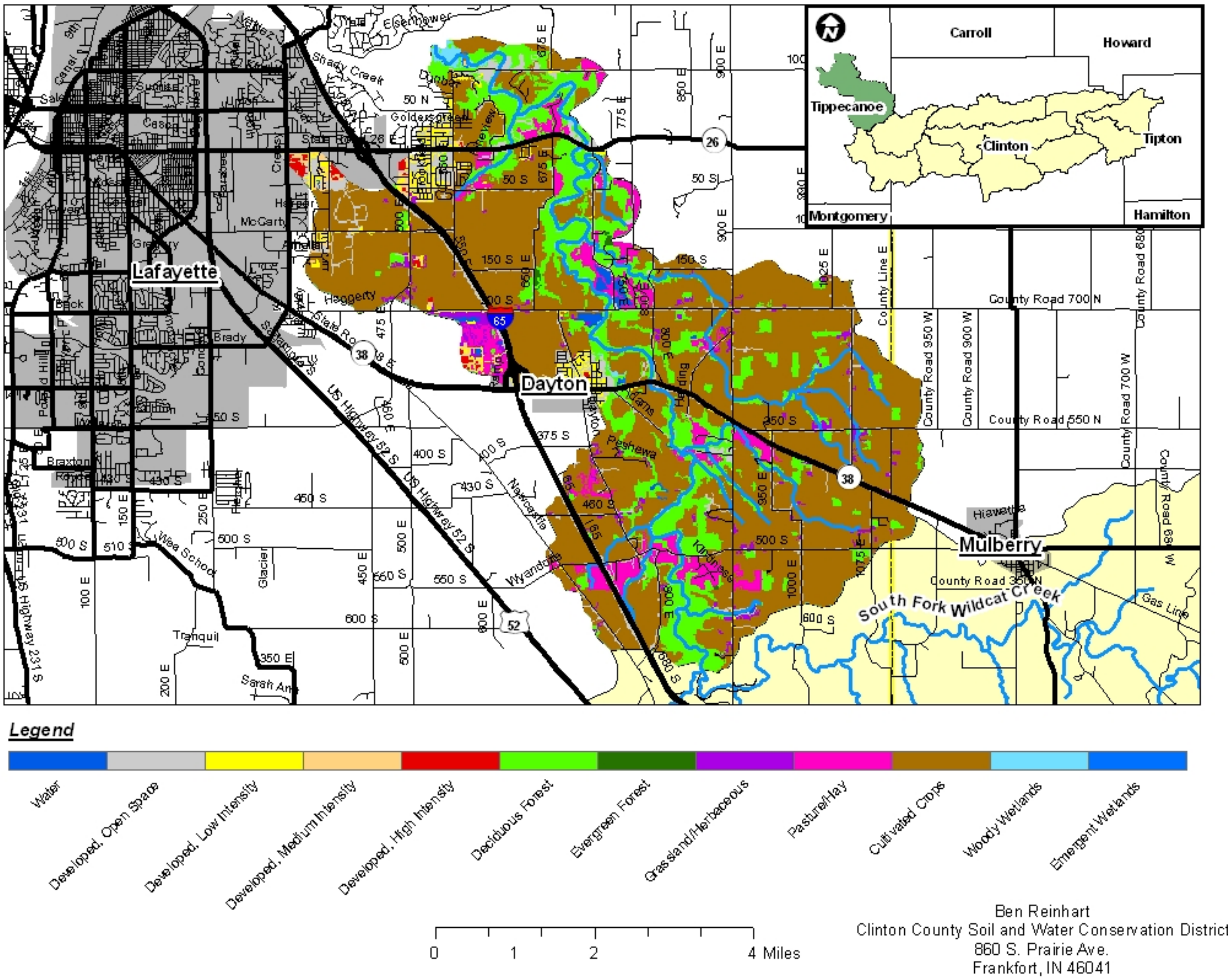


Figure 79. Town of Dayton-South Fork Wildcat Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

Only one of the three identified Confined feeding operations were listed as Active. Four Underground Storage Tanks and one Leaking Underground Storage Tank were identified primarily around the outskirts of Lafayette. Two locations were identified that fall under the Resource Conservation and Recovery Act which regulates hazardous waste and non-hazardous solid waste (Figure 80). One Abandoned Landfill Facility was located along the main channel of the South Fork Wildcat Creek near State Road 26. Volunteers completing a windshield inventory noted a few locations of actively eroding areas as well as small livestock and animal operations upstream in the Dayton subwatershed.

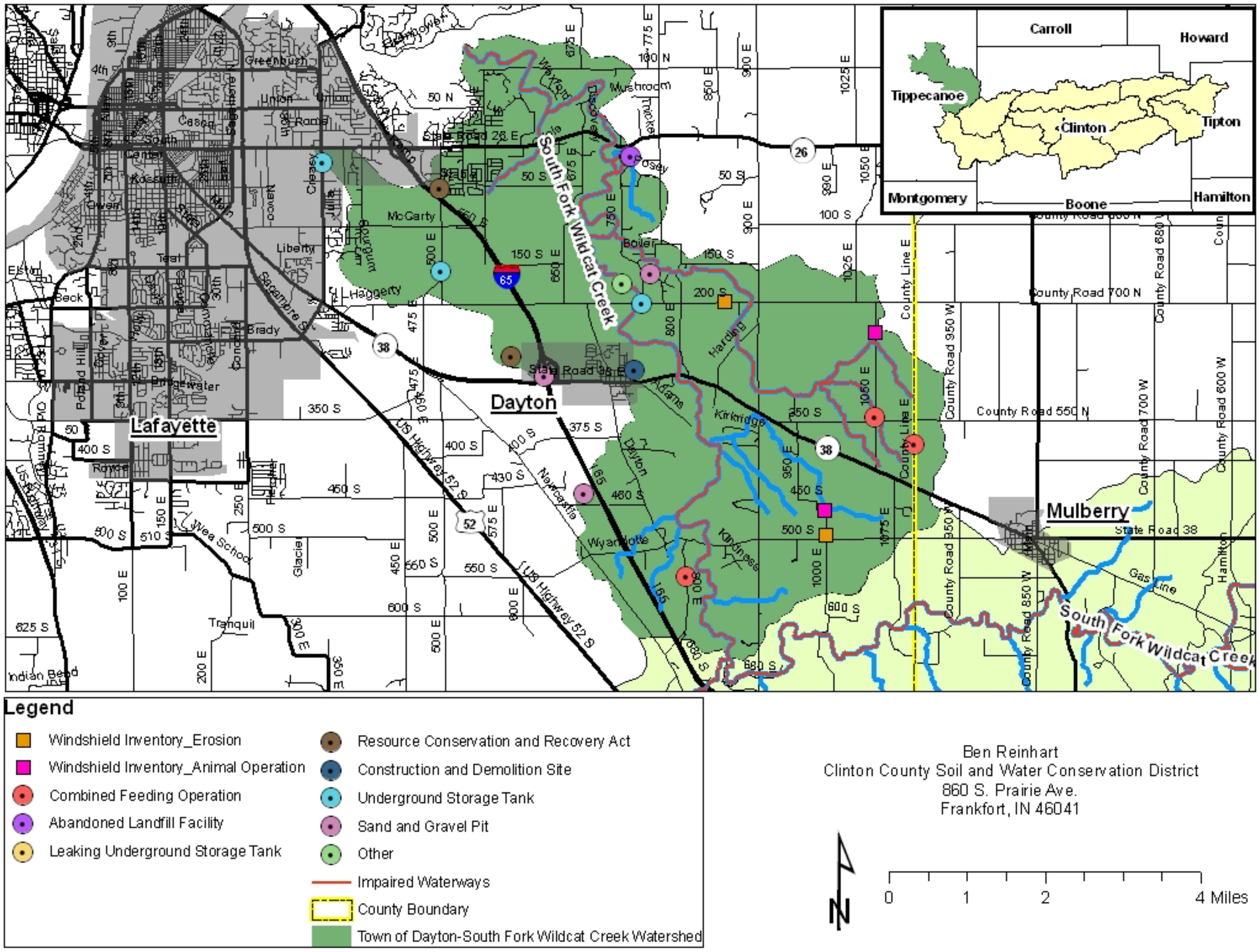


Figure 80. Town of Dayton-South Fork Wildcat Creek Source Investigation

Desktop Surveys

Approximately 57% of land areas within the designated floodplain and riparian zones contain natural land uses. This ranks as the highest among all subwatersheds. The remaining areas consist of cover types such as cultivated crops, livestock pasture, or developed areas. Many areas along the main body of the South Fork Wildcat Creek are buffered while natural land cover types are patchier along local tributaries (Figure 81).

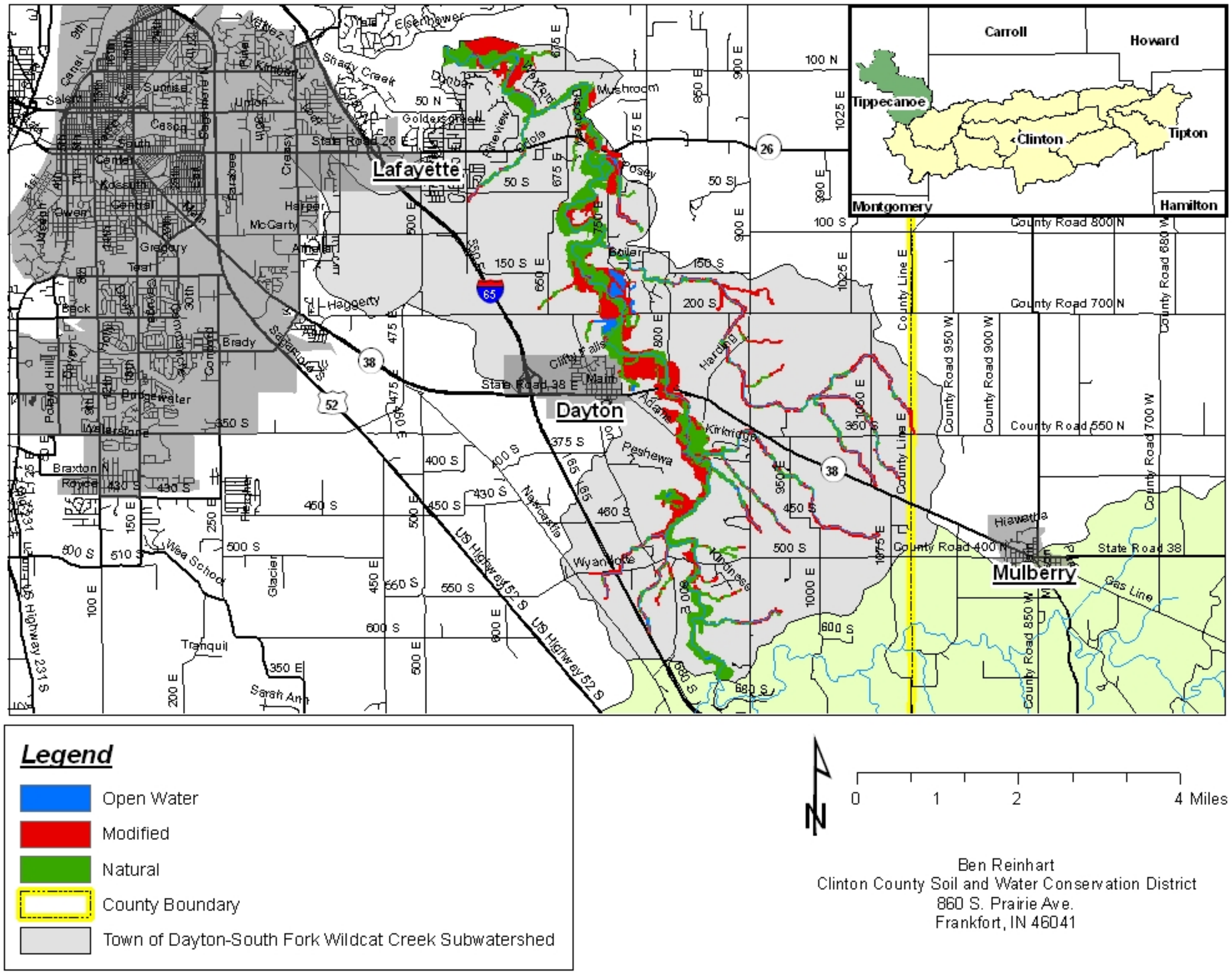


Figure 81. Town of Dayton-South Fork Wildcat Creek Riparian Lands Survey

The Dayton subwatershed is below average when it comes to the percent land area having applied conservation practices. Around 10% of this subwatershed has seen implemented conservation measures compared to an 18.3% average across the South Fork Wildcat Creek drainage. Of those conservation practices that have been applied, Conservation Crop Rotation, residue and tillage management, and Pest and Nutrient Management Plans have been the most common. Other conservation practices that seem to be implemented more frequently with the Dayton subwatershed are the use of conservation cover and cover crops, pasture and livestock management, and habitat management practices.

Water Quality Information

IDEM 305(b)/303(d)

Much of the waterways within the Dayton subwatershed are declared impaired as part of IDEM's 2008 report (Figure 82). The main channel of the South Fork Wildcat Creek contains impairments to recreational uses and well as the presence of mercury and/or PCBs in fish tissues. Tributaries of the South Fork Wildcat Creek are listed as having impaired biotic communities.

Hoosier Riverwatch

There are a couple different sampling events within the Hoosier Riverwatch database ranging from the fall of 2002 to the summer of 2006. Water Quality Index scores fluctuated from 67 to 79 which is about average. Pollution Tolerance Index scores also stayed average with ratings of Fair and Good.

AIMS

Nine sites were sampled within the Dayton subwatershed in 1998 for *E. coli* levels. One site located on the South Fork Wildcat Creek at S.R. 26 showed extremely high levels, exceeding accepted standards. Fourteen sampling efforts were recorded, documenting habitat quality and biological (fish and macroinvertebrate) communities, within the Dayton subwatershed between 1991 and 2004. Higher scores for both habitat quality and biological communities were seen on the South Fork Wildcat Creek compared to local tributaries. However, tributary sites located at County Road 900 East and 1000 East did show relatively high quality fish communities despite average habitat quality. In 2008, nitrate-nitrite levels approaching but not exceeding accepted standards were recorded on the South Fork Wildcat Creek at S.R. 26.

South Fork TMDL

Two sampling sites within the Dayton subwatershed were used for *E. coli* load calculations. Based on these calculations, the site located upstream of the Middle Fork Wildcat Creek confluence required only a 16% reduction while the site downstream of the confluence required an 80% reduction.

Samples for total phosphorus were collected downstream of the Middle Fork Wildcat Creek confluence and upstream of a local tributary. Phosphorus reductions above the local tributary were 6% while load reductions required below the Middle Fork Wildcat Creek confluence were 30%.

Total suspended solids were calculated at one site on the South Fork Wildcat Creek below the Middle Fork Wildcat Creek confluence. Based on samples from this location, reductions of 85% are required.

Two assessment locations were included within the Dayton subwatershed. It was noted that a number of NPDES facilities and two MS4 areas discharge upstream of these sampling locations which may explain some of the elevated pollutant loads, especially during high flows.

Current Data

As part of the South Fork Wildcat Creek Assessment, two locations were included in the Dayton subwatershed. Habitat and macroinvertebrate sampling at Site 12, which is an unnamed tributary of the South Fork Wildcat Creek, showed relatively high quality aquatic habitat and biological communities. Pollution-intolerant macroinvertebrates were particularly abundant at this site. Similar sampling done on the main channel of the South Fork Wildcat Creek showed some of the highest habitat scores in the watershed. However, biological scores were only slightly above the accepted standards.

The sampling location near S.R. 26 showed average concentrations exceeding target levels for *E. coli*, total phosphorus, and TSS during high flow periods. Nitrate-nitrite levels were documented exceeding target levels during these high flow periods as well. All low flow concentrations fell below water quality targets.

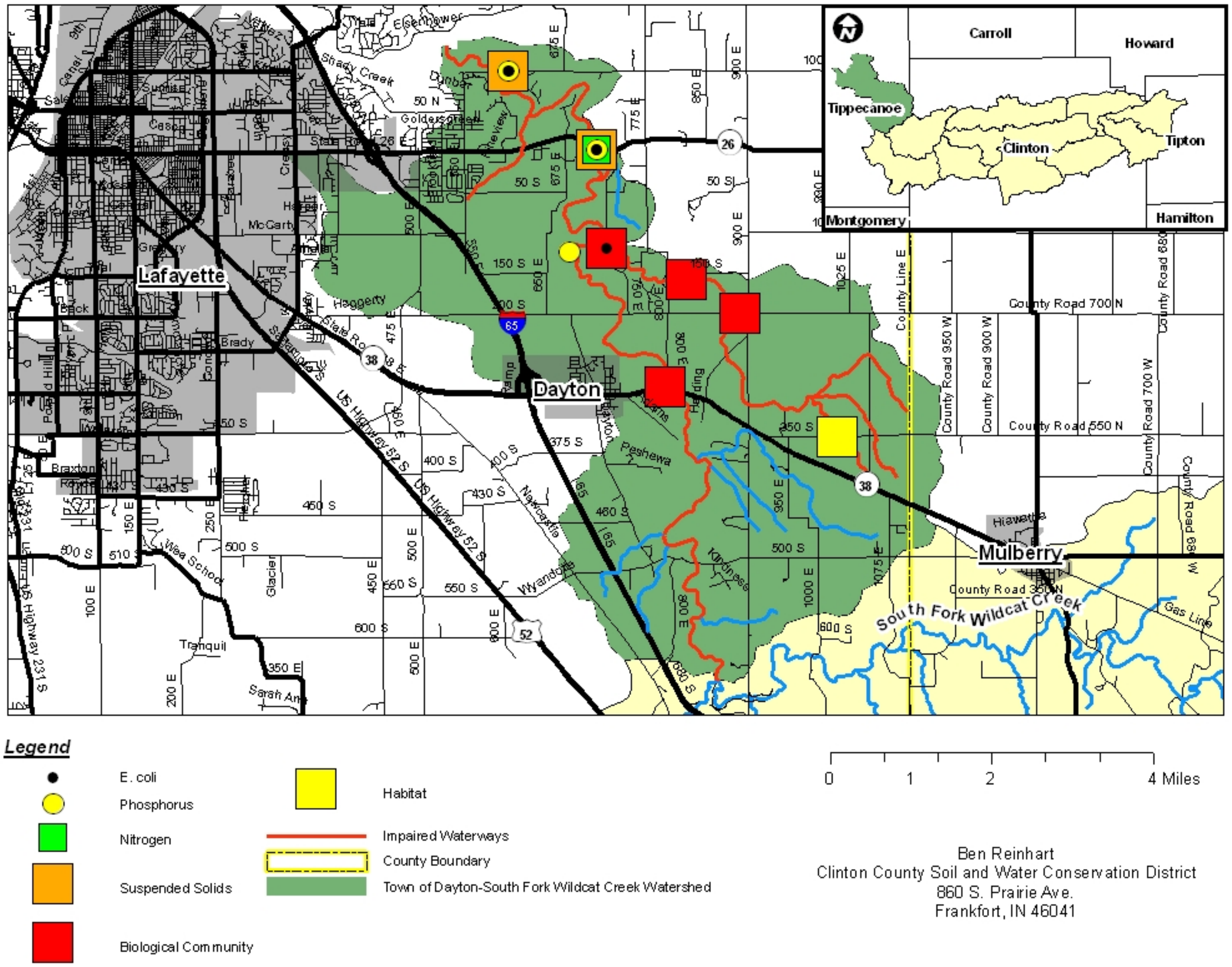


Figure 82. Town of Dayton-South Fork Wildcat Creek Water Quality Impairments

4.11 Town of Mulberry – South Fork Wildcat Creek (HUC: 051201070311)

Land Use Information

The Town of Mulberry-South Fork Wildcat Creek subwatershed drains approximately 13,325 acres of west-central Clinton County and southeastern Tippecanoe County. There are just over 21 miles of natural waterways within this subwatershed such as the South Fork Wildcat Creek and several unnamed tributaries (Figure 83). Of the total stream miles throughout the subwatershed, roughly 10.5 miles of South Fork Wildcat Creek has been documented as having impaired water quality.

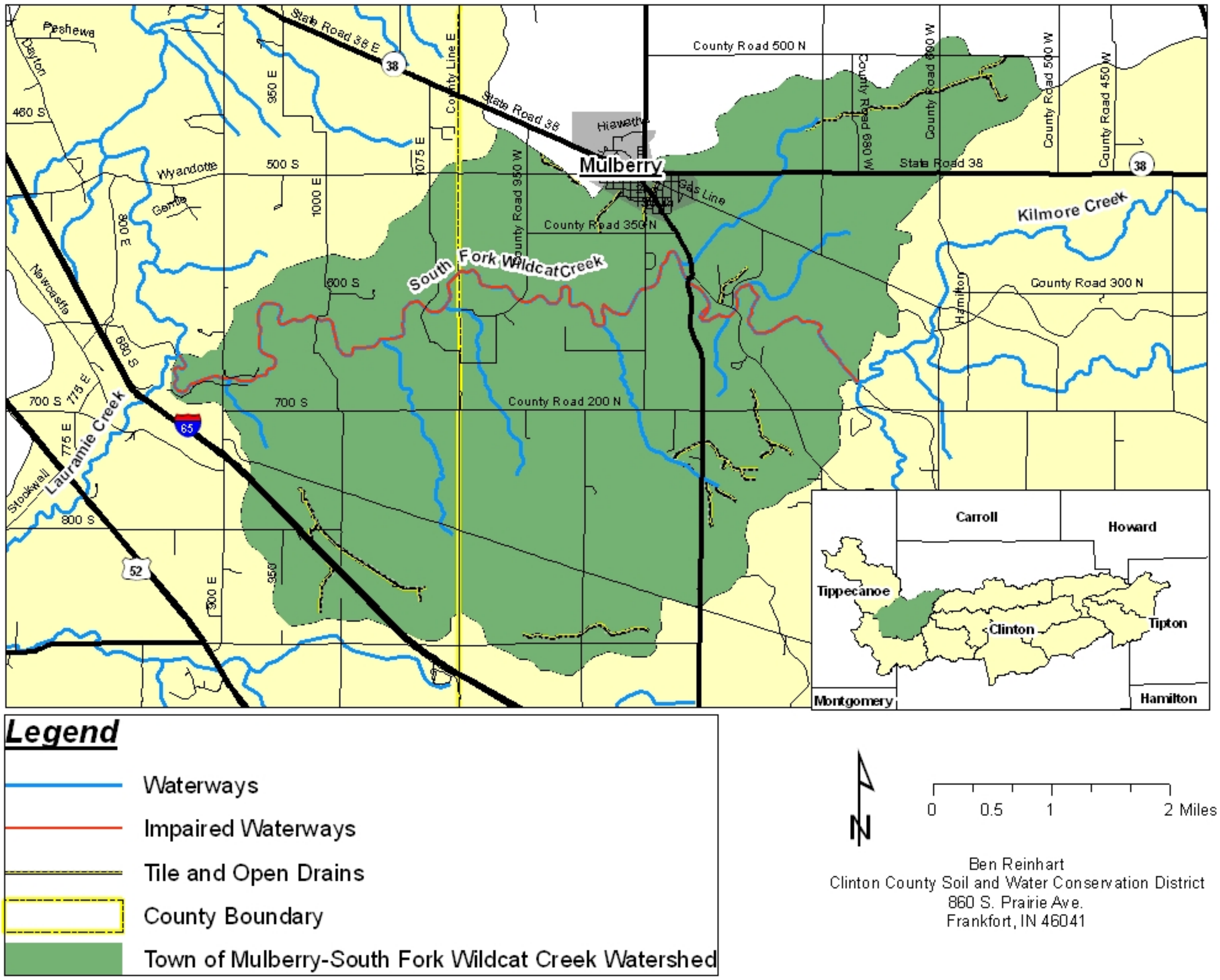


Figure 83. Town of Mulberry-South Fork Wildcat Creek Waterways and Drainage

Lands within the Town of Mulberry subwatershed show the second lowest occurrence of hydric soil properties (19%) and the third highest occurrence of HEL areas (12%). Approximately 25% of lands within the drainage area can be classified as PHEL. The majority of the HEL/PHEL lands occur along the major waterways and floodplains of the Mulberry subwatershed (Figure 84). This can most likely be attributed to steeper slopes which are more likely to erode during precipitation events.

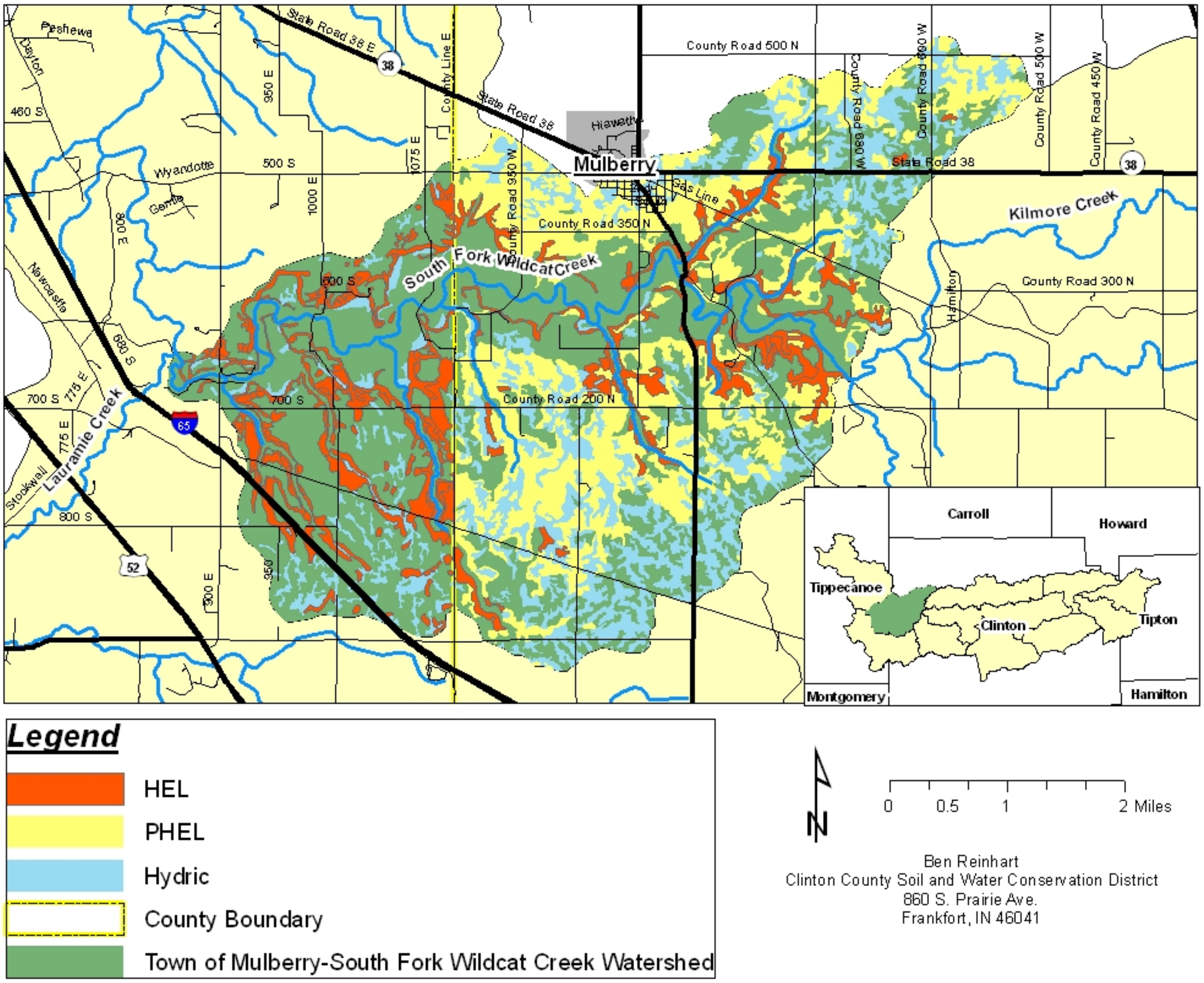


Figure 84. Town of Mulberry-South Fork Wildcat Creek Soils

The majority of development seen can be attributed to the Town of Mulberry and residential developments along the South Fork Wildcat Creek south of Mulberry. The remaining land uses along the primary waterways in the watershed are largely wooded areas and pasture lands. Other woodlands are scattered throughout the remaining areas but mostly these lands are dominated by cultivated crops (Figure 85).

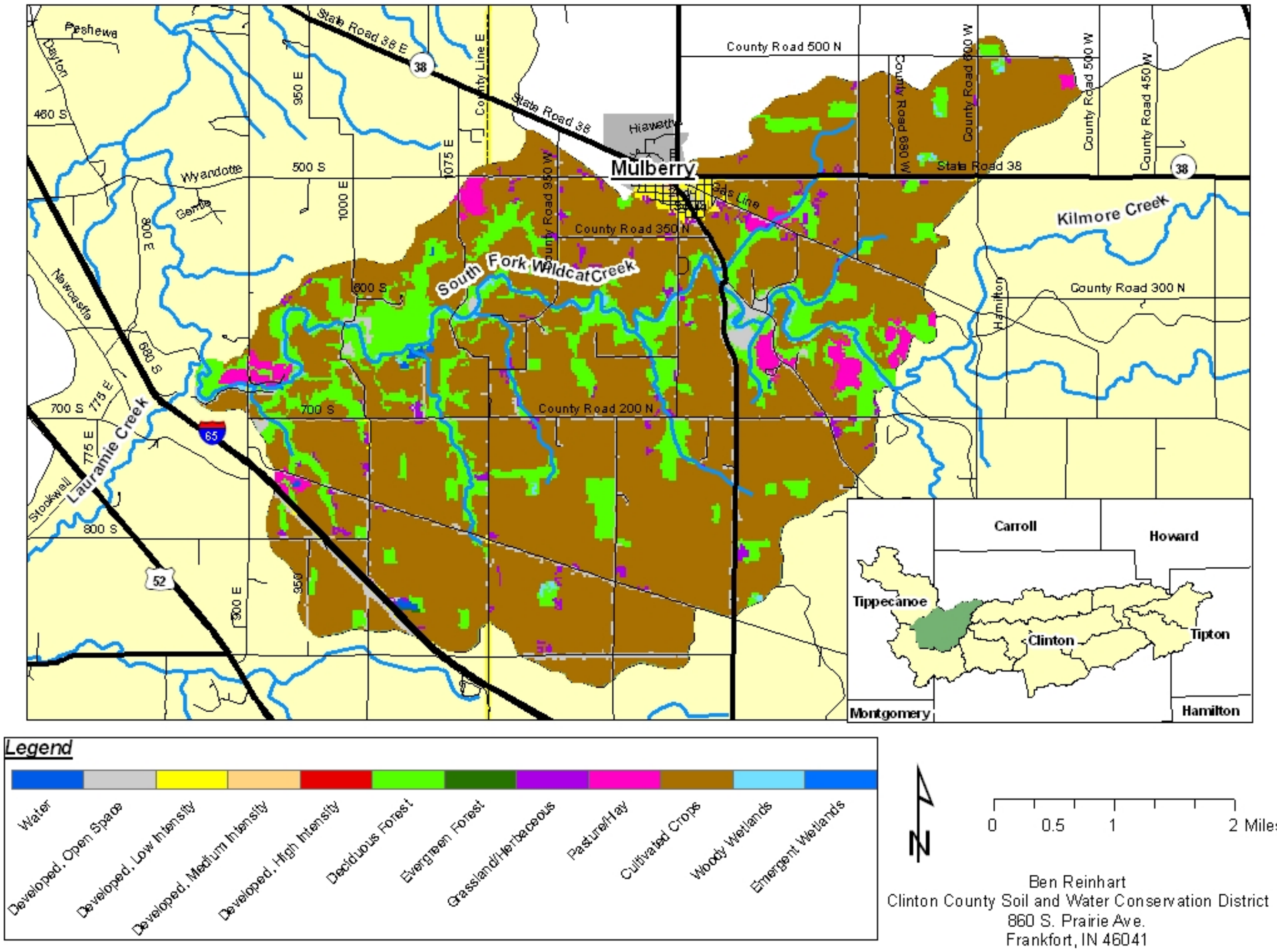


Figure 85. Town of Mulberry-South Fork Wildcat Creek Land Use

Watershed Inventories

Windshield Survey & Source Identification

Two NPDES facility permits and one pipe discharge permit were identified within the Mulberry subwatershed. The Mulberry Municipal WWTP has recorded four effluent exceedances for Chlorine, Biochemical Oxygen Demand, and Total Suspended Solids. The most recent exceedances were recorded for chlorine and Total Suspended Solids in May of 2009. Also, eight overflows in the Sanitary Sewer System were recorded between 2005 and 2010 totaling an estimated discharge of 175,000 gallons. A total of eight Confined feeding operations were identified within the drainage area with all but one being listed as Active. During the windshield inventory, volunteers identified isolated locations of actively eroding areas, small livestock and animal operations, and areas where livestock had free access to local waterways (Figure 86).

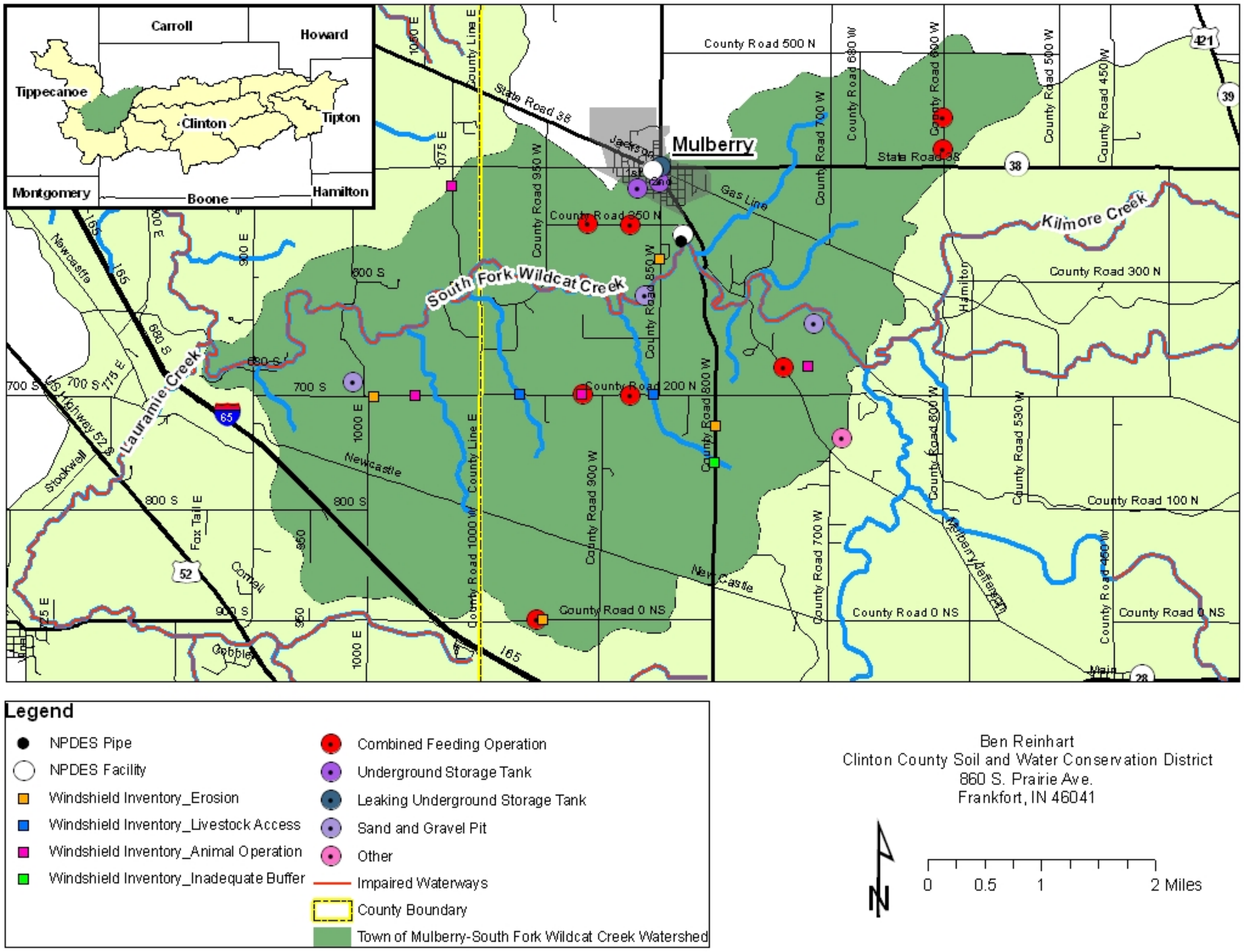


Figure 86. Town of Mulberry-South Fork Wildcat Creek Source Investigation

Desktop Surveys

The Mulberry subwatershed ranks second highest among all subwatersheds in regards to natural buffers along primary waterways. Roughly 53% of land areas within the designated floodplain and other riparian areas consist of natural land uses. Only about six miles of primary waterways remain unbuffered (Figure 87).

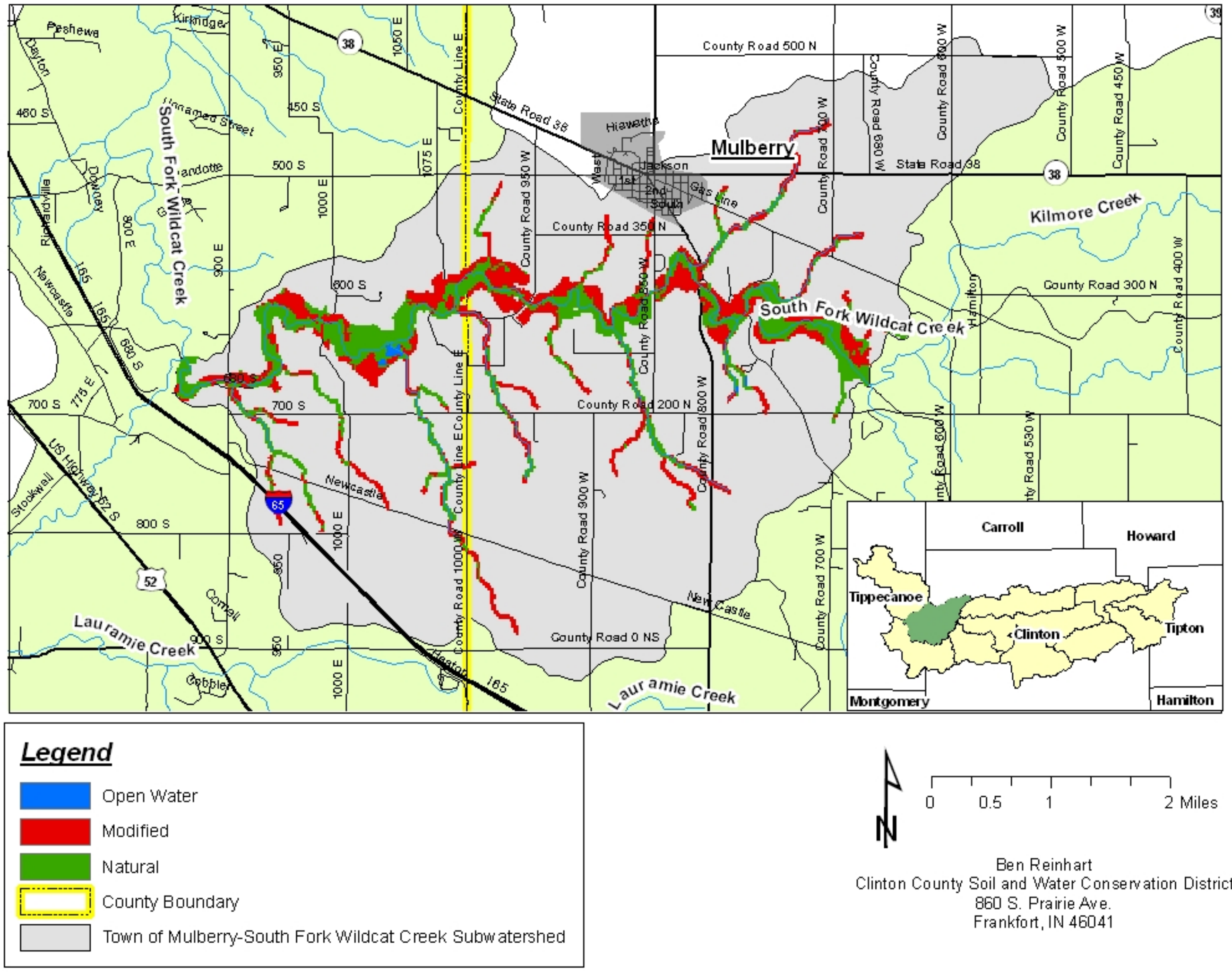


Figure 87. Town of Mulberry-South Fork Wildcat Creek Riparian Lands Survey

The Mulberry subwatershed is right around average in regards to the percent of land area having applied conservation practices. Just fewer than 18% of the lands within the Mulberry subwatershed have had conservation practices applied compared to an 18.3% average across the South Fork Wildcat Creek drainage. As in most other subwatersheds, Conservation Crop Rotation and residue and tillage management are the most common practices applied to acres within the Mulberry subwatershed. The development and implementation of Pest and Nutrient Management Plans are somewhat less common. Also, a number of areas are listed for installed field borders.

Water Quality Information

IDEM 305(b)/303(d)

Within the Mulberry subwatershed, primarily just the main channel of the South Fork Wildcat Creek is listed as being impaired (Figure 88). This section of the South Fork Wildcat Creek is impaired due to the presence of mercury and/or PCBs in fish tissues.

Hoosier Riverwatch

One sampling site from the Hoosier Riverwatch database was found within the Mulberry subwatershed. Sampling was completed in October of 2000 with scores from the Water Quality Index, Pollution Tolerance Index, and CQHEI showing average to above average conditions.

AIMS

One sampling location, sampled in 1998 on South Fork Wildcat Creek at Mulberry-Jefferson Road, exceeded *E. coli* standards. Thirteen sites were sampled within the Mulberry subwatershed for habitat quality and fish communities in 2004. All sites met accepted standards for habitat quality and fish communities. The highest habitat scores were seen on the South Fork Wildcat Creek at Mulberry-Jefferson Road and County Road 1000 East. The highest fish community scores were seen on the South Fork Wildcat Creek at Mulberry-Jefferson Road and County Road 850 West. Extremely high nitrate-nitrite levels were seen at the discharge of the Mulberry POTW during a 1998 sampling.

Current Data

One sampling location from the South Fork Wildcat Creek Assessment was located within the Mulberry subwatershed. This site recorded good scores on both habitat and biological evaluations.

Average concentrations exceeded target levels for *E. coli*, total phosphorus, and TSS during high flow periods at this location. Also, average low flow concentrations for total phosphorus and *E. coli* as well as high flow concentrations for nitrate-nitrite were seen approaching, and periodically exceeding, target water quality standards.

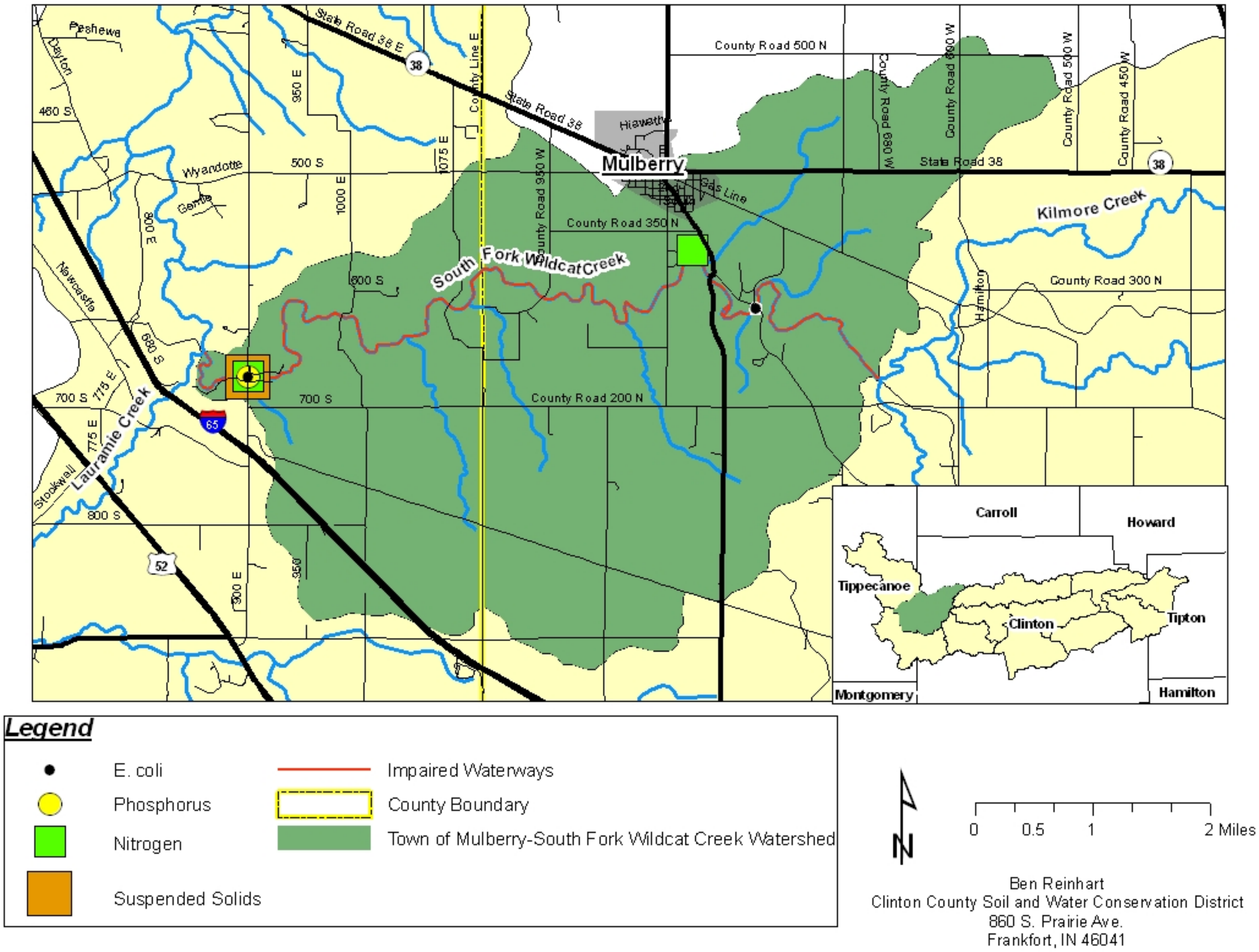


Figure 88. Town of Mulberry-South Fork Wildcat Creek Water Quality Impairments

5.0 REVIEW OF WATERSHED PROBLEMS AND CAUSES

5.1 SUMMARY OF WATER QUALITY

Total Suspended Solids (TSS)

Total Suspended Solids includes anything in the water column that can be filtered out (e.g. sediment, sewage, leaf litter or organic residues, algae, etc.). Many times sediment and other residues are carried away by water during storm events through surface runoff. To determine the potential of this surface runoff, each subwatershed was graded on the amount of Highly Erodible Land (HEL) and Potentially Highly Erodible Land (PHEL) which is based on soil type and land slope. When combining these two categories into an Erodibility Score for each subwatershed, HEL lands were weighted by a factor of two to assume a higher erosion risk. The Kilmore Creek subwatershed ranked first among all subwatersheds for erodible lands. This is also supported by the number of documented impairments for TSS from recent and historic water quality sampling (Figure 89).

Other subwatersheds that ranked highly included Dayton, Mulberry, Lauramie, Jenkins Ditch, and Spring Creek subwatersheds. These drainages, except for Spring Creek, also show recent and historic impairments for TSS. Based on current load estimates, all above mentioned subwatersheds except for Spring Creek and Lauramie Creek, have estimated load reductions from 45%-84% during high flow periods(Table 29). Load estimates for low flow periods currently meet water quality targets. The headwater drainages including, Stump Ditch, Shanty Creek, Swamp Creek, Talbert Ditch, and Prairie Creek ranked low in term of erodible lands but still show some historic TSS impairments. Current sampling in the Stump Ditch and Prairie Creek subwatersheds show both high and low flow TSS concentrations within our water quality targets. Current sampling results show that during high flows

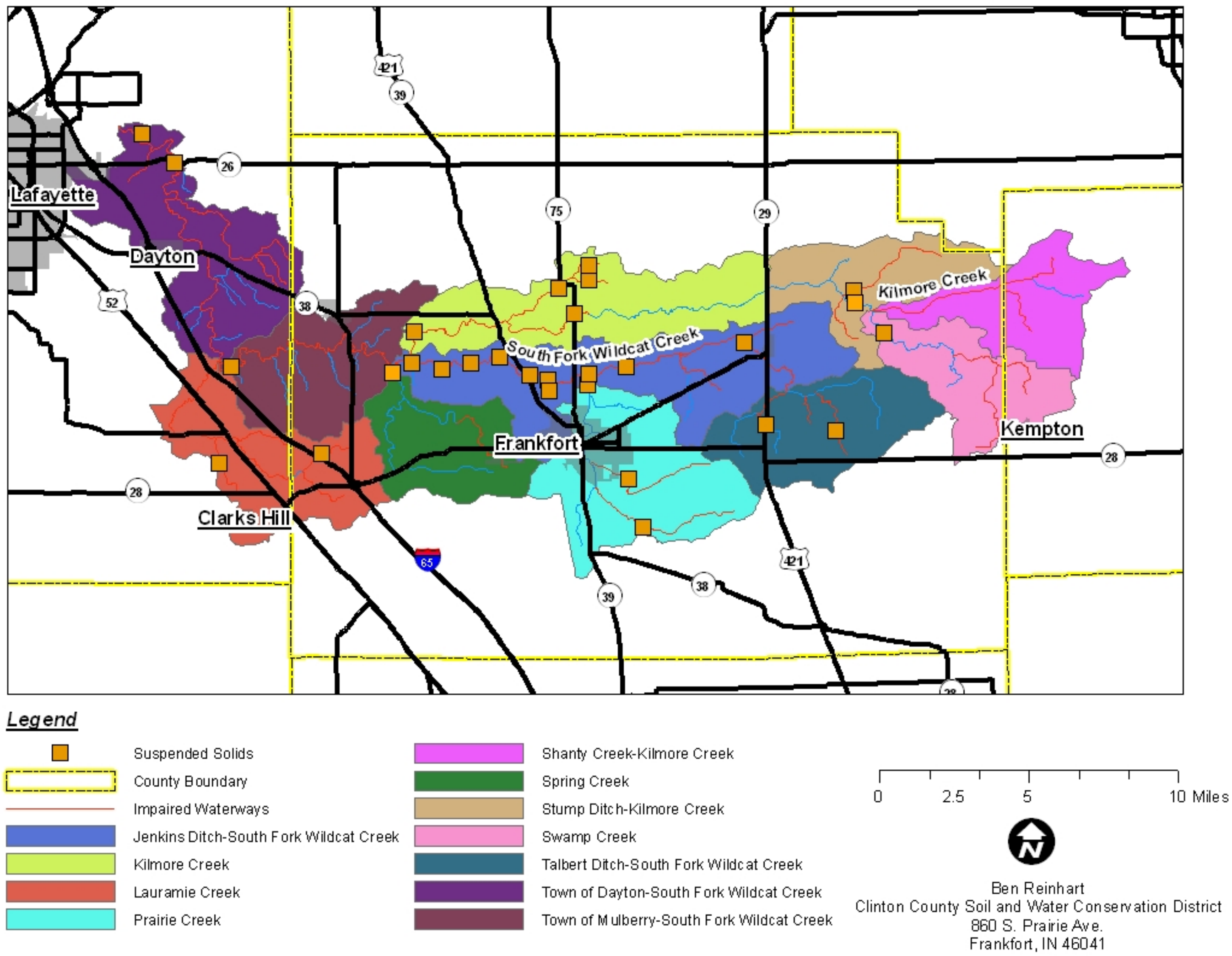


Figure 89. Total Suspended Solids Impairments for the South Fork Wildcat Creek Watershed

(i.e. wet weather periods) is when water quality standards are commonly being exceeded. Rural and urban surface runoff obviously plays a role in these loadings but streambank erosion has also been identified as a potential source of elevated TSS concentrations, especially during high flow, wet weather events. The Talbert Ditch subwatershed is the only headwater drainage area with a required load reduction for TSS (28% reduction, high flow periods only).

Nutrients

Nutrients have long been identified as a pollutant of concern within the South Fork Wildcat Creek watershed. A number of areas have been targeted in the past, such as Lauramie Creek, Prairie Creek, and Swamp Creek subwatersheds, to determine the extent of nitrogen and phosphorus loading from various sources. As can be seen below there have been a number of impairments identified within these drainages as well as in the Jenkins Ditch, Kilmore Creek, and Spring Creek subwatersheds (Figure 90). Current sampling efforts show excessive Total Phosphorus levels within the Prairie Creek drainage during both high and low flow events. Also, the Jenkins Ditch subwatershed exceeds phosphorus water quality targets both upstream and downstream of the Prairie Creek outlet during high flow events. Ammonia has historically been measured downstream of potential sources of wastewater discharges. These areas have shown various impairments. Current sampling did not focus on measuring ammonia levels but rather measured nitrate-nitrite levels. At our target level of 10 mg/L, a drinking water standard for the State of Indiana, only one site within the Jenkins Ditch subwatershed exceeded this concentration which was during a wet weather event. Other drainage areas, except for Spring Creek and Lauramie Creek subwatersheds, showed average high flow concentrations approaching our target level while average low flow concentrations fell well below the target standard. Based on current water quality targets, the Jenkins Ditch drainage area is the only subwatershed with required load reductions

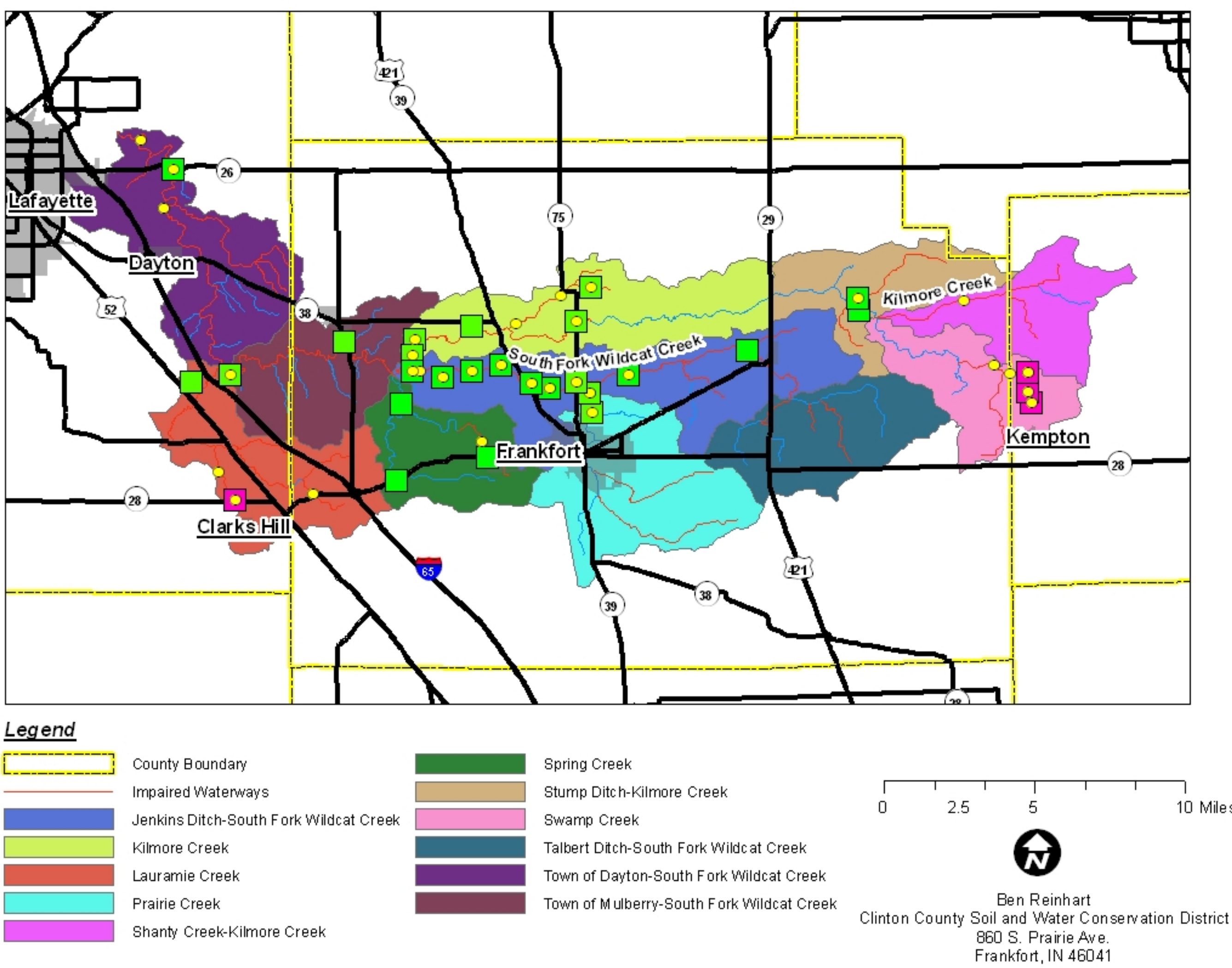


Figure 90. Nutrient Impairments for the South Fork Wildcat Creek Watershed

for nitrate-nitrite (4%, high flow periods only). The Jenkins Ditch subwatershed, as well as the Town of Dayton subwatershed, has load reductions for Total Phosphorus of 12% and 35%, respectively, for high flow periods. The Prairie Creek Subwatershed has estimated load reductions for both high flow (27%) and low flow (75%) periods.

Bacteria and Pathogens

Along with nutrients, *E. coli* has been a historically important parameter for water quality in the South Fork Wildcat Creek watershed (Figure 91). Past areas that have been specifically focused on include the Swamp Creek, Lauramie Creek, and Spring Creek subwatersheds as well as areas around the Blinn Ditch and Boyle's Ditch drainages. Current sampling has shown that the highest averages during both high and low flow periods can be found in the Jenkins Ditch, Prairie Creek, Lauramie Creek, and Stump Ditch subwatersheds. The Jenkins Ditch, Prairie Creek, Kilmore Creek, Spring Creek, and Lauramie Creek

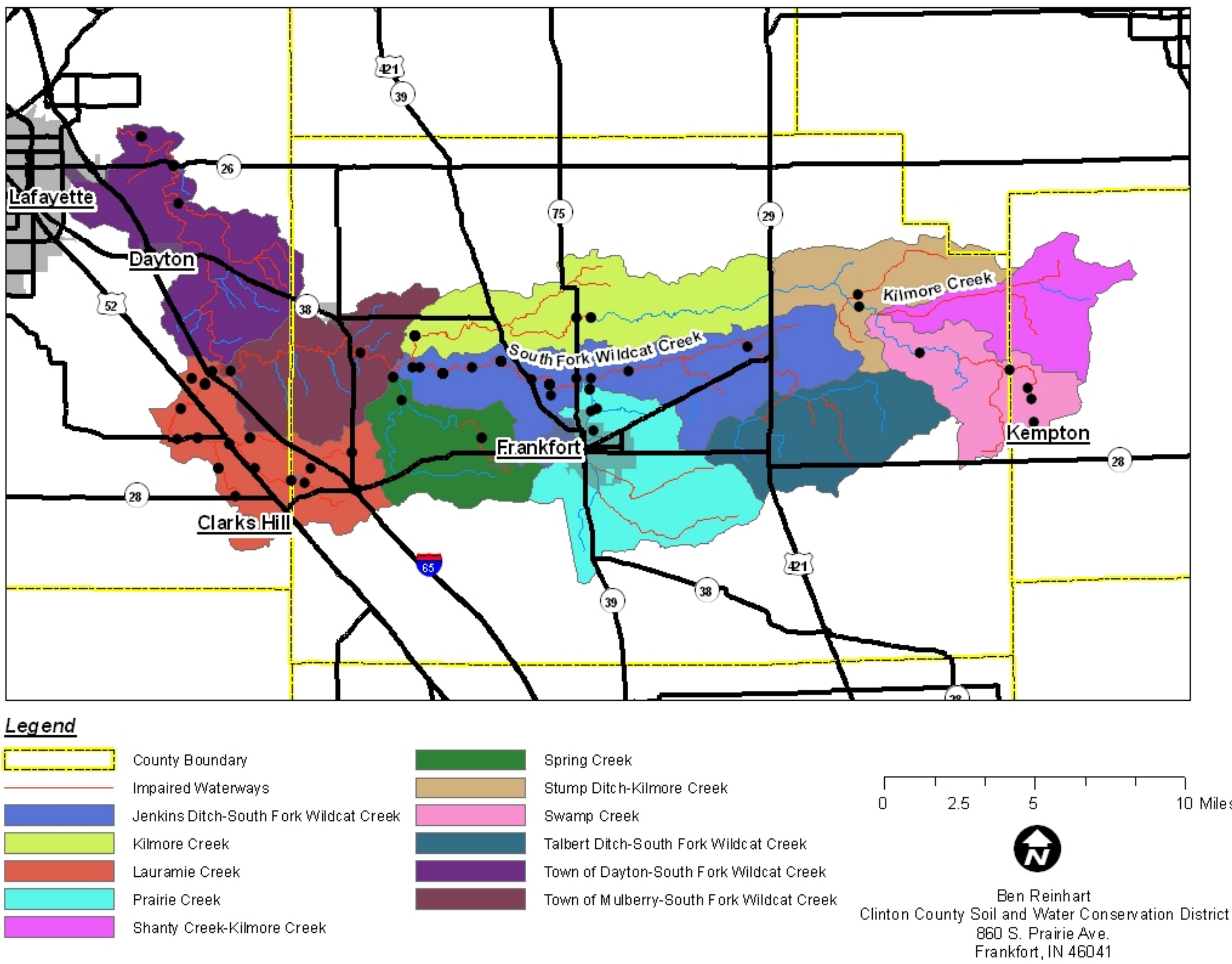


Figure 91. E.coli Impairments for the South Fork Wildcat Creek Watershed

drainage areas have estimated load reductions for both high and low flow periods. Low flow period reductions range from 39% in the Jenkins Ditch drainage to 66% in the Prairie Creek drainage. However, all subwatersheds within the South Fork Wildcat Creek Watershed have load reductions estimated at 61% or more for *E. coli* during high flow periods. Past documented impairments in the Spring Creek subwatershed will hopefully improve given the new utilities and infrastructure expansion occurring around the Town of Jefferson. Also, current talks are progressing regarding potential wastewater strategies for the Town of Kempton which has historically struggled with wastewater discharges.

Habitat and Biology

Indices and other measures of habitat quality and biological communities have been routinely sampled as part of recent and historic water quality projects (Figure 92). Generally, impaired sites have been documented in headwater drainage areas while the main, downstream channels of the South Fork Wildcat Creek and Kilmore Creek have supported high quality habitat and biology. During current sampling, locations within the Prairie Creek and Stump Ditch subwatersheds showed the lowest habitat and biological scores (2-4 index points below the standard). Also, biological measurements showed relatively low-quality communities within the Jenkins Ditch drainage despite offering average to good in-stream habitat. Generally this type of relationship would suggest that a chemical or other environmental stressor (e.g. high bacteria and pathogen loads) is impacting local macroinvertebrates. Some of the highest quality subwatersheds included the Dayton, Mulberry, Kilmore, Spring, and Lauramie Creek drainages. These drainages also rank highly in regards to the percentage of natural land uses within floodplains and riparian areas.

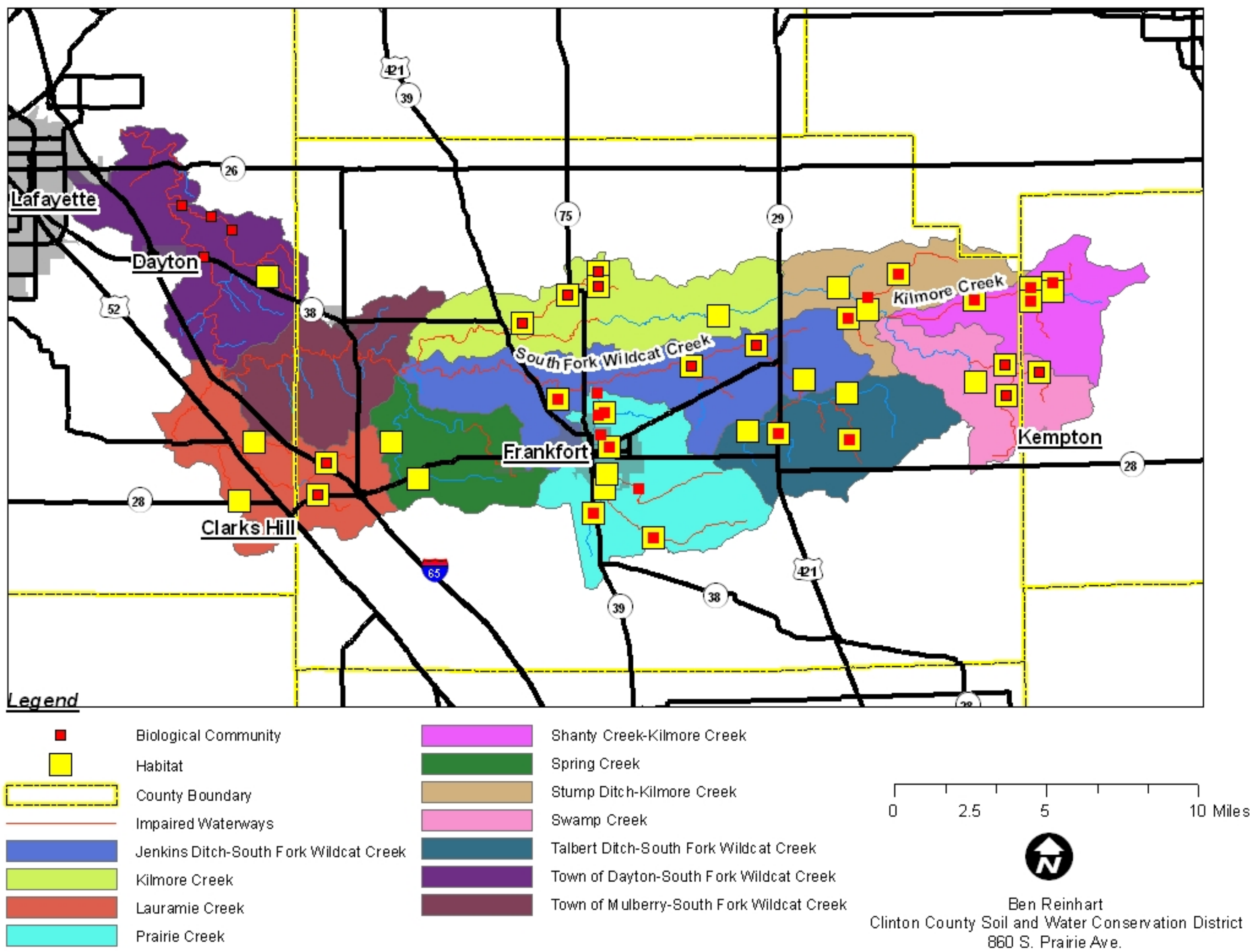


Figure 92. Habitat and Biology Impairments for the South Fork Wildcat Creek Watershed

5.2 ANALYSIS OF STAKEHOLDER CONCERNS

Following the characterization and inventory of the South Fork Wildcat Creek watershed, stakeholder and steering committee concerns were analyzed. As part of this analysis, each concern was evaluated to determine if there was data to support it, if so what evidence is currently available, can the concerned by reasonably quantified, and is the concern within the scope of this project (Table 25). These grading variables helped the steering committee prioritize the wide variety of concerns that were gathered during the initial stages of this watershed planning effort. All but three concerns were accepted by the steering committee during this process. Flooding and drainage issues, in relation to land use change on a watershed-scale, was determined to be a more appropriate issue for local planning professionals. While it was generally agreed upon that certain locales have experienced increased development and growth, it was also determined that these issues are better suited for the established procedures and protocols of the local planning offices. However, the steering committee will look to encourage and support future planning efforts that will help restore the natural functions of local floodplains and riparian areas which will help reduce costly flooding and drainage issues. Other concerns that the steering committee has chosen not to directly focus on are issues related to established regulations and permitting processes. Issues such as municipal stormwater regulations and environmental remediation sites have established guidelines for addressing problems. Here again, the steering committee has instead chosen to play more of a support role by offering help such as general assistance or community outreach to both public and private partners which are already operating under or subject to these set regulations.

Table 25. Analysis of Stakeholder Concerns

Stakeholder Concerns	Supported by Data (Y/N)	Evidence	Quantifiable (Y/N)	Outside WMP Scope (Y/N)	Accepted (Y/N)
Development and land use change has resulted in more frequent flood events and problems with drainage	NO	More detailed data is needed	YES	YES	NO, but will look to support all local planning efforts
Mismanagement of our floodplains and streams (e.g. construction in floodplain, use of natural waterways as drains, channel filling, etc.) has altered the natural hydrology of the watershed resulting in unstable channels and flows as well as reduced flood storage.	YES	Observation and Landowner Accounts	NO	NO	YES

Table 25. Analysis of Stakeholder Concerns (continued)

Stakeholder Concerns	Supported by Data (Y/N)	Evidence	Quantifiable (Y/N)	Outside WMP Scope (Y/N)	Accepted (Y/N)
Developing areas are contributing pathogens and *E. coli* through sewer overflow events and other wastewater discharges.	YES	Watershed Inventories; NPDES Permit Information	YES	YES	NO, but will look to support existing regulations
Livestock and the spreading of their manure increase pathogen and *E. coli* loads in local waters	YES	Observation and Landowner Accounts; Current and Historic Sampling Projects	YES	NO	YES
Lack of septic systems, or maintenance of older systems, increase pathogen and *E. coli* levels especially near local unsewered communities	YES	Observation and Landowner Accounts; Current and Historic Sampling Projects	YES	NO	YES
Urban and industrial areas are contributing various environmental toxins including PCB's	YES	Watershed Inventories; More detailed WQ date is necessary to confirm	YES	YES	NO, but will look to support existing regulations
Current and past landfill sites are introducing sediments and pollutants into local waters	YES	Observation and Landowner Accounts	YES	NO	YES
Stormwater runoff from developed or developing areas contain high levels of water quality pollutants	NO	More detailed WQ data needed within target areas	YES	NO	YES, Committee has assumed this is still a valid concern

Table 25. Analysis of Stakeholder Concerns (continued)

Stakeholder Concerns	Supported by Data (Y/N)	Evidence	Quantifiable (Y/N)	Outside WMP Scope (Y/N)	Accepted (Y/N)
Lawn runoff from high-residential areas contain elevated levels of pesticides and nutrients	NO	More detailed WQ data needed within target areas	YES	NO	YES, Committee has assumed this is still a valid concern
Streambank erosion and slope failures input high levels of sediment directly into local streams	YES	Observation and Landowner Accounts	YES	NO	YES
The lack of conservation tillage practices in the county is contributing to high levels of sediment and nutrients in our waterways	YES	Watershed Inventories	YES	NO	YES
The lack of buffers, filter strips, and grass waterways allow agricultural land to introduce a lot of sediment and nutrients across the watershed	YES	Watershed Inventories	YES	NO	YES
Many people are not aware or know much about the watershed	YES	Social Indicator Survey	YES	NO	YES
There is low public appreciation and support for the watershed as can be seen through illegal dumping activities, passive regulations, and lack of maintained access points or other recreational amenities	YES	Social Indicator Survey	YES	NO	YES
Forested riparian habitat is limited across the watershed impacting local wildlife and water quality	YES	Watershed & Land Use Inventories	YES	NO	YES

5.3 POTENTIAL SOURCES OF WATER QUALITY IMPAIRMENTS

Once the concerns were identified by the steering committee, they were used to identify specific problems that can be seen throughout the watershed. Defined here, a problem is a certain condition in the watershed that occurs due to a particular concern. Also, as you can see in the table below, multiple concerns can all relate to a single specific problem (Table 26). Identified problems were further broken down by the steering committee into potential causes and possible sources of those causes. Both recent and historic water quality data was used by the group to try and provide specific parameters as root causes to problems, where applicable. Then using information from the Watershed Inventory and GIS data, potential sources were characterized for the entire South Fork Wildcat Creek. Many of these sources are also described on a subwatershed level in Chapter 6. Critical and Priority Area Selection.

Table 26. Identification of Potential Sources

Stakeholder Concern	Problem	Potential Causes	Potential Sources
Mismanagement of our floodplains and streams (e.g. construction in floodplain, use of natural waterways as drains, channel filling, etc.) has altered the natural hydrology of the watershed resulting in unstable channels and flows as well as reduced flood storage.	Current management of riparian lands degrade the natural functions and benefits of floodplains	Excessive drainage, loss of natural riparian habitat	• 7.5 % of land within riparian areas and floodplains are developed • 51.5% of land within riparian areas and floodplains are grazed, hayed, or cultivated • Over 200 miles of drain tile and 100 miles of open ditch
Developing areas are contributing pathogens and *E. coli* through Combined Sewer Overflow (CSO) events and other wastewater discharges.	Many surface waters throughout the watershed may be unsafe for recreation or other contact uses	*E. coli* levels exceed accepted target levels	• 40 Active CFO's in the watershed • City of Frankfort CSO • 7 NPDES with ≥1 effluent exceedances • 17 confirmed locations where livestock can freely access waterways • Over 200 miles of drain tile and 100 miles of open ditch • 92% of watershed soils poorly suited for septic systems
Livestock and the spreading of their manure increase pathogen and *E. coli* loads in local waters			
Lack of septic systems, or maintenance of older systems, increase pathogen and *E. coli* levels especially near local unsewered communities			
Urban and industrial areas are contributing various environmental toxins including PCB's			
Current and past landfill sites are introducing sediments and pollutants into local waters			
Stormwater runoff from developed or developing areas contain high levels of water quality pollutants			
Lawn runoff from high-residential areas contain elevated levels of pesticides and nutrients			

Table 26. Identification of Potential Sources (continued)

Stakeholder Concern	Problem	Potential Causes	Potential Sources
Many people are not aware or know much about the watershed There is low public appreciation and support for the watershed as can be seen through illegal dumping activities, passive regulations, and lack of maintained access points or other recreational amenities	Coordinated efforts for watershed education and outreach have not previously been focused on the watershed	Underutilized partnerships, Lack of Funding, Low exposure to local officials	N/A
There is low public appreciation and support for the watershed as can be seen through illegal dumping activities, passive regulations, and lack of maintained access points or other recreational amenities Current and past landfill sites are introducing sediments and pollutants into local waters	Trash and illegal dumping are apparent in various parts of the watershed	Lack of education & outreach (especially to unique target groups), Lack of affordable disposal outlets	N/A
Streambank erosion and slope failures input high levels of sediment directly into local streams The lack of conservation tillage practices in the county is contributing to high levels of sediment and nutrients in our waterways The lack of buffers, filter strips, and grass waterways allow agricultural land to introduce a lot of sediment and nutrients across the watershed Current and past landfill sites are introducing sediments and pollutants into local waters Stormwater runoff from developed or developing areas contain high levels of water quality pollutants	Surface waters throughout the watershed are often turbid and appear muddy	Total Suspended Sediment (TSS) levels exceed accepted standards	• 7.5 % of land within riparian areas and floodplains are developed • 51.5% of land within riparian areas and floodplains are grazed, hayed, or cultivated • 6% of watershed is HEL, 30% of watershed is PHEL • 17 confirmed locations where livestock can freely access waterways • 8.2% of watershed is impervious surface • 72 locations of active erosion identified through windshield surveys

Table 26. Identification of Potential Sources (continued)

Stakeholder Concern	Problem	Potential Causes	Potential Sources
The lack of conservation tillage practices in the county is contributing to high levels of sediment and nutrients in our waterways The lack of buffers, filter strips, and grass waterways allow agricultural land to introduce a lot of sediment and nutrients across the watershed Lawn runoff from high-residential areas contain elevated levels of pesticides and nutrients Stormwater runoff from developed or developing areas contain high levels of water quality pollutants	High levels of nutrients can be found in surface waters throughout the watershed	Nitrogen and Phosphorus levels exceed accepted target levels	• 40 Active CFO's in the watershed • City of Frankfort CSO • 7 NPDES with ≥1 effluent exceedances • 17 confirmed locations where livestock can freely access waterways • Over 200 miles of drain tile and 100 miles of open ditch • 7.5 % of land within riparian areas and floodplains are developed • 51.5% of land within riparian areas and floodplains are grazed, hayed, or cultivated
Forested riparian habitat is limited across the watershed impacting local wildlife and water quality	Many aquatic and terrestrial wildlife are either at risk or occur in much lower numbers	Lack of natural riparian habitat and habitat corridors, Low water quality	• 7.5 % of land within riparian areas and floodplains are developed • 51.5% of land within riparian areas and floodplains are grazed, hayed, or cultivated • 17 confirmed locations where livestock can freely access waterways

6.0 CRITICAL & PRIORITY AREA SELECTION

In order to prioritize future implementation and funding efforts, the steering committee worked to develop Critical Land Areas (CLA) and Priority Protection Areas (PPA). CLA's defined here are areas or specific situations which have a high likelihood of contributing pollutant loads to the watershed. Each water quality parameter has its own set of CLA's. For example, CLA's were developed for Nutrients, TSS, Bacteria & Pathogens, and Environmental Quality. The steering committee also recognized that the South Fork Wildcat Creek watershed has certain land areas where riparian and in-stream habitats exist in a relatively natural condition. These areas have been designated as PPA's and will be prioritized for future protection measures to preserve the existing natural conditions.

CLA's and PPA's were calculated at the subwatershed level using a numeric ranking system that would take into account certain variables related to each water quality parameter (Figure 93). Also, given that modeled load estimates were not calculated for *E.coli*, current load estimates were weighted by a factor of two. All variables used in the selection of CLA's and PPA's are described below.

NUTRIENTS = Modeled Loading + Current Loading + Hydric Soils + Riparian Land Use + Confined Feeding Operations + NPDES Facilities

TOTAL SUSPENDED SOLIDS = Modeled Loading + Current Loading + Erodible Lands + Riparian Land Use + Impervious Surfaces

BACTERIA & PATHOGENS = (Current Loading x 2) + Hydric Soils + Riparian Land Use + Confined Feeding Operations + NPDES Facilities

ENVIRONMENTAL QUALITY = QHEI Score + mIBI Score + Applied Conservation Practices + Riparian Land Use + Impervious Surfaces

Figure 93. Ranking Formulas

6.1 MODELED AND CURRENT POLLUTANT LOAD ESTIMATES

Purdue researchers modeled pollutant yields for nutrients and sediment across the South Fork Wildcat Creek watershed using the Soil & Water Assessment Tool (SWAT). SWAT is a model that was developed by Texas A&M University for the USDA Agricultural Research Service in the early 1990's and has since went through a number of updates and advances. This model incorporates a number of characteristics from the watershed (e.g. weather patterns, soil properties, topography, land use and management, etc.) to estimate pollutant yields across a diverse landscape, continuously over an extended time period. Compared to our calculations of current pollutant loads, which look only at a single point time, the SWAT model allows for a more long-term analysis of pollutant yields. Another important consideration is the SWAT delineates subbasins (i.e. subwatersheds) based on elevation models which may or may not match the Hydrologic Unit Code boundaries of subwatersheds that were used during this watershed planning project. For our comparisons, SWAT subbasins were grouped together to approximate 12-digit Hydrologic Unit Code boundaries, to the closest extent possible.

For the South Fork Wildcat Creek watershed, estimates of annual sediment and nutrient yields were modeled over a period of 15 years starting in 1995. All yields were averaged across the 15-year period for each subwatershed and then divided by the total drainage area. This resulted in average annual yield per acre for nutrients and sediments (Table 27). Each subwatershed was then ranked based on their relative annual yield per acre with a ranking of "1" indicating the highest amount of loading among all drainage areas and "10" indicating the lowest amount of loading (Table 39).

Table 27. SWAT Modeling of Subwatersheds (lbs/ac/year)

Subwatershed	Total Phosphorus	Nitrates	Sediment
Shanty Creek/Swamp Creek	2.7	10.0	2782.7
Stump Ditch-Kilmore Creek	3.5	13.3	4274.6
Kilmore Creek	4.9	22.9	6830.1
Talbert Ditch-South Fork Wildcat Creek	2.9	12.5	3375.2
Prairie Creek	4.7	18.1	5233.0
Jenkins Ditch-South Fork Wildcat Creek	6.3	28.0	8433.4
Spring Creek	2.5	9.2	2203.8
Lauramie Creek	4.0	13.6	4412.9
Town of Mulberry-South Fork Wildcat Creek	3.4	11.3	4706.0
Town of Dayton-South Fork Wildcat Creek	3.0	12.8	3667.9

Estimates of current loading were calculated using water quality data from the South Fork Wildcat Creek Water Quality Assessment which was completed during 2010 and 2011. Most subwatersheds have at least one sampling location located near the outlet of that drainage area. A couple exceptions are the Swamp Creek, Shanty Creek, and Talbert Ditch subwatersheds. In these situations the closest downstream location from the subwatershed outlet was used. Also, in this instance, both the Shanty Creek and Swamp Creek subwatershed will be treated as a single drainage area outletting at Sampling Location #3. The Talbert Ditch subwatershed will be evaluated at Sampling Location #2. The Kilmore Creek subwatershed contains two sampling locations while the Jenkins Ditch subwatershed contains three sampling locations. Water quality data at those locations were averaged to obtain an overall loading for each respective drainage area (Table 28).

Table 28. Sampling Locations Used for Load Estimations

Subwatershed	Sampling Location
Shanty Creek/Swamp Creek	3
Stump Ditch-Kilmore Creek	1
Kilmore Creek	4,5
Talbert Ditch-South Fork Wildcat Creek	2
Prairie Creek	6
Jenkins Ditch-South Fork Wildcat Creek	13,14, 18
Spring Creek	9
Lauramie Creek	10
Town of Mulberry-South Fork Wildcat Creek	15
Town of Dayton-South Fork Wildcat Creek	16

Current loading estimates by subwatershed were calculated by multiplying the average pollutant concentration, an estimate of the volume of streamflow passing through that location at a certain point in time, and a specific conversion factor to transform each concentration measurement into a mass-based or organism-based "load" for that point in time. Our estimates for mass-based pollutants (e.g. nutrients and sediment) are expressed in tons per year (T/Yr). Since *E. coli* does not have a specific mass-based conversion factor, the total number of organisms was calculated to give loads in billions of organisms per year (G-org/Yr). Current loads for each subwatershed and required reductions necessary to meet this project's water quality targets are shown below (Table 29). For the purposes of identifying CLA's and PPA's, current load estimates were divided by the total drainage area to reach a loading per acre estimate. Each subwatershed was then ranked based on their current loading per acre with one being the highest loading per acre. It is important to realize that in some cases prioritized CLA's may not correlate directly with subwatershed estimates for cumulative loads or loading per acre estimates. This can be attributed to a number of reasons. Current loadings are estimated for a single point in time and may not reflect the variation in actual, real world pollutant loading that occurs within each drainage over the course of the seasons. We looked to introduce some of these other variables into our ranking system to account for some of this variability. Another potential reason for this discrepancy is that downstream subwatersheds often "inherit" water quality impairments from more upstream drainages. So, in this case, if you were to focus all of your attention on the drainage area where the loading is documented, you still wouldn't be addressing the true source of the loading which may lie in a completely different watershed. Again, we looked to add in characteristics such as land use and other variables that can help identify these areas.

Table 29. Load Estimates and Required Load Reductions (T/Yr.; G-Org/Yr.)

Red Text Indicates Values Exceeding Current Water Quality Targets

Subwatershed	Total Phosphorus *Current Load (Target)*		Nitrate-Nitrite *Current Load (Target)*		Total Suspended Solids *Current Load (Target)*		*E. coli** *Current Load (Target)*	
	High Flow	*Low Flow*	*High Flow*	*Low Flow*	*High Flow*	*Low Flow*	*High Flow*	*Low Flow*
Shanty Creek/Swamp Creek	2 (4)	0.1 (0.5)	129 (143)	5 (16)	328 (428)	18 (47)	100,352 (16,182)	809 (1,786)
Stump Ditch-Kilmore Creek	5 (7)	1 (1)	175 (231)	11 (34)	468 (693)	17 (103)	140,392 (26,226)	2,025 (3,906)
Kilmore Creek	23 (32)	1 (4)	887 (1,050)	43 (127)	5,907 (3,150)	63 (382)	441,488 (119,132)	25,419 (14,452)
Talbert Ditch-South Fork Wildcat Creek	7 (14)	0.4 (2)	407 (467)	16 (50)	1,951 (1,402)	20 (151)	398,520 (53,009)	3,274 (5,692)
Prairie Creek	11 (8)	12 (3)	254 (271)	77 (93)	690 (812)	38 (280)	208,579 (30,690)	30,805 (10,602)
Jenkins Ditch-South Fork Wildcat Creek	52 (46)	3 (5)	1,610 (1,538)	78 (180)	8,432 (4,613)	114 (539)	1,065,654 (174,466)	33,347 (20,385)

Table 29. Load Estimates and Required Load Reductions (T/Yr.; G-Org/Yr.) continued

Subwatershed	Total Phosphorus Current Load (Target)		Nitrate-Nitrite Current Load (Target)		Total Suspended Solids Current Load (Target)		*E. coli** Current Load (Target)	
	High Flow	*Low Flow*	*High Flow*	*Low Flow*	*High Flow*	*Low Flow*	*High Flow*	*Low Flow*
Spring Creek	3 (5)	1 (3)	91 (152)	16 (89)	381 (457)	28 (266)	79,379 (17,298)	20,142 (10,044)
Lauramie Creek	2 (4)	0.4 (1)	62 (148)	10 (49)	70 (443)	13 (148)	91,350 (16,740)	12,547 (5,580)
Town of Mulberry-South Fork Wildcat Creek	133 (133)	7 (14)	3,940 (4,427)	166 (475)	50,795 (13,280)	196 (1,425)	1,648,504 (502,194)	43,797 (53,902)
Town of Dayton-South Fork Wildcat Creek	249 (162)	5 (18)	4,842 (5,410)	159 (595)	102,794 (16,231)	174 (1,785)	1,578,108 (613,793)	29,431 (67,517)
Subwatershed Totals	486 (415)	30 (51)	12,396 (13,836)	583 (1,709)	171,816 (41,509)	681 (5,126)	5,752,325 (1,569,729)	201,598 (193,866)
LOAD REDUCTIONS								
Shanty Creek/Swamp Creek	-	-	-	-	-	-	84,170 (84%)	-
Stump Ditch-Kilmore Creek	-	-	-	-	-	-	114,166 (81%)	-
Kilmore Creek	-	-	-	-	2,756 (47%)	-	322,356 (73%)	10,967 (43%)
Talbert Ditch-South Fork Wildcat Creek	-	-	-	-	549 (28%)	-	345,511 (87%)	-
Prairie Creek	3 (27%)	9 (75%)	-	-	-	-	177,890 (85%)	20,204 (66%)
Jenkins Ditch-South Fork Wildcat Creek	6 (12%)	-	72 (4%)	-	3,819 (45%)	-	891,188 (84%)	12,961 (39%)
Spring Creek	-	-	-	-	-	-	62, 081 (78%)	10,098 (50%)
Lauramie Creek	-	-	-	-	-	-	74,610 (82%)	6,968 (56%)
Town of Mulberry-South Fork Wildcat Creek	-	-	-	-	37, 515 (74%)	-	1,146,309 (70%)	-
Town of Dayton-South Fork Wildcat Creek	87 (35%)	-	-	-	86,563 (84%)	-	964,315 (61%)	-
Total Reductions	*71 (15%)*	*-*	*-*	*-*	*130,307 (76%)*	*-*	*4,182,596 (73%)*	*7,732 (4%)*

Note 1. High flow (May-June) and low flow (Sept.-Oct.) averaged estimates from South Fork Wildcat Creek SWAT Model

6.2 LAND USE EVALUATIONS

Various land use metrics were used to evaluate subwatersheds within the South Fork Wildcat Creek watershed for the purpose of determining the need for restoration or protection. First, impervious surfaces were measured throughout each subwatershed. As was discussed in the Land Use section of this plan, impervious surfaces can make significant impacts towards impacting local waterways. According to the Center for Watershed Protection, impacts on local surface waters begin to show once impervious surfaces exceed 10% of the total watershed land use. Lands with over 10% impervious surfaces were totaled for each subwatershed and divided by the total drainage area for that subwatershed (Table 30). The subwatersheds were then ranked based on the percentage of lands within their boundaries that exceed that 10% impervious surface limit. A ranking of "1" indicates the subwatershed with the greatest amount of impervious surfaces.

Table 30. Evaluation of Impervious Surfaces by Subwatershed

Subwatershed	Impervious Surfaces		
	<10%	*10-25%*	*>25%*
Swamp Creek/Shanty Creek-Kilmore Creek	99%	0.4%	0.5%
Stump Ditch-Kilmore Creek	99%	1%	1%
Kilmore Creek	99%	1%	0.4%
Talbert Ditch-South Fork Wildcat Creek	98%	1%	1%
Prairie Creek	88%	2%	9%
Jenkins Ditch-South Fork Wildcat Creek	95%	1%	4%
Spring Creek	97%	1%	2%
Lauramie Creek	96%	2%	3%
Town of Mulberry-South Fork Wildcat Creek	98%	1%	1%
Town of Dayton-South Fork Wildcat Creek	94%	2%	4%

The second metric used to evaluate land use relates to the type of land cover within the floodplain area of local waterways. For waterways which did not show floodways on the Flood Insurance Rate Maps a floodplain/riparian area of 100' was designated. Land-use/land-cover was divided into two categories, modified or natural. Modified land uses included various degrees of development as well as land used for agricultural purposes such as farming or grazing. Natural land uses including wooded areas, grasslands, and wetlands. Rankings, based on the percentage of modified land within the floodplain/riparian area, for each subwatershed were developed similar to what was described above (Table 31). A subwatershed ranking of "1" indicates the lowest amount of natural land cover within designated floodplain and riparian areas.

Table 31. Floodplain & Riparian Land Use Evaluation by Subwatershed

Subwatershed	Floodplain & Riparian Zone Land Use	
	Modified	*Natural*
Swamp Creek/Shanty Creek-Kilmore Creek	91%	9%
Stump Ditch-Kilmore Creek	83%	17%
Kilmore Creek	49%	51%
Talbert Ditch-South Fork Wildcat Creek	92%	8%
Prairie Creek	82%	18%
Jenkins Ditch-South Fork Wildcat Creek	56%	44%
Spring Creek	74%	26%
Lauramie Creek	60%	40%
Town of Mulberry-South Fork Wildcat Creek	47%	53%
Town of Dayton-South Fork Wildcat Creek	42%	58%

Our third metric addressed the issue of already applied conservation practices within each subwatershed. This measure allows us to see a couple different things. First, it acts as an indicator of interest in participating in government-run conservation programs. Attracting funding and support for implementation programs is not useful or effective if land owners and managers are unwilling to participate in those programs. However, this measure also allows us to identify gaps in applied conservation. These gaps may indicate an unwillingness to participate in government programs. However, these gaps could also indicate areas where outreach efforts have fallen short or where demonstration projects may be targeted. Using NRCS tracking systems the total amount of acres with applied conservation practices were calculated and then divided by the total subwatershed drainage area (Table 32). Subwatersheds were then ranked based on this percentage with "1" indicating the lowest amount of applied conservation acres. It is important to note that certain acres may have multiple practices addressing various resource concerns. In order to avoid inflating estimates for certain subwatersheds and so that all acres would be counted equal, acres with multiple practices were only counted once to get an estimate of unique conservation acres per subwatershed.

Table 32. Subwatershed Evaluation of Applied Conservation

Subwatershed	Total Drainage Area	Applied Conservation	
	Acres	Acres	Percent
Swamp Creek/Shanty Creek-Kilmore Creek	15,110	2,555	16.9%
Stump Ditch-Kilmore Creek	10,594	912	8.6%
Kilmore Creek	17,423	4,509	25.9%
Talbert Ditch-South Fork Wildcat Creek	13,116	4,641	35.4%
Prairie Creek	17,191	1,113	6.5%
Jenkins Ditch-South Fork Wildcat Creek	22,816	4,580	20.1%
Spring Creek	10,218	3,910	38.3%
Lauramie Creek	15,110	2,555	16.9%
Town of Mulberry-South Fork Wildcat Creek	13,335	2,371	17.8%
Town of Dayton-South Fork Wildcat Creek	18,834	1,877	10.0%
South Fork Wildcat Creek Watershed Total	*153,747*	*29,024*	*18.9%*

Last, we looked to quantify and compare the occurrences of two specific land uses, Confined feeding operations (CFO) and NPDES facilities with documented water quality exceedances. CFO's are often targeted due to public perceptions of their operations. However, often times these operations go above and beyond to mitigate their impacts on surrounding lands. Despite this, these operations still represent high threat areas for water quality impacts. These threats not only come from the facility themselves but also from the treatment of animal wastes from that facility. These wastes are often used as fertilizer in farm operations and areas surrounding CFO's can often become saturated with manure-based fertilizers. These fields can contribute high nutrient and bacteria loads not only from surface runoff but also through subsurface tile drainage.

NPDES facilities are similar in some regards to CFO's. Often times these operations are run within established regulations and impacts on surrounding lands are minimal. However, these facilities can and do have periods where they operate outside of current regulations. During these periods, large amounts of nutrients, sewage, and other pollutants can be discharged directly into local waterways, untreated. For this comparison we only counted NPDES facilities with documented effluent exceedances and active CFO's (Table 33). Each subwatershed was then ranked based on this total number with a ranking of "1" indicating the highest number of active CFO's/NPDES permits. One note is that previously it was documented that there are currently seven NPDES facilities with documented effluent exceedances while the table below shows a total of eight. This is due to the fact that one NPDES facility discharges in two separate subwatersheds.

Table 33. Comparison of Confined Feeding Operations & NPDES Permits by Subwatershed

Subwatershed	Active Livestock Operations	NPDES Permits (w/exceedances)
Swamp Creek/Shanty Creek-Kilmore Creek	4	0
Stump Ditch-Kilmore Creek	6	0
Kilmore Creek	6	0
Talbert Ditch-South Fork Wildcat Creek	5	0
Prairie Creek	1	1
Jenkins Ditch-South Fork Wildcat Creek	6	2
Spring Creek	1	2
Lauramie Creek	3	2
Town of Mulberry-South Fork Wildcat Creek	7	1
Town of Dayton-South Fork Wildcat Creek	1	0

6.3 CRITICAL SOIL AREAS

Critical soil areas were determined to be those that are highly erodible as well as soils with hydric properties. Highly erodible lands are those land areas which are susceptible to erosion from surface runoff and thus have a high potential of contributing sediment and nutrients to local waterways. These areas were determined by soil type using NRCS Highly Erodible Soils Lists for each county with land area in the South Fork Wildcat Creek watershed. This list classifies each soil type as: 1. Highly Erodible, 2. Potentially Highly Erodible, and 3. Not Highly Erodible. A total Erodibility score was calculated by combining the percentage of total lands within each subwatershed that could be classified as either Highly Erodible or Potentially Highly Erodible (Table 34). Highly erodible lands were weighted by a factor of two, assuming a higher potential for erosion to occur. Each subwatershed was then ranked based on their Erodibility score. A ranking of "1" indicates a greater Erodibility Score

Hydric soils were treated similar to the process described above. A total percentage of land area for each subwatershed was determined based on soil type and NRCS Hydric Soils Lists for each county. Subwatersheds were then ranked based on the percentage of hydric soils within their boundaries. A ranking of "1" indicates the highest occurrence of hydric soils.

Table 34. Evaluation of Hydric & Erodible Soils by Subwatershed

Subwatershed	Hydric Soil	Highly Erodible Soils	Potentially Highly Erodible Soils
		Percent of Total Drainage Area	
Swamp Creek/Shanty Creek-Kilmore Creek	54%	0.4%	24%
Stump Ditch-Kilmore Creek	47%	1%	37%
Talbert Ditch-South Fork Wildcat Creek	52%	0.5%	42%
Prairie Creek	39%	0.3%	40%
Kilmore Creek	22%	6%	56%
Spring Creek	40%	6%	21%
Jenkins Ditch-South Fork Wildcat Creek	26%	6%	44%
Lauramie Creek	36%	13%	4%
Town of Dayton-South Fork Wildcat Creek	16%	19%	2%
Town of Mulberry-South Fork Wildcat Creek	19%	12%	26%

6.4 HABITAT & BIOLOGY

Evaluations of stream habitat and biology were described for each subwatershed using mIBI and QHEI scores collected during the South Fork Wildcat Creek Water Quality Assessment. Subwatersheds which had more than one sampling location within their boundaries took the average score among all sampling sites (Table 35). Each subwatershed was then ranked with a ranking of "1" indicating the lowest scores. Sampling location #3 which was used to evaluate both the Swamp Creek and Shanty Creek subwatershed did not have a mIBI score. Its mIBI ranking was assumed to be "1", based off low QHEI scores, past documented impairments for biological communities, and current 303(d) listings for impaired biotic communities.

Table 35. Evaluation of Habitat & Biological Communities by Subwatershed

Subwatershed	Sampling Locations	Average QHEI	Average mIBI
Town of Dayton-South Fork Wildcat Creek	12,16	73.5	42
Jenkins Ditch-South Fork Wildcat Creek	13,14,17	64.0	39
Kilmore Creek	4,5	67.0	44
Lauramie Creek	10,11	61.5	43
Town of Mulberry-South Fork Wildcat Creek	15	73.0	46
Prairie Creek	6,7,8	52.0	38
Spring Creek	9	68.0	42
Stump Ditch-Kilmore Creek	1	54.0	34
Talbert Ditch-South Fork Wildcat Creek	2	57.0	40
Swamp Creek/Shanty Creek-Kilmore Creek	3	47.0	-

6.5 CRITICAL & PRIORITY LAND AREAS

Final subwatershed rankings are displayed in Table 37. Total scores for Nutrients, TSS, Bacteria & Pathogens, and Environmental Quality were calculated for each drainage area using the ranking formulas mentioned above and then evaluated to determine natural break points. All subwatersheds were grouped as Tier 1, Tier 2, or Tier 3 CLA's based on the above variables and ranking equations (Table

36). Tier 1 subwatersheds represent the highest priority drainage areas and where water quality practices will initially be focused. Tier 2 and 3 subwatersheds are those drainage areas which were determined to be secondary CLA's and will be addressed during the future phases of implementation funding. In regards to the Environmental Quality category, all drainage areas scoring over 30 points were designated as Priority Protection Areas.

Table 36. Critical Land Areas & Priority Protection Areas

Subwatershed	Nutrients	TSS	Bacteria & Pathogens	Environmental Quality
Swamp Creek/Shanty Creek-Kilmore Creek	**28**	*33*	**28**	**18**
Stump Ditch-Kilmore Creek	**22**	*27*	**25**	**18**
Kilmore Creek	**28**	**22**	**31**	**38**
Talbert Ditch-South Fork Wildcat Creek	**23**	*26*	**21**	**25**
Prairie Creek	**24**	**19**	**25**	**10**
Jenkins Ditch-South Fork Wildcat Creek	**21**	**16**	**23**	**26**
Spring Creek	*33*	*28*	**24**	**33**
Lauramie Creek	**30**	**23**	**34**	**26**
Town of Mulberry-South Fork Wildcat Creek	**29**	**22**	**23**	**38**
Town of Dayton-South Fork Wildcat Creek	*37*	**22**	**33**	**30**

TIER 1, **Tier 2**, *Tier 3*, **Priority Protection Area**

Table 37. Subwatershed Rankings for Critical Land Area Selections (1=Greater Risk to Water Quality)

Subwatershed	Historic Loading		Current Loading			Average mIBI	Average QHEI
	Nutrients	*Sediment*	*Nutrients*	*TSS*	*E. coli*		
Swamp Creek/Shanty Creek-Kilmore Creek	9	9	9	5	9	1	1
Stump Ditch-Kilmore Creek	5	6	6	4	7	1	3
Kilmore Creek	2	2	5	3	5	7	7
Talbert Ditch-South Fork Wildcat Creek	8	8	6	4	6	4	4
Prairie Creek	3	3	4	4	4	2	2
Jenkins Ditch-South Fork Wildcat Creek	1	1	3	2	3	3	6
Spring Creek	10	10	7	4	4	5	8
Lauramie Creek	4	5	8	5	8	6	5
Town of Mulberry-South Fork Wildcat Creek	7	4	1	1	1	8	9
Town of Dayton-South Fork Wildcat Creek	6	7	2	1	2	5	10

Subwatershed	Hydric Soils	Erodibility	Impervious Surfaces	Riparian Land Use	Applied Conservation	Active Livestock Operations	NPDES Permits (w/exceedances)
Swamp Creek/Shanty Creek-Kilmore Creek	1	7	10	2	4	4	3
Stump Ditch-Kilmore Creek	3	5	9	3	2	2	3
Kilmore Creek	8	1	8	8	8	2	3
Talbert Ditch-South Fork Wildcat Creek	2	6	7	1	9	3	3
Prairie Creek	5	7	1	4	1	6	2
Jenkins Ditch-South Fork Wildcat Creek	7	3	3	7	7	2	1
Spring Creek	4	4	5	5	10	6	1
Lauramie Creek	6	3	4	6	5	5	1
Town of Mulberry-South Fork Wildcat Creek	9	2	6	9	6	1	2
Town of Dayton-South Fork Wildcat Creek	10	2	2	10	3	6	3

NUTRIENTS-Tier 1 CLA's

Tier 1 CLA's for Nutrients included the Stump Ditch-Kilmore Creek, Talbert Ditch-South Fork Wildcat Creek, Prairie Creek and Jenkins Ditch-South Fork Wildcat Creek subwatershed (Figure 94). Both the Jenkins Ditch and Prairie Creek subwatersheds rank in the top four drainage areas for both current and historic modeled nutrient loading. These two drainage areas also rank as the top two subwatersheds for the number of NPDES facilities with documented exceedances. The Stump Ditch and Talbert Ditch subwatersheds contain large occurrences of hydric soils, low percentage of riparian areas with natural land cover, and rank in the top three drainage areas for the occurrence of Confined feeding operations. All of these characteristics present an elevated potential for nutrient loading from surface and subsurface drainage.

TOTAL SUSPENDED SOLIDS-Tier 1 CLA's

Tier 1 CLA's for TSS included both the Prairie Creek and Jenkins Ditch subwatersheds (Figure 95). These two drainage areas ranked in the top three during modeled historic loading for sediment yields and in the top four for current load estimates. Both drainage areas also ranked in the top three for the amount of impervious surfaces present. The Jenkins Ditch subwatershed can be characterized by a more rolling and steep terrain which attributed to it being ranked third in regards to erodible lands. Both subwatersheds ranked in the middle of the pack for the amount of well-buffered floodplains and riparian area with Prairie Creek ranking number four and Jenkins Ditch number seven.

BACTERIA & PATHOGENS-Tier 1 CLA's

Virtually the entire South Fork Wildcat Creek watershed experiences exceedances for *E. coli*. Tier 1 CLA's for Bacteria & Pathogens including Stump Ditch-Kilmore Creek, Talbert Ditch-South Fork Wildcat Creek, Jenkins Ditch-South Fork Wildcat Creek, Prairie Creek, Spring Creek, and the Town of Mulberry-South Fork Wildcat Creek (Figure 96). The Town of Mulberry drainage area ranked as the number one subwatershed for *E. coli* loads per acre. This drainage area also is ranked highest for the occurrence of Confined feeding operations and contains NPDES facilities with documented exceedances. The Jenkins Ditch, Prairie Creek, and Spring Creek subwatersheds all rank in the top four drainages areas for *E. coli* loading per acre. Jenkins Ditch and Spring Creek also rank the highest for having multiple NPDES facilities with documented exceedances. Jenkins Ditch also ranks number two for the amount of Confined feeding operations present. The Stump Ditch and Talbert Ditch subwatersheds contain large occurrences of hydric soils, low percentage of riparian areas with natural land cover, and rank in the top three drainage areas for the occurrence of Confined feeding operations. These characteristics can all lead to increased bacteria and pathogen loading through failing septic systems, runoff from livestock areas, and agricultural tile drainage.

ENVIRONMENTAL QUALITY-Tier 1 CLA's

Tier 1 CLA's for Environmental Quality include the Stump Ditch-Kilmore Creek, Shanty Creek-Kilmore Creek, Swamp Creek, and Prairie Creek subwatersheds (Figure 97). These drainage areas rank as the lowest scoring subwatersheds for both indices of biological communities as well as aquatic habitat evaluations. All of these subwatersheds also rank in the top four for lowest percentage of natural land cover within floodplains and riparian areas and low participation in government-funded conservation programs. Prairie Creek also ranks as number one for the concentration of impervious surfaces within its boundaries.

Subwatersheds designated as PPA's included the Kilmore Creek, Spring Creek, and Town of Mulberry-South Fork Wildcat Creek drainage areas. All three of these subwatersheds rank highly in terms of well protected floodplains and riparian areas, participation in conservation programs, relatively low amounts of development and impervious surfaces. All three of these characteristics help to understand why some of the highest quality habitats and biological communities are found within these areas.

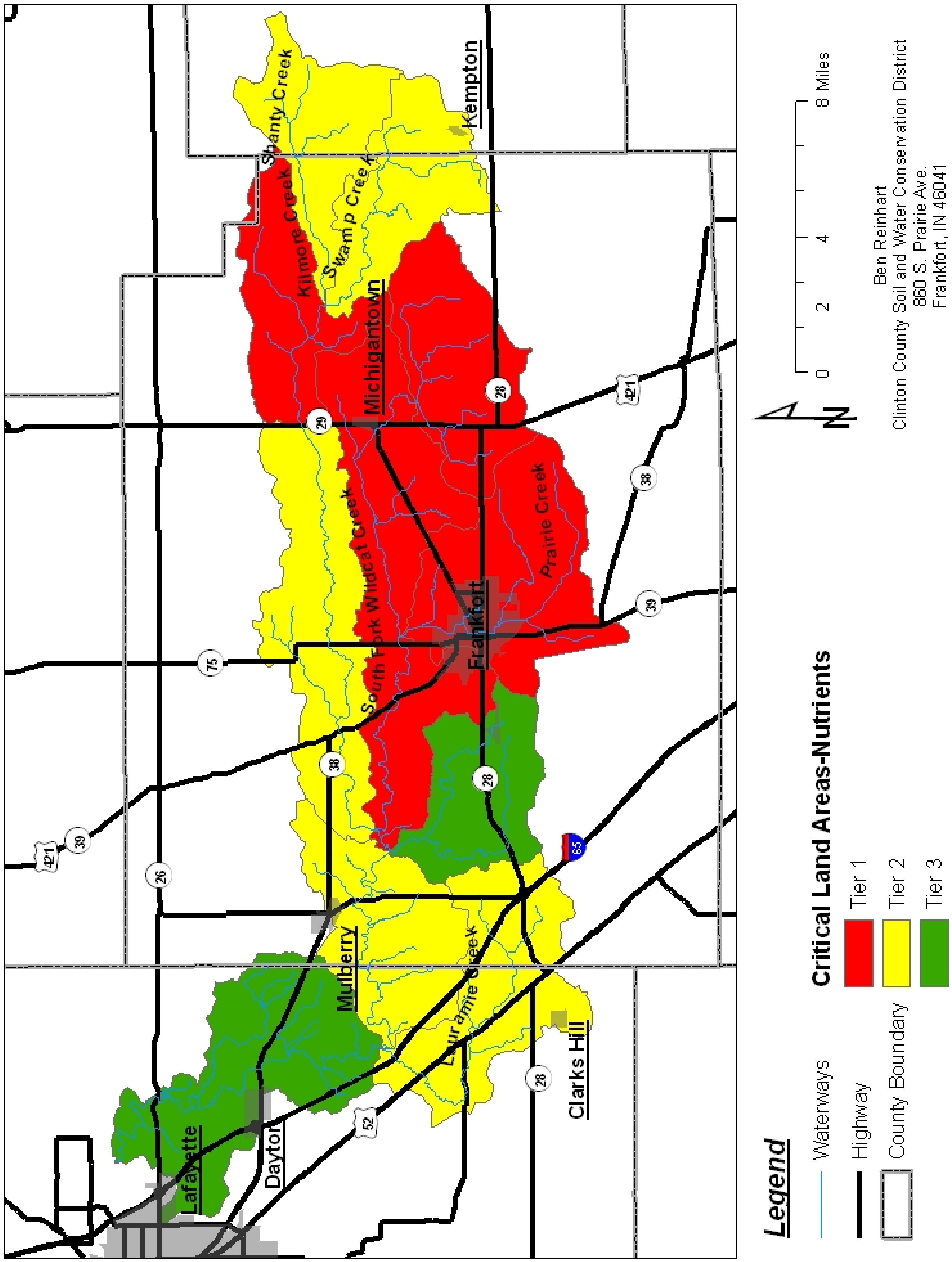


Figure 94. Tier 1 Critical Land Areas - Nutrients

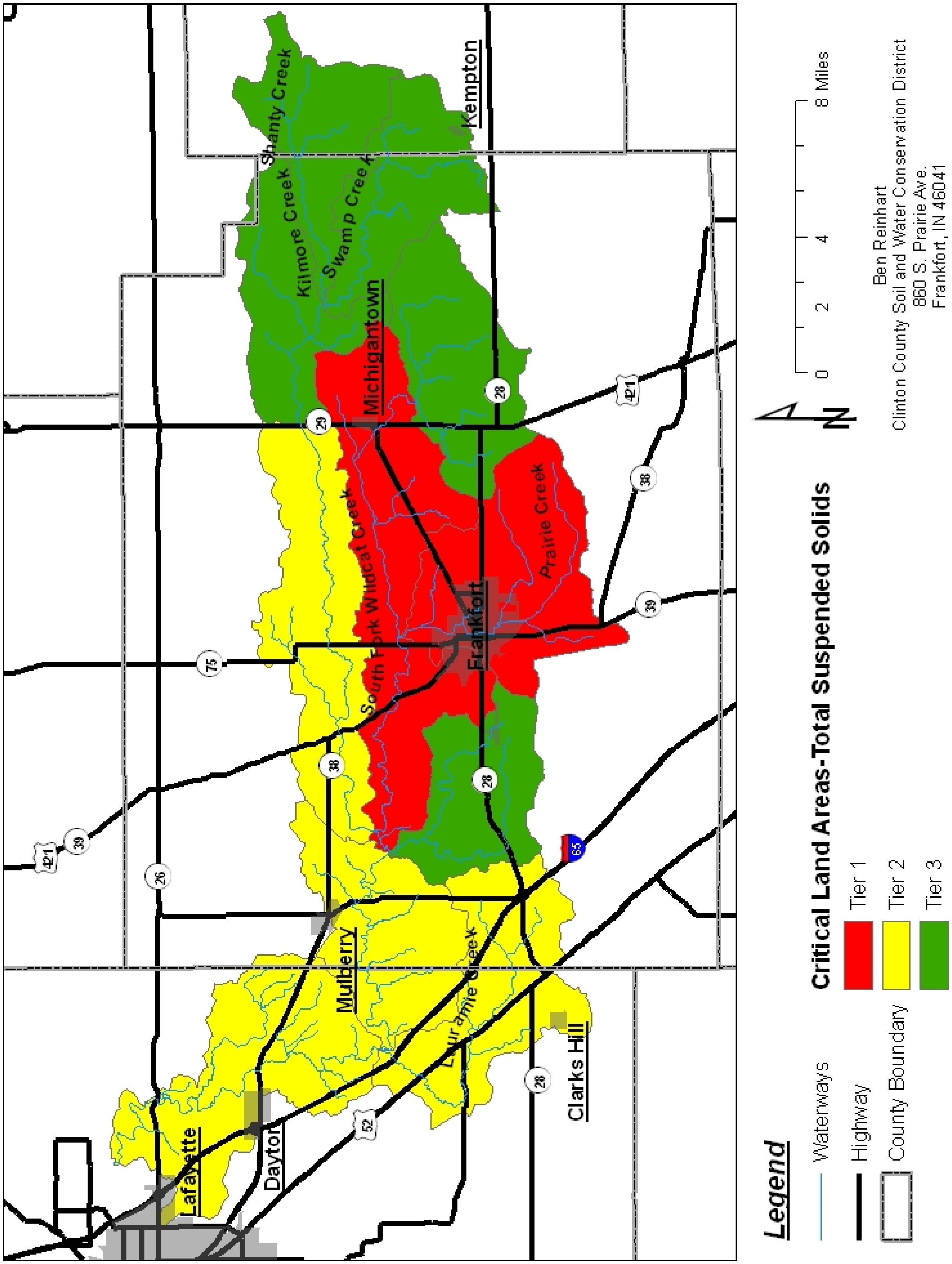


Figure 95. Tier 1 Critical Land Areas-Total Suspended Solids

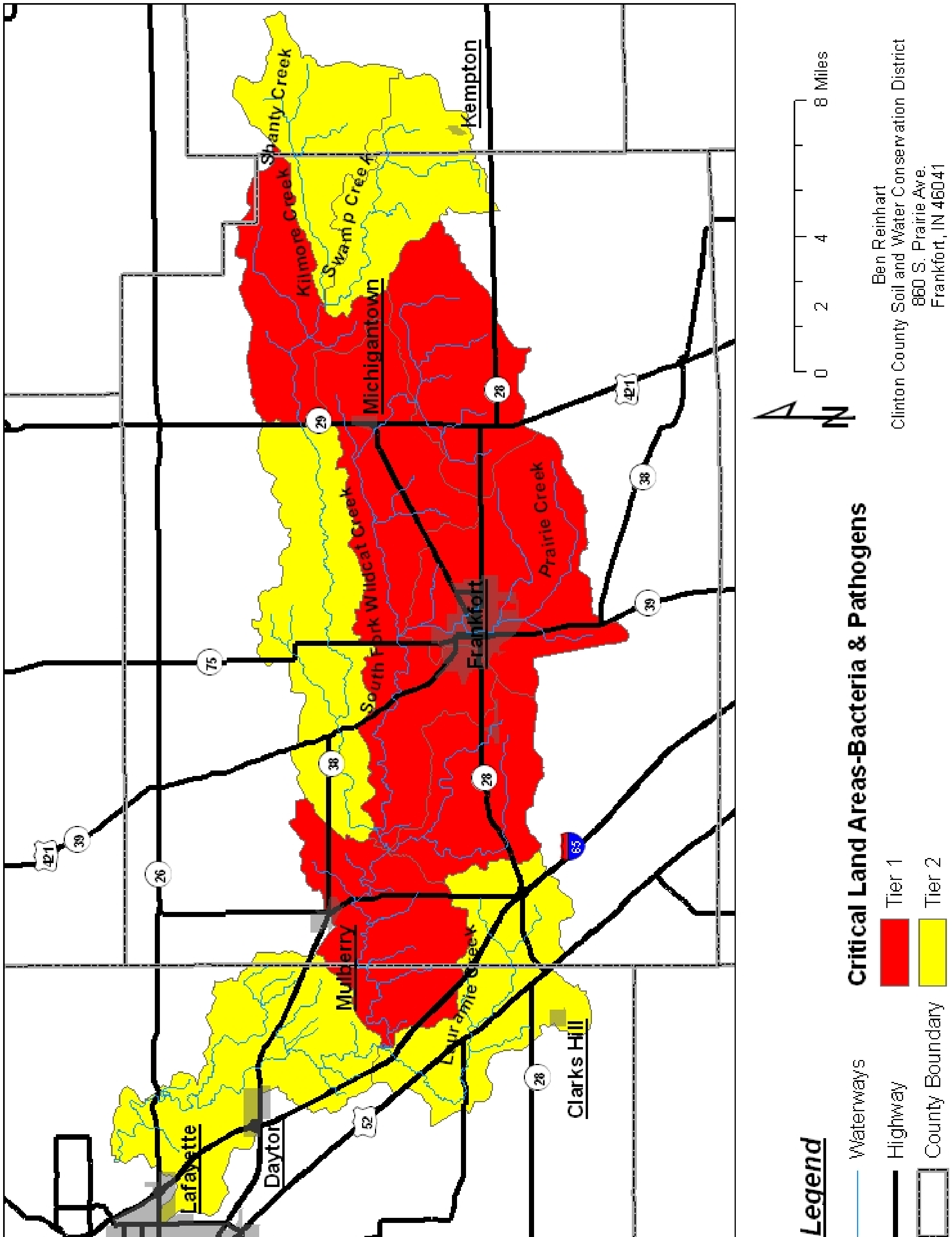


Figure 96. Tier 1 Critical Land Areas – Bacteria & Pathogens

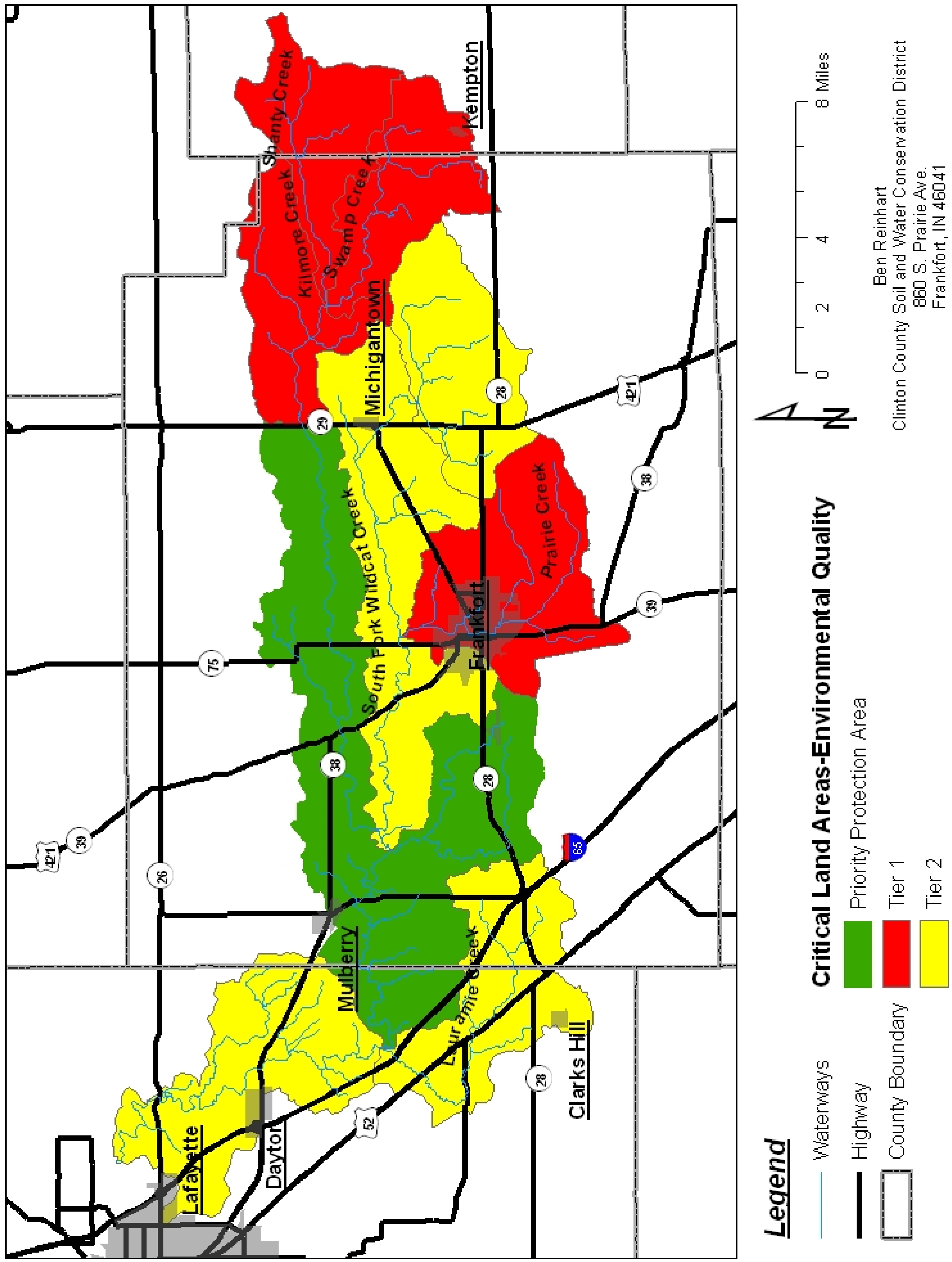


Figure 97. Tier 1 Critical Land Areas & Priority Protection Areas – Environmental Quality

7.0 WATER QUALITY GOALS AND INDICATORS

Water quality impairments were shown for nutrients, total suspended solids, and *E.coli*. To address these impairments the Steering Committee developed various goals, including indicators, used to measure progress towards each goal. Pollutant concentrations measured during our water quality assessment were averaged for both high and low flow periods of the year to obtain an overall annual average concentration for the South Fork Wildcat Creek Watershed. Goals for both nutrients (i.e. nitrogen and phosphorus) and Total Suspended Solids were established by comparing averaged annual concentrations for the watershed to median concentration values collected from IDEM fixed stations within the Eastern Corn Belt Plains ecoregion spanning from 1990-2010. These targets, if achieved, will meet the reductions called for in the South Fork Wildcat Creek TMDL. Goals for bacteria and pathogens were established by comparing average annual *E.coli* concentrations against the State of Indiana's recreational standard for surface waters of 125 CFU/100 mL.

The Spreadsheet Tool for the Estimation of Pollutant Loads (STEPL) was used to model load reductions and develop scaled goals. Model input data was downloaded for each subwatershed from the STEPL Model Input Data Server which includes data on land use, climate and runoff information, soil, livestock operations, and septic systems. Urban land use values were manually input based on the 2006 National Land Cover Dataset. This input data provided modeled pollutant loads from each respective subwatershed and land use. Load reduction efficiencies for individual Best Management Practices (BMP) were collected through a review of research literature and entered into STEPL. The Steering Committee has agreed that the most effective approach to reduce pollutant loadings result from a suite of BMP's acting together rather than any single implemented BMP. This is commonly referred to as a Resource Management System (RMS). In order to incorporate this philosophy into the STEPL model for the South Fork Wildcat Creek Watershed, related BMP's were grouped into RMS packages. Using the BMP Calculator through STEPL, these combinations of practices were modeled to calculate load reduction efficiencies for the entire applied RMS package. These RMS packages were assigned to each respective subwatershed based on land use type and management, topography, and general soil properties. For example, subwatersheds which contained a higher concentration of livestock operations were assigned an RMS package that included livestock waste management, as one may assume manure would more commonly be handled and used as a farming input in these areas. Based on the STEPL model, to achieve our overall goal statements listed below, RMS packages would need to be implemented on approximately 90% of the cropland within each subwatershed as well as the implementation of urban conservation practices within the Prairie Creek and Jenkins Ditch subwatersheds. These overall modeling results were then scaled down to reflect the amount of expected conservation practices to be implemented within a five year period (~20% of land within Tier 1 CLA's). All model input data, BMP load reduction efficiencies, and RMS prescriptions by subwatershed can be found in Appendix H.

It is important to note that certain pieces of these RMS packages are already implemented on certain land parcels throughout each subwatershed. For example, based on survey data collected during this planning effort, over 60% of agricultural producers are already implementing some form of variable rate fertilizer management and/or conservation tillage. The role of future implementation efforts should be focused on adding to these already applied practices in order to complete a holistic RMS system on these land areas.

STEPL modeling did not cover goal statements related to bacteria and pathogens or overall environmental quality. Progress towards these goal statements will be undoubtedly linked with implemented conservation practices for nutrients and total suspended solids but lacking supporting modeling data will assume an overall target achievement date of 30 years.

NUTRIENTS – GOAL STATEMENT

Nutrients such as phosphorus and nitrogen impact our local environments and wildlife. The steering committee would like to reduce average annual total phosphorus (TP) concentrations from 0.23 mg/L to 0.12 mg/L (a 48% reduction) and average annual nitrate-nitrite concentrations from 6.11 mg/L to 2.9 mg/L (a 53% reductions).

Scaled Goal (5 Years)

Reduce average annual Total Phosphorus and Nitrate-Nitrite concentrations by 13%

Indicators

Water quality data will be used as the primary indicator to show progress towards attaining this goal. Field-collected data on orthophosphates (a subcomponent of Total Phosphorus) and nitrate-nitrite will be paired with modeling data to document changes in dissolved nutrient levels over time.

TOTAL SUSPENDED SOLIDS – GOAL STATEMENT

Total suspended solids (TSS) such as sediment, floatable debris, and organic matter has been identified as a problem throughout the South Fork Wildcat Creek Watershed. The Steering Committee would like to reduce average annual TSS concentrations from 30.3 mg/L to 19 mg/L (a 37% reduction).

Scaled Goal (5 Years)

Reduce average annual TSS concentrations by 13%

Indicators

Water quality data will be used as the primary indicator to show progress towards attaining this goal. Field-collected data on Total Suspended Solids and turbidity will be paired with modeling data to document changes in suspended solids over time.

BACTERIA & PATHOGENS – GOAL STATEMENT

Bacteria and harmful pathogens have been identified as one of the greatest water quality concerns within the South Fork Wildcat Creek Watershed. The Steering Committee would like to reduce current average annual E. coli concentrations from 407 CFU/100 mL to 125 CFU/100 mL (a 69% reduction) by 2042.

Indicators

Water quality data will be used as the primary indicator to show progress towards attaining this goal. Field-collected data on bacteria and pathogens will be paired with modeling data to document changes in pathogen levels over time.

ENVIRONMENTAL QUALITY – GOAL STATEMENT

Many locations across the South Fork Wildcat Creek Watershed have impaired biological communities and habitats. The Steering Committee would like to increase stakeholder awareness regarding the importance of restoring and protecting natural land uses within floodplain and riparian areas. All waterways which are currently listed on the 303(d) Impaired Waters List will be restored to their aquatic life use designation by 2042.

Indicators

Water quality data will be paired with social indicator data to document changes in environmental condition and overall awareness. Social indicator data will be collected during and after implementation phases to assess changes in awareness, attitudes, and behavior related to the quality of the South Fork Wildcat Creek Watershed. Analysis of social indicator data will follow the Social Indicator Planning and Evaluation System (SIPES) for Nonpoint Source Management Manual and the online Social Indicators Data Management and Analysis (SIDMA) Tool. Field-collected data using methods comparable to the ones used during this study will be evaluated to document changes in habitat or biological quality.

8.0 IMPLEMENTATION STRATEGIES

8.1 Best Management Practices for Watershed Protection and Restoration

Steering Committee members identified a generalized list of Best Management Practices which could be used within the South Fork Wildcat Creek Watershed to achieve the water quality goals described above (Table 38-41). Please note that this list is not all-inclusive and other practices may come into play in future implementation programs as there are improvements in technology and land management strategies. This list is heavily focused on practices for agricultural-based rural land which is by far the most common land use within the watershed. Some of these practices (e.g. conservation cover and buffers, conservation planning, critical area planting, streambank stabilization) can also be applied or adapted to more urban areas. However, as we move into an implementation phase it is expected that the Steering Committee will work to broaden the list of Best Management Practices to more adequately address urban and residential areas. Complete reviews of each of these identified Best Management Practices are provided in the Appendix I.

Table 38. BMP's for Nitrogen and Phosphorus Load Reductions

Tier 1 Critical Areas	Water Quality Impairment	Implementation Strategy	Estimated Cost	Practice Examples and Description (Load Reduction Efficiency, %)
Stump Ditch-Kilmore Creek	Nitrogen and/or Phosphorus	Conservation Tillage	$11-$52/ac.	No-till, Strip Till, Mulch Till (Nitrogen – 15%, Phosphorus – 30%, Sediment – 70%)
		Agricultural Waste Management	$46.50/ac. For waste application $0.31/yd^3 for waste closure $9,519/Comprehensive Nutrient Management Plan $53/ft^3 for waste transfer	Waste Utilization, Waste Transfer, Waste Closure (Nitrogen – 75%, Phosphorus – 75%)
Talbert Ditch-South Fork Wildcat Creek		Conservation Cover & Buffers	$452/ac. For seedings and plantings $4,345/ac. For installed waterways and swales	Filter Strip, Riparian Plantings, Grassed Waterways, Bioswales (Nitrogen – 54%, Phosphorus – 58%, Sediment – 58%)
		Cover Crops	$56/ac.	Planting of non-income crop for improved soil health and erosion control (Nitrogen – 43%, Phosphorus – 32%, Sediment – 15%)
Prairie Creek		Streambank Stabilization	$11.50/foot of 2-stage ditch $1.50/foot of fencing	Channel Reconstruction (2-stage ditch), Exclusion Fencing, Bank Stabilization (Nitrogen – 65%, Phosphorus – 78%, Sediment – 76%)
Jenkins Ditch-South Fork Wildcat Creek		Nutrient Management	$13.25/ac. For adaptive nutrient management $2,128/Nutrient Management Plan	Development of Nutrient Management Plan, Upgrades to precision application equipment, Applied On-Farm Research (Nitrogen – 7%, Phosphorus – 5%)
		Drainage Water Management	$24/ac. annual labor costs $1,456.75/control structure	Managing groundwater levels and tile flow on drained cropland (Nitrogen – 33%, Phosphorus – 30%)
		Denitrifying Bioreactors	$7,829/structure	Denitrifying Bioreactor (Nitrogen – 50%, Phosphorus – 80%)
		Septic System Upgrades	Highly Variable Based on System	Upgrade of septic system (Nitrogen – 50%)
		Stormwater Infiltration	$3,790/structure	Bioretention basins, rain gardens (Nitrogen – 85%, Phosphorus – 85%, Sediment – 90%)

Table 39. BMP's for TSS Load Reductions

Tier 1 Critical Area	Water Quality Impairment	Implementation Strategy	Estimated Cost	Practice Examples and Description (Load Reduction Efficiency, %)
Prairie Creek	Total Suspended Sediments	Conservation Tillage	$11-$52/ac.	No-till, Strip Till, Mulch Till (Nitrogen – 15%, Phosphorus – 30%, Sediment – 70%)
		Conservation Cover & Buffers	$452/ac. For seedings and plantings $4,345/ac. For installed waterways and swales	Filter Strip, Riparian Plantings, Grassed Waterways, Bioswales (Nitrogen – 54%, Phosphorus – 58%, Sediment – 58%)
		Cover Crops	$56/ac.	Planting of non-income crop for improved soil health and erosion control (Nitrogen – 43%, Phosphorus – 32%, Sediment – 15%)
Jenkins Ditch-South Fork Wildcat Creek		Streambank Stabilization	$11.50/foot of 2-stage ditch $1.50/foot of fencing	Channel Reconstruction (2-stage ditch), Exclusion Fencing, Bank Stabilization (Nitrogen – 65%, Phosphorus – 78%, Sediment – 76%)
		Critical Area Stabilization	$1.50/ft^2	Heavy Use Area Protection (Nitrogen – 20%, Phosphorus – 20%, Sediment – 40%)
		Pasture Management	$28/ac.	Rotational Grazing (Nitrogen – 9%, Phosphorus – 24%, Sediment – 30%)
		Conservation Planning	- (Provided as Public Service)	Development of Conservation Plan for land use management (Nitrogen – 5%, Phosphorus – 1%, Sediment – 14%)
		Water and Sediment Control Basins	$2,884/structure	WASCOBs (Nitrogen – 20%, Phosphorus – 20%, Sediment – 60%)
		Stormwater Infiltration	$3,790/structure	Bioretention basins, rain gardens (Nitrogen – 85%, Phosphorus – 85%, Sediment – 90%)

Table 40. BMP's for Bacteria Load Reductions

Tier 1 Critical Area	Water Quality Impairment	Implementation Strategy	Estimated Cost	Practice Examples and Description (Load Reduction Efficiency, %)
Stump Ditch-Kilmore Creek	Bacteria & Pathogens	Conservation Cover & Buffers	$452/ac. For seedings and plantings $4,345/ac. For installed waterways and swales	Filter Strip, Riparian Plantings, Grassed Waterways, Bioswales (Nitrogen – 54%, Phosphorus – 58%, Sediment – 58%)
		Pasture Management	$28/ac.	Rotational Grazing (Nitrogen – 9%, Phosphorus – 24%, Sediment – 30%)
Talbert Ditch-South Fork Wildcat Creek		Conservation Planning	- (Provided as Public Service)	Development of Conservation Plan for land use management (Nitrogen – 5%, Phosphorus – 1%, Sediment – 14%)
Prairie Creek		Agricultural Waste Management	$46.50/ac. For waste application $0.31/yd^3 for waste closure $9,519/Comprehensive Nutrient Management Plan $53/ft^3 for waste transfer	Waste Utilization, Waste Transfer, Waste Closure (Nitrogen – 75%, Phosphorus – 75%)
Jenkins Ditch-South Fork Wildcat Creek		Denitrifying Bioreactors	$7,829/structure	Denitrifying Bioreactor (Nitrogen – 50%, Phosphorus – 80%)
Spring Creek Town of Mulberry-South Fork Wildcat Creek		Septic System Upgrades	Highly Variable Based on System	Upgrade of septic system (Nitrogen – 50%)

Table 41. BMP's for Biological and Habitat Impairments

Tier 1 Critical Area	Water Quality Impairment	Implementation Strategy	Estimated Cost	Practice Examples and Description (Load Reduction Efficiency, %)
Swamp Creek	Degraded Habitat and/or Biological Community	Conservation Cover & Buffers	$452/ac. For seedings and plantings $4,345/ac. For installed waterways and swales	Filter Strip, Riparian Plantings, Grassed Waterways, Bioswales (Nitrogen – 54%, Phosphorus – 58%, Sediment – 58%)
		Conservation Planning	- (Provided as Public Service)	Development of Conservation Plan for land use management (Nitrogen – 5%, Phosphorus – 1%, Sediment – 14%)
Shanty Creek-Kilmore Creek		Streambank Stabilization	$11.50/foot of 2-stage ditch $1.50/foot of fencing	Channel Reconstruction (2-stage ditch), Exclusion Fencing, Bank Stabilization (Nitrogen – 65%, Phosphorus – 78%, Sediment – 76%)
		Conservation Tillage	$11-$52/ac.	No-till, Strip Till, Mulch Till (Nitrogen – 15%, Phosphorus – 30%, Sediment – 70%)
Stump Ditch-Kilmore Creek		Cover Crops	$56/ac.	Planting of non-income crop for improved soil health and erosion control (Nitrogen – 43%, Phosphorus – 32%, Sediment – 15%)
		Stormwater Infiltration	$3,790/structure	Bioretention basins, rain gardens (Nitrogen – 85%, Phosphorus – 85%, Sediment – 90%)
Prairie Creek		Drainage Water Management	$24/ac. annual labor costs $1,456.75/control structure	Managing groundwater levels and tile flow on drained cropland (Nitrogen – 33%, Phosphorus – 30%)
		Denitrifying Bioreactors	$7,829/structure	Denitrifying Bioreactor (Nitrogen – 50%, Phosphorus – 80%)

8.2 Outreach and Education for Watershed Protection and Restoration

As part of any implementation phase for watershed restoration education and outreach plays a critical role in initiating changes in attitudes and behavior. Steering Committee members reviewed various outreach strategies and education topics to focus on within designated critical areas. Social data which was collected through the Social Indicator Survey was used to identify current barriers to practice adoption, evaluate attitudes and values, and take into consideration current awareness. Table 42 lists the desired social outcomes, and recommended strategies to achieve those outcomes, for the South Fork Wildcat Creek Watershed Management Plan.

Table 42. Desired Social Outcomes for the South Fork Wildcat Creek Watershed Management Plan

Ag Social Outcomes	Strategies	Non-Ag Social Outcomes	Strategies
Increase knowledge of practices such as cover cropping and drainage water management	Workshop, Field Days, Community Events	**Increase knowledge of recommended water quality practices for residential and commercial land used**	Workshop, Field Days, Community Events
Increase adoption of water quality practices within critical areas	Cost-Share, Technical Assistance Programs, Workshops, Field Days	**Increase awareness and appreciation of watershed efforts**	Media outreach (Website, Social Media, Newspaper), Signage, Newsletter, Community Events
Increase capacity to fund and manage water quality practices within critical areas	Cost-Share, Technical Assistance	**Change attitudes to highlight the recreational qualities and opportunities of the South Fork Wildcat Creek**	Recreational Field Days, Media, Community Events
Change attitudes to highlight the recreational qualities and opportunities of the South Fork Wildcat Creek	Recreational Field Days, Media, Newsletter, Community Events	**Reduce financial and technical assistance constraints on landowners to implement water quality practices**	Cost-Share, Technical Assistance Programs, Workshops, Field Days
Increase awareness of consequences of poor water quality on local communities	Media Outreach (Website, Social Media, Newspaper), Newsletter, Community Events	**Increase capacity to fund and manage water quality practices within residential and commercial land uses**	Cost-Share, Technical Assistance
		Increase adoption of water quality practices within residential and commercial land uses	Cost-Share, Technical Assistance Programs, Workshops, Field Days, Community Events

8.3 Action Register and Schedule

In an effort to bring together identified strategies for both on-the-ground land use management practices as well as education and outreach priorities, the Steering Committee compiled an Action Register to help guide future efforts. This Action Register identifies strategies, estimated costs, milestones, and potential project partners for each goal of the South Fork Wildcat Creek Watershed Management Plan. Project partners will be extremely valuable during implementation efforts through leveraging of funds and technical support. The complete Action Register can be found in Appendix J.

9.0 FUTURE ACTIVITIES & PROJECT TRACKING

9.1 Tracking Effectiveness

Indicators have been identified for each goal outlined above. Water quality data will be collected using both field-collected data as well as modeling results. Temperature, dissolved oxygen, pH, conductivity, orthophosphates, nitrate-nitrite, turbidity, total suspended solids, and *E.coli* will be sampled weekly, or as funding permits, at select sampling locations (Figure 98). Orthophosphates will be sampled either using a portable colorimeter or Hoosier Riverwatch methods. Turbidity will be measured using Hoosier Riverwatch methods. Total suspended solids and *E. coli* will be analyzed at the Frankfort Wastewater Treatment Plant. Remaining parameters will be measure with a YSI handheld multiparameter meter. Streamflow data will be collected during each sampling visit using a velocity meter and channel dimensions. Habitat and biological communities will be evaluated annually at each of the sites samples during this study. All water quality data will be maintained in a database by the Clinton County SWCD. The total estimated costs for sample collection, equipment maintenance, and database management is $12,558.97.

Any implemented Best Management Practices will be mapped and modeled for their respective load reductions. We will also evaluate the potential for developing an online mapping application where community members can place a “push pin” where Best Management Practices have been completed. These “push pins” would then be field verified by the Clinton County SWCD or qualified volunteers on a quarterly basis.

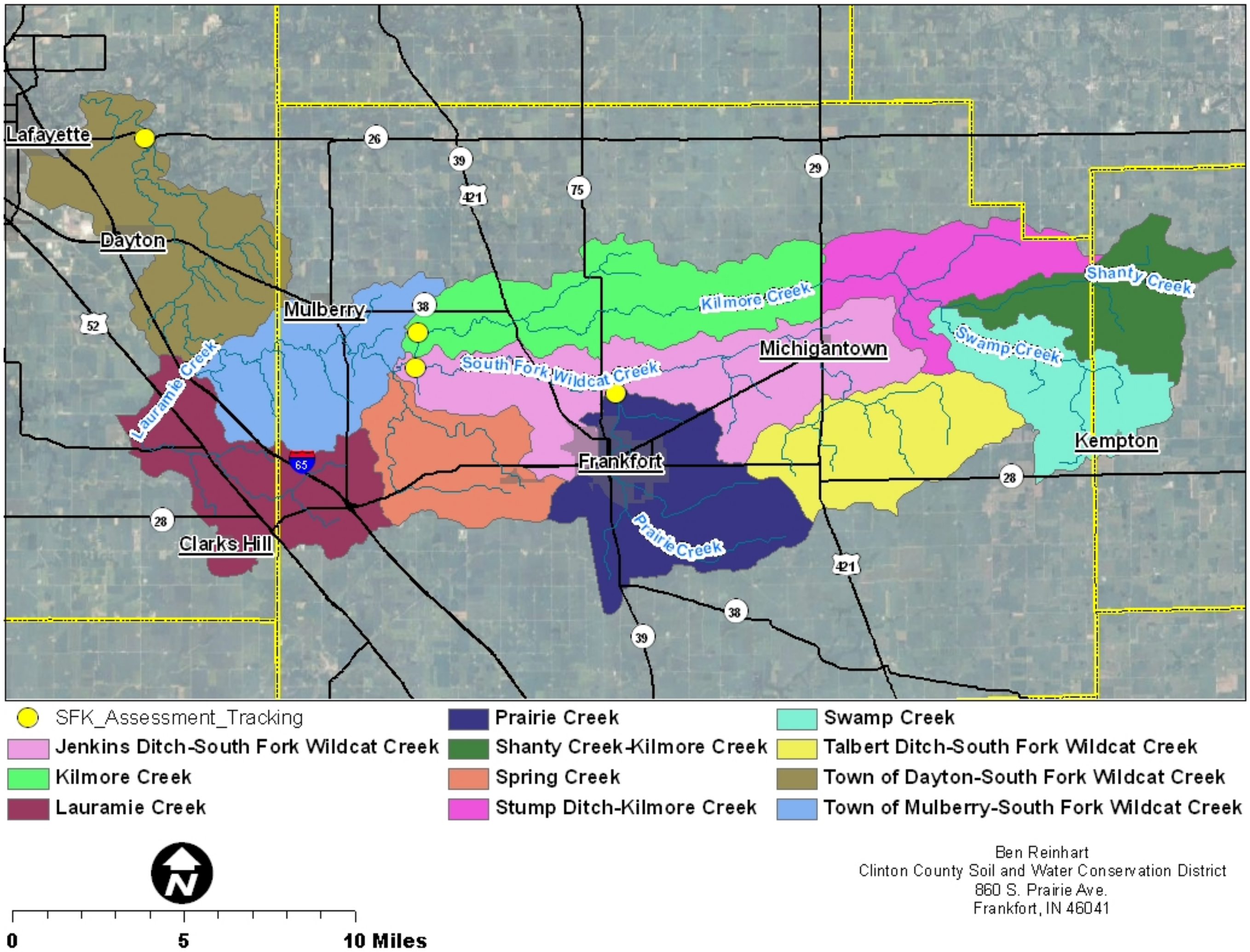


Figure 98. Locations for Long Term Tracking of Water Quality

Social data will also be used to help track progress towards our goals and objectives. All attendees of field days, workshops, or informational meetings will be given an end-of-session questionnaire to evaluate any immediate changes in knowledge and awareness. Annual follow-up questionnaires will also be distributed to get a more accurate estimate of how/if individuals apply information that they received at our events. Personal interviews will be completed with any landowners taking advantage of financial assistance programs to evaluate usefulness and effectiveness as well as to identify improvements for future programs. Website statistics (e.g. Google Analytics) will be used to collect data on our online presence such as visits to specific pages and document downloads. Annual cost estimates for social indicator tracking and evaluation, including both materials and staff time for data analysis, is $2,762.80.

9.2 Future Plans

It is anticipated that the Clinton County SWCD will remain the project leader for watershed projects which relate to the South Fork Wildcat Creek Watershed. However, strong support from groups such as the Wildcat Creek Foundation, Wildcat Guardians, USDA Natural Resources Conservation Service, and local governmental agencies will be necessary for achieving project goals and objectives.

It is expected to reevaluate, and revise if necessary, the South Fork wildcat Creek Watershed Management Plan on a five year basis. This will primarily be meant to take into consideration changes in local land use, regulations, and to document associated changes in water quality. Changes in attitudes, awareness, and behavior will also be evaluated at this time through the delivery of a social indicator survey. Addendums to address extraordinary issues may be completed outside of the five year interval if deemed appropriate by local community leaders. This plan may also be revised to allow better integration into regional planning efforts which may occur in future years.

Appendix A. Acronym Key

AIMS Assessment Information Management System (IDEM)
BMP Best Management Practice
BOD Biochemical Oxygen Demand
CALM Consolidated Assessment and Listing Methodology (IDEM)
CBBEL Christopher B. Burke Engineering, Ltd.
CCSWCD Clinton County Soil & Water Conservation District
CFO Confined Feeding Operations
CLA Critical Land Area
CQHEI Citizen's Qualitative Habitat Evaluation Index
CSO Combined Sewer Overflow
DO Dissolved Oxygen
E. coli Escherichia coli bacteria
EPA U.S. Environmental Protection Agency
FCA Fish Consumption Advisory (IDNR)
GIS Geographic Information Systems
HEL Highly Erodible Lands
IDEA Integrated Data for Enterprise Analysis (USDA-NRCS)
IDEM Indiana Department of Environmental Management
IDNR Indiana Department of Natural Resources
KCSD Kilmore Creek-Stump Ditch
mIBI macroinvertebrate Index of Biotic Integrity
MS4 Municipal Separate Storm Sewer System
NO3 Nitrate-Nitrogen
NPDES National Pollutant Discharge Elimination System
NRC Natural Resources Commission
NRCS Natural Resources Conservation Service
PCB Polychlorinated biphenyls
PHEL Potentially Highly Erodible Lands
POTW Publicly Owned Treatment Works
PPA Priority Protection Area
QAPP Quality Assurance Project Plan
QHEI Qualitative Habitat Evaluation Index
RC&D Resource Conservation & Development Council
RWA Rapid Watershed Assessment (USDA-NRCS)
SCLR Spring Creek Lick Run
SCREC Stream Reach and Characterization and Evaluation Report
SFK-KC South Fork Wildcat Creek-Blinn Ditch & Kilmore Creek-Boyles Ditch
SIDMA Social Indicators Data Management & Analysis
SIPES Social Indicator Planning and Evaluation System
Source ID Water Quality Impairment Program (IDEM)
SSURGO Soil Survey Geographic Database
STATSGO State Soil Geographic Database
SWAT Soil & Water Assessment Tool
SWCD Soil & Water Conservation District
TMDL Total Maximum Daily Load
TP Total Phosphorus
TSS Total Suspended Soils
USDA U.S. Department of Agriculture

UST Underground Storage Tanks
UST/L Leaking Underground Storage Tanks
UWA Unified Watershed Assessment
WMP Watershed Management Plan
WWTP Wastewater Treatment Plant

(EPA, 2010) 303(d) Listed Impaired Waters: Impaired streams on the 2010 list of Indiana 303(d) list. Environmental Protection Agency. Line Shapefile.

(USGS, 2001) National Hydrography Dataset (1:100000; 1:24000): Streams derived from the National Hydrography Dataset at a 1:100000 scale. U.S. Geological Survey. Line Shapefile.

(U.S. Dept. of Commerce, U.S. Census Bureau, 2002) Populated Areas: Aerial locations of all populated places identified by the US Census Bureau. Derived from U.S. Department of Commerce, U.S. Census Bureau, Census 2000 Tiger Line Files. IndianaMap. Polygon Shapefile.

(USCB, 2002) Counties: Location and census data for each county of Indiana. Data from U.S. Department of Commerce, U.S. Census Bureau. IndianaMap. Polygon Shapefile.

(USGS, 2009) HUC 10 2009: Ten-digit Hydrologic Unit Code watershed boundaries for Indiana watersheds. A part of the Watershed Boundary Data set (WBD). Data credited to U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), and U.S. Geological Survey (USGS). IndianaMap. Polygon Shapefile.

(USGS, 2009) HUC 12 2009: Twelve-digit Hydrologic Unit Code watershed boundaries for Indiana watersheds. A part of the Watershed Boundary Data set (WBD). Data credited to U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), and U.S. Geological Survey (USGS). IndianaMap. Polygon Shapefile.

(USGS, 2001) 30 Meter DEM: Digital Elevation Model (DEM). A digital grid sized to 30 meters by 30 meters showing elevation. U.S. Geological Survey. Raster file.

(USGS, 2007) National Hydrography Dataset (1:24000): Surface water features including lakes, ponds, and reservoirs. From the National Hydrography Dataset (NHD). U.S. Geological Survey (USGS). Line and polygon Shapefile.

(USFWS; Ducks Unlimited, 2007) National Wetlands Inventory: The approximate location, type, and extent of wetlands as defined by Cowardin et al. (1979). U.S. Fish and Wildlife Service, Division of Habitat and Resource Conservation (2007 Update by Ducks Unlimited). Polygon Shapefile.

(NRC, 2004) Rivers Outstanding: Rivers and stream segments on the respective list for Indiana by the Natural Resource Commission (NRC). Data obtained for the 1:100000 National Hydrography Dataset (NHD). IndianaMap. Line Shapefile.

(Clinton Co. SWCD, 2008, 2011) Legal Drains/Tiles: Location and length of regulated drains for Clinton and Tippecanoe Counties (respective to publication date). Data from the counties' Surveyor Offices. Line Shapefile.

(NCSS, 1994) STATSGO Soil Associations: State Soil Geographic (STATSGO) data base-derived general soil associations. Developed by the National Cooperative Soil Survey (NCSS). IndianaMap. Polygon Shapefile.

(Clinton Co. SWCD, 2010) Unsewered Communities: A collection of the communities within the South Fork Wildcat Creek Watershed that do not have sewer systems, but use septic systems instead. Information from the health departments of Clinton and Tippecanoe Counties. Point Shapefile.

(NRCS, 2006) SSURGO Soil Survey: Soil Survey Geographic (SSURGO) Database showing the most detailed geographic soil data. Data obtained by the Indiana Geological Survey (IGS), Soil Data Mart (SDM), National Resources Conservation Service (NRCS), and U.S. Department of Agriculture (USDA). Polygon Shapefile.

(USGS, 2006) Land Cover 2006: A 30-meter grid showing land cover data in Indiana using data from 2006. Fifteen categories of land use are represented. Data compiled for Indiana from the 2006 National Land Cover Database. U.S. Geological Survey (USGS). Digital representation by Ben Reinhart. Raster file.

(NASS, 2010) Crops 2010: A 30-meter grid showing categorized land covers of crops. The satellite imagery was collected during the growing season. National Agricultural Statistics Service (NASS), U.S. Department of Agriculture (USDA). Digital representation by Ben Reinhart. Raster file.

(INDOT, 2004) Highways INDOT: Interstate, U.S., and State Highways. Attributes include route numbers and number of lanes. Indiana Department of Transportation (INDOT). Line Shapefile.

(INDOT, 2006) Roads INDOT 2005: City streets, county roads, U.S., State, and Interstate Roads, and non-certified other roads are shown. Indiana Department of Transportation (INDOT). Line Shapefile.

(IDEM, 2010) CONFINED_FEEDING_OPERATIONS_IDEM_IN: Confined feeding operation facility locations in Indiana. Operations include swine, chicken, turkey, beef, and dairy agri-businesses. Indiana Department of Environmental Management (IDEM). Point Shapefile.

(IGS, 2003) SAND_GRAVEL_PITS_ABANDONED_IN: Locations of abandoned sand and gravel pits in Indiana. Derived from an unpublished memorandum report. Indiana Geological Survey (IGS). Point Shapefile.

(IDEM, 2010) CLEANUP_SITES_IDEM_IN: Locations of cleanup sites in Indiana. Sites require mitigation of risk to human health and the environment. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) BROWNFIELDS_IDEM_IN: Locations of brownfields in Indiana. Abandoned, inactive, or inappropriately-used real estate parcels with or potentially with a hazard substance, contaminant, petroleum, or a petroleum product that poses a risk to human health and the environment. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) UST_IDEM_IN: Locations of regulated underground storage tanks in Indiana. Attributes include facility identifications, federal identification numbers, and addresses. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) LUST_IDEM_IN: Locations of all leaking underground storage tanks in Indiana. Attributes include facility identifications, federal identification numbers, and addresses. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) WASTE_TIRE_SITES_IDEM_IN: Locations of waste tire sites in Indiana. Attributes include facility names and federal identification numbers. Tires at sites can be for processing, storage, or transportation. Some are illegal tire dumps. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) VRP_SITES_IDEM_IN: Locations of Voluntary Remediation Program sites in Indiana. Attributes include facility names and federal identification numbers. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) NPDES_PIPE_IDEM_IN: Locations of National Pollutant Discharge Elimination System (NPDES) Program pipes in Indiana. Attributes include facility identifications, federal identification numbers, and addresses. Indiana Department of Environmental Management (IDEM), Office of Water Quality. Point Shapefile.

(IDEM, 2010) NPDES_FACILITY_IDEM_IN: Locations of National Pollutant Discharge Elimination System (NPDES) Program Facilities in Indiana. Attributes include facility identifications, federal identification numbers, and addresses. Indiana Department of Environmental Management (IDEM), Office of Water Quality. Point Shapefile.

(IDEM, 2010) WASTE_SOLID_ACTIVE_PERMITTED_IDEM_IN: Locations of active permitted solid waste sites in Indiana. Attributes include facility identifications, federal identification numbers, and addresses. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) OPEN_DUMPS_IDEM_IN: Locations of open dumps sites in Indiana. Attributes include facility names and federal identification numbers. Sites are not regulated and are illegal dump sites of solid waste. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) WASTE_OLD_LANDFILLS_IDEM_IN: Locations of post-closure landfills in Indiana. The landfills are finished with post-closure care or are older landfills that were never permitted. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) CONSTRUCTION_DEMOLITION_WASTE_IDEM_IN: Locations of construction and demolition waste facilities in Indiana. Sites are permitted state licensed facilities that accept solid waste in the form of anything that is attached to a house during construction or demolition. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

(IDEM, 2010) CORRECTIVE_ACTION_SITES_IDEM_IN: Locations of corrective action sites in Indiana. Indiana Department of Environmental Management (IDEM), Office of Land Quality. Point Shapefile.

Survey of Agricultural Producers in the Watershed

Rating of Water Quality

Overall, how would you rate the quality of water in your area?

	Poor (1)	Okay (2)	ood (3)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. For canoeing / kayaking / other boating	23.9	29.6	32.4	14.1	2.1 (0.81)	61 / 71
2. For picnicking and family activities	18.3	38	33.8	9.9	2.17 (0.75)	64 / 71
3. For fish habitat	21.1	38	26.8	14.1	2.07 (0.75)	61 / 71
4. For scenic beauty	11.3	33.8	49.3	5.6	2.4 (0.7)	67 / 71

Your Water Resources

1. Of these activities, which is the most important to you? **(Responses: 65)**

12.3% For canoeing / kayaking / other boating

10.8% For eating locally caught fish

0% For swimming

7.7% For picnicking and family activities

23.1% For fish habitat

46.2% For scenic beauty

2. Do you know where the rain water goes when it runs off of your property? **(Responses: 69)**

20.3% No

79.7% Yes

Your Opinions

Please indicate your level of agreement or disagreement with the statements below.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Mean (SD)	Valid Responses / Total Responses
1. Using recommended management practices on farms improves water quality.	1.5	0	11.8	57.4	29.4	4.13 (0.73)	68 / 68
2. It is my personal responsibility to help protect water quality.	0	2.8	2.8	60.6	33.8	4.25 (0.65)	71 / 71
3. It is important to protect water quality even if it slows economic development.	0	4.3	14.3	54.3	27.1	4.04 (0.77)	70 / 70
4. My actions have an impact on water quality.	0	4.2	14.1	54.9	26.8	4.04 (0.76)	71 / 71
5. I would be willing to pay more to improve water quality (for example: though local taxes or fees)	15.9	15.9	37.7	21.7	8.7	2.91 (1.17)	69 / 69
6. I would be willing to change management practices to improve water quality.	5.7	5.7	34.3	37.1	17.1	3.54 (1.03)	70 / 70

Water Impairments

Below is a list of water pollutants and conditions that are generally present in water bodies to some extent. The pollutants and conditions become a problem when present in excessive amounts. In your opinion, how much of a problem are the following water impairments in your area?

	Not a Problem (1)	Slight Problem (2)	Moderate Problem (3)	Severe Problem (4)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. Sedimentation (dirt and soil) in the water	6.9	23.6	40.3	15.3	13.9	2.74 (0.85)	62 / 72
2. Nitrogen	11.3	21.1	23.9	5.6	38	2.39 (0.89)	44 / 71
3. Phosphorus	11.9	23.9	20.9	3	40.3	2.25 (0.84)	40 / 67
4. Bacteria and viruses in the water (such as *E.coli* / coliform)	7	22.5	32.4	7	31	2.57 (0.82)	49 / 71
5. Trash or debris in the water	4.2	25	45.8	12.5	12.5	2.76 (0.76)	63 / 72
6. Toxic materials in the water	13.9	31.9	15.3	4.2	34.7	2.15 (0.83)	47 / 72
7. Flow Alteration	14.1	25.4	23.9	9.9	26.8	2.4 (0.96)	52 / 71
8. Habitat alteration harming local fish	16.9	26.8	14.1	5.6	36.6	2.13 (0.92)	45 / 71
9. Pesticides	15.3	29.2	19.4	6.9	29.2	2.25 (0.91)	51 / 72

Sources of Water Pollution

The items listed below are sources of water quality pollution across the country. In your opinion, how much of a problem are the following sources in your area?

	Not a Problem (1)	Slight Problem (2)	Moderate Problem (3)	Severe Problem (4)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. Discharges from industry into streams and lakes	16.7	25	26.4	11.1	20.8	2.4 (0.98)	57 / 72
2. Discharges from sewage treatment plants	22.2	18.1	26.4	13.9	19.4	2.4 (1.08)	58 / 72
3. Soil erosion from construction sites	30.6	37.5	12.5	2.8	16.7	1.85 (0.8)	60 / 72
4. Soil erosion from farm fields	5.6	38.9	33.3	9.7	12.5	2.54 (0.78)	63 / 72
5. Soil erosion from shorelines and/or streambanks	8.3	40.3	27.8	4.2	19.4	2.34 (0.74)	58 / 72
6. Improperly maintained septic systems	11.3	25.4	23.9	11.3	28.2	2.49 (0.95)	51 / 71
7. Manure from farm animals	23.9	33.8	16.9	4.2	21.1	2.02 (0.86)	56 / 71
8. Littering/illegal dumping of trash	6.9	30.6	38.9	18.1	5.6	2.72 (0.86)	68 / 72
9. Excessive use of fertilizers for crop production	27.8	37.5	13.9	1.4	19.4	1.86 (0.76)	58 / 72
10. Animal feeding operations	29.2	37.5	6.9	1.4	25	1.74 (0.71)	54 / 72
11. Urban stormwater runoff	19.4	26.4	20.8	8.3	25	2.24 (0.97)	54 / 72
12. Landfill(s)	19.7	23.9	23.9	9.9	22.5	2.31 (1)	55 / 71
13. Channelization of streams	9.7	36.1	12.5	4.2	37.5	2.18 (0.78)	45 / 72
14. Removal of riparian vegetation	19.4	27.8	12.5	2.8	37.5	1.98 (0.84)	45 / 72
15. Natural sources	23.6	33.3	12.5	0	30.6	1.84 (0.71)	50 / 72

Consequences of Poor Water Quality

Poor water quality can lead to a variety of consequences for communities. In your opinion, how much of a problem are the following issues in your area?

	Not a Problem (1)	Slight Problem (2)	Moderate Problem (3)	Severe Problem (4)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. Contaminated drinking water	45.8	20.8	12.5	2.8	18.1	1.66 (0.86)	59 / 72
2. Contaminated fish	22.2	23.6	15.3	9.7	29.2	2.18 (1.03)	51 / 72
3. High drinking water treatment costs	33.8	18.3	8.5	4.2	35.2	1.74 (0.93)	46 / 71
4. Loss of desirable fish species	23.9	11.3	14.1	8.5	42.3	2.12 (1.12)	41 / 71
5. Reduced beauty of lakes or streams	28.2	26.8	26.8	5.6	12.7	2.11 (0.94)	62 / 71
6. Reduced quality of water recreation activities	26.4	27.8	23.6	2.8	19.4	2.03 (0.88)	58 / 72
7. Excessive aquatic plants or algae	21.1	23.9	22.5	2.8	29.6	2.1 (0.89)	50 / 71
8. Odor	32.4	29.6	11.3	2.8	23.9	1.8 (0.83)	54 / 71
9. Lower property values	36.1	22.2	11.1	2.8	27.8	1.73 (0.87)	52 / 72

Practices to Improve Water Quality

Please indicate which statement most accurately describes your level of experience with each practice listed below.

	Not relevant for my property (9)	Never heard of it (1)	Somewhat familiar with it (2)	Know how to use it; not using it (3)	Currently use it (4)	Mean (SD)	Valid Responses / Total Responses
1. Regular servicing of septic system	21.4	4.3	17.1	5.7	51.4	3.33 (1)	55 / 70
2. Follow university recommendations for fertilization rates	10.1	8.7	23.2	2.9	55.1	3.16 (1.12)	62 / 69
3. Use field records of crops, pests and pesticide use to help develop pest control strategies	10.4	4.5	19.4	13.4	52.2	3.27 (0.97)	60 / 67
4. Use heavy use area protection for waste management	56.9	20	9.2	9.2	4.6	1.96 (1.07)	28 / 65
5. Compost manure prior to land application	61.8	4.4	13.2	13.2	7.4	2.62 (0.94)	26 / 68
6. Retain crop residue on soil surface to reduce erosion	8.8	0	11.8	2.9	76.5	3.71 (0.69)	62 / 68
7. Follow an approved grazing plan to maintain grass quality and reduce erosion	66.2	2.9	2.9	14.7	13.2	3.13 (0.92)	23 / 68
8. Regulate the water level in tile lines	35.8	20.9	22.4	14.9	6	2.09 (0.97)	43 / 67
9. Manage manure according to an approved nutrient management plan	72.1	8.8	5.9	5.9	7.4	2.42 (1.22)	19 / 68
10. Restore/enhance wetland	61.8	4.4	8.8	11.8	13.2	2.88 (1.03)	26 / 68
11. Maintain riparian buffer	23.9	11.9	14.9	11.9	37.3	2.98 (1.16)	51 / 67

Specific Constraints of Practices

Variable Rate Fertilizer Application: *Use variable rate application management units to minimize fertilizer waste and achieve more precise crop production.*

1. How familiar are you with this practice? **(Responses: 69)**

14.5% Not relevant

5.8% Never heard of it

8.7% Somewhat familiar with it

10.1% Know how to use it; not using it

60.9% Currently use it

2. Are you willing to try this practice? **(Responses: 50)**

68% Yes or already do

20% Maybe

12% No

How much do the following factors limit your ability to implement this practice?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
3. Don't know how to do it	56.9	13.7	7.8	3.9	17.6	3.5 (0.86)	42 / 51
4. Time required	52.9	13.7	11.8	3.9	17.6	3.4 (0.91)	42 / 51
5. Cost	38	20	8	16	18	2.98 (1.17)	41 / 50
6. The features of my property make it difficult	50	15.4	13.5	1.9	19.2	3.4 (0.86)	42 / 52
7. Insufficient proof of water quality benefit	46.2	23.1	7.7	1.9	21.2	3.44 (0.78)	41 / 52
8. Desire to keep things the way they are	51.9	7.7	17.3	9.6	13.5	3.18 (1.11)	45 / 52
9. Hard to use with my farming system	52.8	15.1	13.2	3.8	15.1	3.38 (0.91)	45 / 53
10. Lack of equipment	37.3	15.7	15.7	17.6	13.7	2.84 (1.2)	44 / 51

Cover Crops: *Planting cover crops for erosion protection and soil improvement.*

11. How familiar are you with this practice? **(Responses: 70)**

14.3% Not relevant

1.4% Never heard of it

27.1% Somewhat familiar with it

31.4% Know how to use it; not using it

25.7% Currently use it

12. Are you willing to try this practice? **(Responses: 62)**

48.4% Yes or already do

37.1% Maybe

14.5% No

How much do the following factors limit your ability to implement this practice?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
13. Don't know how to do it	46.3	24.1	11.1	1.9	16.7	3.38 (0.81)	45 / 54
14. Time required	25	21.4	23.2	12.5	17.9	2.72 (1.07)	46 / 56
15. Cost	20	20	23.6	18.2	18.2	2.51 (1.1)	45 / 55
16. The features of my property make it difficult	50	17.9	10.7	1.8	19.6	3.44 (0.81)	45 / 56
17. Insufficient proof of water quality benefit	37.5	23.2	14.3	3.6	21.4	3.2 (0.9)	44 / 56
18. Desire to keep things the way they are	50	15.5	6.9	12.1	15.5	3.22 (1.1)	49 / 58
19. Hard to use with my farming system	44.8	12.1	10.3	8.6	24.1	3.23 (1.08)	44 / 58
20. Lack of equipment	26.3	21.1	19.3	15.8	17.5	2.7 (1.12)	47 / 57

Riparian Fencing: *Fencing that excludes animals from critical riparian areas.*

21. How familiar are you with this practice? **(Responses: 73)**

57.5% Not relevant
12.3% Never heard of it
15.1% Somewhat familiar with it
9.6% Know how to use it; not using it
5.5% Currently use it

22. Are you willing to try this practice? **(Responses: 34)**

17.6% Yes or already do
35.3% Maybe
47.1% No

How much do the following factors limit your ability to implement this practice?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
23. Don't know how to do it	32.4	13.5	8.1	18.9	27	2.81 (1.27)	27 / 37
24. Time required	21.1	7.9	21.1	21.1	28.9	2.41 (1.22)	27 / 38
25. Cost	16.2	8.1	21.6	21.6	32.4	2.28 (1.17)	25 / 37
26. The features of my property make it difficult	34.2	5.3	13.2	15.8	31.6	2.85 (1.29)	26 / 38
27. Insufficient proof of water quality benefit	34.2	5.3	13.2	13.2	34.2	2.92 (1.26)	25 / 38
28. Desire to keep things the way they are	30.8	7.7	10.3	20.5	30.8	2.7 (1.32)	27 / 39
29. Hard to use with my farming system	28.2	10.3	10.3	20.5	30.8	2.67 (1.3)	27 / 39
30. Lack of equipment	13.5	13.5	18.9	24.3	29.7	2.23 (1.14)	26 / 37

Conservation Tillage: *Establishing crops in the previous crop residues, which are purposely left on the soil surface.*

31. How familiar are you with this practice? **(Responses: 72)**

9.7% Not relevant

5.6% Never heard of it

11.1% Somewhat familiar with it

6.9% Know how to use it; not using it

66.7% Currently use it

32. Are you willing to try this practice? **(Responses: 48)**

75% Yes or already do

16.7% Maybe

8.3% No

How much do the following factors limit your ability to implement this practice?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
33. Don't know how to do it	69.6	6.5	6.5	2.2	15.2	3.69 (0.73)	39 / 46
34. Time required	70.2	6.4	6.4	2.1	14.9	3.7 (0.72)	40 / 47
35. Cost	53.2	10.6	12.8	8.5	14.9	3.28 (1.06)	40 / 47
36. The features of my property make it difficult	66	4.3	14.9	0	14.9	3.6 (0.78)	40 / 47
37. Insufficient proof of water quality benefit	60.4	8.3	8.3	4.2	18.8	3.54 (0.88)	39 / 48
38. Desire to keep things the way they are	64.6	2.1	10.4	12.5	10.4	3.33 (1.15)	43 / 48
39. Hard to use with my farming system	68.1	6.4	6.4	6.4	12.8	3.56 (0.92)	41 / 47
40. Lack of equipment	58.7	6.5	15.2	10.9	8.7	3.24 (1.12)	42 / 46

Making Decisions for my Property

In general, how much does each issue limit your ability to change your agricultural management practices?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. Personal out-of-pocket expense	10.4	17.9	32.8	25.4	13.4	2.16 (0.99)	58 / 67
2. Lack of government funds for cost share	21.9	15.6	31.2	17.2	14.1	2.49 (1.09)	55 / 64
3. Not having access to the equipment that I need	18.2	15.2	30.3	21.2	15.2	2.36 (1.09)	56 / 66
4. Lack of available information about a practice	28.4	17.9	26.9	6	20.9	2.87 (1)	53 / 67
5. No one else I know is implementing the practice	41.5	6.2	15.4	6.2	30.8	3.2 (1.08)	45 / 65
6. Concerns about reduced yields	26.2	16.9	24.6	20	12.3	2.56 (1.15)	57 / 65
7. Approval of my neighbors	53.7	4.5	19.4	3	19.4	3.35 (0.97)	54 / 67
8. Don't want to participate in government programs	46.9	14.1	20.3	6.2	12.5	3.16 (1.02)	56 / 64
9. Requirements or restrictions of government programs	26.2	16.9	27.7	16.9	12.3	2.6 (1.12)	57 / 65
10. Possible interference with my flexibility to change land use practices as conditions warrant	30.8	16.9	21.5	13.8	16.9	2.78 (1.13)	54 / 65
11. Environmental damage caused by practice	32.3	7.7	21.5	9.2	29.2	2.89 (1.14)	46 / 65
12. I do not own the property	63.9	8.2	14.8	6.6	6.6	3.39 (1)	57 / 61
13. Not being able to see a demonstration of the practice before I decide	36.4	16.7	18.2	7.6	21.2	3.04 (1.05)	52 / 66

About Your Farm Operation

1. Please select the option that best describes who generally makes management decisions for your operation. **(Responses: 72)**

36.1% Me alone or with my spouse
25% Me with my family partners (siblings, parents, children)
5.6% Me with the landowner
23.6% Me with my tenant
6.9% Me and my business partners
2.8% Someone else makes the decision for the operation
0% Other

2. Please estimate the total tillable acreage (owned and/or rented) of your farming operation this year. (Mean=463.62; SD = 695.93; Min = 0; Max = 4000; Range = 4000; n = 68)

3. This year, how many acres of conservation set aside / CRP do you manage? If none, please enter a zero. (Mean=3.2; SD = 7.97; Min = 0; Max = 46; Range = 46; n = 69)

4. This year, how many acres of forest / woodland do you manage? If none, please enter a zero. (Mean=10.68; SD = 37.7; Min = 0; Max = 300; Range = 300; n = 68)

5. How many years have you been farming? (Please enter years). (Mean=35.24; SD = 19.71; Min = 0; Max = 66; Range = 66; n = 63)

6. How many other livestock are part of your farming operation? If none, please enter a zero. (Mean=31.46; SD = 242.44; Min = 0; Max = 2000; Range = 2000; n = 68)

7. Does the property you manage touch a stream, river, lake, or wetland? (Responses: 71)

69% Yes
31% No

8. Five years from now, which statement will best describe your farm operation? (Responses: 70)

58.6% It will be about the same as it is today
15.7% It will be larger
2.9% It will be smaller
22.9% I don't know

9. Do you have a nutrient management plan for your farm operation? (Responses: 67)

49.3% No
50.7% Yes

10. Who developed your current nutrient management plan? (Responses: 53)

5.7% My land Conservation District / Department, University Extension, or NRCS office

47.2% A private-sector agronomist or crop consultant

18.9% I created my own plan

13.2% I don't know

15.1% Other

About You

1. What is your gender? **(Responses: 72)**

83.3% Male

16.7% Female

2. What is your age? (Mean=64.72; SD = 14.58; Min = 27; Max = 92; Range = 65; n = 72)

3. What is the highest grade in school you have completed? **(Responses: 70)**

1.4% Some formal schooling

30% High school diploma/GED

28.6% Some college

2.9% 2 year college degree

27.1% 4 year college degree

10% Post-graduate degree

4. How long have you lived at your current residence (years)? (Mean=33.21; SD = 19.71; Min = 1.5; Max = 75; Range = 73.5; n = 71)

5. Which of the following best describes where you live? **(Responses: 72)**

12.5% In a town, village, or city

8.3% In an isolated, rural, non-farm residence

6.9% Rural subdivision or development

72.2% On a farm

6. Where are you likely to seek information about soil and water conservation issues? (Check all that apply) **(Responses: 71)**

74.6% Newsletters/brochure/factsheet

46.5% Internet

12.7% Radio

43.7% Workshops/demonstrations/meetings

52.1% Conversations with others

43.7% Trade publications/magazines

7% None of the above

7. Do you regularly read a local newspaper? **(Responses: 72)**

86.1% Yes

13.9% No

Information Sources

People get information about water quality from a number of different sources. To what extent do you trust those listed below as a source of information about soil and water?

	Not at all (1)	Slightly (2)	Moderately (3)	Very much (4)	Am not familiar (9)	Mean (SD)	Valid Responses / Total Responses
1. Soil and Water Conservation District	1.4	12.7	35.2	49.3	1.4	3.34 (0.76)	70 / 71
2. Natural Resources Conservation Service	1.5	14.9	40.3	40.3	3	3.23 (0.77)	65 / 67
3. University Extension	2.8	14.1	36.6	39.4	7	3.21 (0.81)	66 / 71
4. State agricultural agency	5.6	15.5	46.5	21.1	11.3	2.94 (0.82)	63 / 71
5. Environmental groups	28.8	34.2	23.3	6.8	6.8	2.09 (0.93)	68 / 73
6. Crop consultants	8.8	14.7	48.5	20.6	7.4	2.87 (0.87)	63 / 68
7. Other landowners / friends	6.9	19.4	47.2	23.6	2.8	2.9 (0.85)	70 / 72
8. State natural resources agency	7	23.9	38	22.5	8.5	2.83 (0.89)	65 / 71
9. County Health department	4.3	29	37.7	23.2	5.8	2.85 (0.85)	65 / 69

Survey of Non-Agricultural Residents in the Watershed

Rating of Water Quality
Overall, how would you rate the quality of the water in your area?

	Poor (1)	Okay (2)	Good (3)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. For canoeing / kayaking / other boating	19.4	27.7	12.6	40.3	1.89 (0.73)	114 / 191
2. For picnicking and family activities	21.8	28.2	19.7	30.3	1.97 (0.77)	131 / 188
3. For fish habitat	19.7	28.2	13.8	38.3	1.91 (0.73)	116 / 188
4. For scenic beauty	16.9	32.8	31.7	18.5	2.18 (0.75)	154 / 189

Your Water Resources

1. Of these activities, which is the most important to you? **(Responses: 172)**

4.7% For canoeing / kayaking / other boating
15.7% For eating locally caught fish
5.2% For swimming
11.6% For picnicking and family activities
22.7% For fish habitat
40.1% For scenic beauty

2. Do you know where the rain water goes when it runs off of your property? **(Responses: 183)**

48.6% No
51.4% Yes

Your Opinions
Please indicate your level of agreement or disagreement with the statements below.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Mean (SD)	Valid Responses / Total Responses
1. The way that I care for my lawn and yard can influence water quality in local streams and lakes.	1.6	5.2	21.5	51.3	20.4	3.84 (0.86)	191 / 191
2. It is my personal responsibility to help protect water quality.	0	3.7	14.8	55.6	25.9	4.04 (0.75)	189 / 189
3. It is important to protect water quality even if it slows economic development.	0	4.3	22.3	51.1	22.3	3.91 (0.78)	188 / 188
4. My actions have an impact on water quality.	2.7	3.7	18.6	53.7	21.3	3.87 (0.88)	188 / 188
5. I would be willing to pay more to improve water quality (for example: though local taxes or fees)	16.4	24.3	33.3	17.5	8.5	2.77 (1.17)	189 / 189
6. I would be willing to change the way I care for my lawn and yard to improve water quality.	2.2	10.8	34.4	37.6	15.1	3.53 (0.95)	186 / 186
7. The quality of life in my community depends on good water quality in local streams, rivers and lakes.	1.6	7.3	20.9	49.7	20.4	3.8 (0.9)	191 / 191

Water Impairments

Below is a list of water pollutants and conditions that are generally present in water bodies to some extent. The pollutants and conditions become a problem when present in excessive amounts. In your opinion, how much of a problem are the following water impairments in your area?

	Not a Problem (1)	Slight Problem (2)	Moderate Problem (3)	Severe Problem (4)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. Sedimentation (dirt and soil) in the water	13.6	16.2	24.1	9.4	36.6	2.46 (0.99)	121 / 191
2. Nitrogen	7.8	5.7	11.9	6.7	67.9	2.55 (1.08)	62 / 193
3. Phosphorus	6.8	7.4	10.5	6.3	68.9	2.53 (1.06)	59 / 190
4. Bacteria and viruses in the water (such as *E.coli* / coliform)	6.8	8.4	13.1	14.7	57.1	2.83 (1.08)	82 / 191
5. Trash or debris in the water	11.4	13	24.9	22.3	28.5	2.81 (1.05)	138 / 193
6. Toxic materials in the water	7.3	12	12.5	13.5	54.7	2.71 (1.07)	87 / 192
7. Flow Alteration	14.7	12.1	13.7	4.7	54.7	2.19 (1.01)	86 / 190
8. Habitat alteration harming local fish	8.8	11.9	14.5	12.4	52.3	2.64 (1.06)	92 / 193
9. Pesticides	5.2	12.5	17.7	17.2	47.4	2.89 (0.98)	101 / 192

Sources of Water Pollution

The items listed below are sources of water quality pollution across the country. In your opinion, how much of a problem are the following sources in your area?

	Not a Problem (1)	Slight Problem (2)	Moderate Problem (3)	Severe Problem (4)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. Discharges from industry into streams and lakes	17.2	15.7	12.6	11.1	43.4	2.31 (1.11)	112 / 198
2. Discharges from sewage treatment plants	17.3	16.2	11.2	9.1	46.2	2.23 (1.08)	106 / 197
3. Soil erosion from construction sites	21.1	15.5	12.4	8.2	42.8	2.14 (1.07)	111 / 194
4. Soil erosion from farm fields	7.1	20.4	23.5	13.3	35.7	2.67 (0.93)	126 / 196
5. Soil erosion from shorelines and/or streambanks	14.9	18.6	13.4	8.8	44.3	2.29 (1.03)	108 / 194
6. Improperly maintained septic systems	13.7	11.7	16.8	12.7	45.2	2.52 (1.11)	108 / 197
7. Manure from farm animals	12.8	17.3	19.4	13.3	37.2	2.53 (1.04)	123 / 196
8. Littering/illegal dumping of trash	8.7	21.9	24	21.4	24	2.77 (0.99)	149 / 196
9. Excessive use of fertilizers for crop production	7.1	12.6	21.2	18.7	40.4	2.86 (0.99)	118 / 198
10. Animal feeding operations	16	11.3	16.5	8.2	47.9	2.33 (1.08)	101 / 194
11. Urban stormwater runoff	11.8	18.5	16.9	6.2	46.7	2.33 (0.95)	104 / 195
12. Landfill(s)	13.3	15.3	16.3	17.3	37.8	2.61 (1.11)	122 / 196
13. Channelization of streams	14.9	9.2	11.8	3.1	61	2.08 (1)	76 / 195
14. Removal of riparian vegetation	13.8	6.6	13.8	7.7	58.2	2.37 (1.13)	82 / 196
15. Natural sources	21.2	13.5	7.8	0.5	57	1.71 (0.8)	83 / 193

Consequences of Poor Water Quality

Poor water quality can lead to a variety of consequences for communities. In your opinion, how much of a problem are the following issues in your area?

	Not a Problem (1)	Slight Problem (2)	Moderate Problem (3)	Severe Problem (4)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. Contaminated drinking water	38.3	14	9.8	9.8	28	1.88 (1.1)	139 / 193
2. Contaminated fish	14.5	17.1	16.1	15	37.3	2.5 (1.1)	121 / 193
3. High drinking water treatment costs	22.4	16.7	13	12	35.9	2.23 (1.12)	123 / 192
4. Loss of desirable fish species	15.5	11.9	8.8	15	48.7	2.45 (1.21)	99 / 193
5. Reduced beauty of lakes or streams	18.7	24.9	19.2	10.4	26.9	2.29 (1)	141 / 193
6. Reduced quality of water recreation activities	20.1	13.9	17.5	8.2	40.2	2.23 (1.07)	116 / 194
7. Excessive aquatic plants or algae	17	10.3	17	10.3	45.4	2.38 (1.12)	106 / 194
8. Odor	26.9	22.3	10.4	9.3	31.1	2.03 (1.04)	133 / 193
9. Lower property values	25.4	17.6	9.3	9.8	37.8	2.06 (1.09)	120 / 193

Practices to Improve Water Quality

Please indicate which statement most accurately describes your level of experience with each practice listed below.

	Not relevant for my property (9)	Never heard of it (1)	Somewhat familiar with it (2)	Know how to use it; not using it (3)	Currently use it (4)	Mean (SD)	Valid Responses / Total Responses
1. Following the manufacturer's instructions when fertilizing lawn or garden	26.9	3.6	6.2	24.4	38.9	3.35 (0.84)	141 / 193
2. Keep grass clippings and leaves out of the roads, ditches, and gutters	16.5	4.1	12.9	11.9	54.6	3.4 (0.92)	162 / 194
3. Use phosphate free fertilizer	33.7	17.1	14.4	16.6	18.2	2.54 (1.15)	124 / 187
4. Properly dispose of household waste (chemicals, batteries, florescent light bulbs, etc.)	9.3	3.1	14.5	11.9	61.1	3.45 (0.88)	175 / 193
5. Plant vegetation in critical erosion areas	47.7	8.8	13	10.9	19.7	2.79 (1.13)	101 / 193
6. Restore native plant communities	44.3	17	17.5	9.8	11.3	2.28 (1.11)	108 / 194
7. Maintain riparian buffer	42	33.2	7.8	7.8	9.3	1.88 (1.16)	112 / 193
8. Plug well / Cap well	53.1	22.4	8.3	4.2	12	2.12 (1.26)	90 / 192

Specific Constraints of Practices

Rain Garden : *A garden that uses native plants to absorb and filter stormwater collected off a roof, parking lot, sidewalk, or driveway.*

1. How familiar are you with this practice? **(Responses: 203)**

15.3% Not relevant

40.9% Never heard of it

26.6% Somewhat familiar with it

11.3% Know how to use it; not using it

5.9% Currently use it

2. Are you willing to try this practice? **(Responses: 186)**

27.4% Yes or already do

50% Maybe

22.6% No

How much do the following factors limit your ability to implement this practice?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
3. Don't know how to do it	26.1	12.5	19.3	22.2	19.9	2.53 (1.21)	141 / 176
4. Time required	18.2	14.2	21.6	18.8	27.3	2.44 (1.13)	128 / 176
5. Cost	10.2	9.7	18.2	29.5	32.4	2.01 (1.09)	119 / 176
6. The features of my property make it difficult	19.7	10.1	10.1	21.3	38.8	2.46 (1.27)	109 / 178
7. Insufficient proof of water quality benefit	20.9	4.1	16.9	10.5	47.7	2.68 (1.2)	90 / 172
8. Desire to keep things the way they are	28.8	15.3	19.8	14.7	21.5	2.74 (1.14)	139 / 177
9. Physical or health limitations	40.4	9.6	15.2	14.6	20.2	2.95 (1.2)	142 / 178
10. Hard to use with my farming system	41.3	0.6	6.6	1.8	49.7	3.62 (0.85)	84 / 167
11. Lack of equipment	19.5	8.6	14.4	19	38.5	2.47 (1.23)	107 / 174

Regular Septic System Servicing: *Having septic system thoroughly cleaned every 3-5 years to remove all the sludge, effluent and scum from the tank.*

12. How familiar are you with this practice? **(Responses: 202)**

48.5% Not relevant

10.4% Never heard of it

13.4% Somewhat familiar with it

8.9% Know how to use it; not using it

18.8% Currently use it

13. Are you willing to try this practice? **(Responses: 122)**

41% Yes or already do

29.5% Maybe

29.5% No

How much do the following factors limit your ability to implement this practice?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
14. Don't know how to do it	47.3	7.1	10.7	7.1	27.7	3.31 (1.06)	81 / 112
15. Time required	36.9	15.3	17.1	2.7	27.9	3.2 (0.93)	80 / 111
16. Cost	24.3	9.9	17.1	22.5	26.1	2.49 (1.24)	82 / 111
17. The features of my property make it difficult	48.7	5.3	4.4	8	33.6	3.43 (1.05)	75 / 113
18. Insufficient proof of water quality benefit	38.7	4.5	10.8	5.4	40.5	3.29 (1.06)	66 / 111
19. Desire to keep things the way they are	45.5	11.6	6.2	9.8	26.8	3.27 (1.09)	82 / 112
20. Physical or health limitations	55.5	6.4	7.3	7.3	23.6	3.44 (1.01)	84 / 110
21. Hard to use with my farming system	56.9	2.8	2.8	0	37.6	3.87 (0.45)	68 / 109
22. Lack of equipment	41.8	3.6	4.5	17.3	32.7	3.04 (1.32)	74 / 110

Rain Barrels : *Devices designed to collect stormwater from roofs and gutters that can later be used to water a garden, lawn, or house plants.*

23. How familiar are you with this practice? **(Responses: 199)**

9.5% Not relevant

13.1% Never heard of it

29.6% Somewhat familiar with it

40.7% Know how to use it; not using it

7% Currently use it

24. Are you willing to try this practice? **(Responses: 175)**

38.3% Yes or already do

33.1% Maybe

28.6% No

How much do the following factors limit your ability to implement this practice?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
25. Don't know how to do it	45.7	11	19.1	8.1	16.2	3.12 (1.07)	145 / 173
26. Time required	32.2	16.1	22.4	13.2	16.1	2.8 (1.12)	146 / 174
27. Cost	28.5	12.8	19.8	18	20.9	2.65 (1.19)	136 / 172
28. The features of my property make it difficult	34.5	14.6	14.6	9.4	26.9	3.02 (1.09)	125 / 171
29. Insufficient proof of water quality benefit	38.2	7.6	14.7	7.6	31.8	3.12 (1.1)	116 / 170
30. Desire to keep things the way they are	40.1	14	14.5	14.5	16.9	2.96 (1.17)	143 / 172
31. Physical or health limitations	47.7	9.1	13.6	13.1	16.5	3.1 (1.17)	147 / 176
32. Hard to use with my farming system	56	2.4	2.4	3.6	35.7	3.72 (0.78)	108 / 168
33. Lack of equipment	28.7	8.2	13.5	24.6	25.1	2.55 (1.3)	128 / 171

Filter Strips: *Gently sloping, vegetated areas adjacent to impervious surfaces intended to reduce impacts of sheet flow and velocity of stormwater and help improve its water quality.*

34. How familiar are you with this practice? **(Responses: 194)**

20.1% Not relevant

42.3% Never heard of it

18% Somewhat familiar with it

8.2% Know how to use it; not using it

11.3% Currently use it

35. Are you willing to try this practice? **(Responses: 162)**

30.9% Yes or already do

32.1% Maybe

37% No

How much do the following factors limit your ability to implement this practice?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
36. Don't know how to do it	28.9	11.2	5.9	21.7	32.2	2.7 (1.31)	103 / 152
37. Time required	24.3	11.2	15.8	11.2	37.5	2.78 (1.15)	95 / 152
38. Cost	21.7	7.9	13.2	21.1	36.2	2.47 (1.27)	97 / 152
39. The features of my property make it difficult	24.7	7.1	10.4	14.9	42.9	2.73 (1.27)	88 / 154
40. Insufficient proof of water quality benefit	32	4.7	12.7	4	46.7	3.21 (1.05)	80 / 150
41. Desire to keep things the way they are	35.9	5.9	11.1	16.3	30.7	2.89 (1.27)	106 / 153
42. Physical or health limitations	41	5.8	10.3	13.5	29.5	3.05 (1.23)	110 / 156

Making Decisions for my Property

In general, how much does each issue limit your ability to change your agricultural management practices?

	Not at all (4)	A little (3)	Some (2)	A lot (1)	Don't Know (9)	Mean (SD)	Valid Responses / Total Responses
1. Personal out-of-pocket expense	8.2	6.5	25	48.4	12	1.71 (0.96)	162 / 184
2. My own physical abilities	34.6	11.2	17.6	26.6	10.1	2.6 (1.27)	169 / 188
3. Not having access to the equipment that I need	13.5	11.4	18.9	38.9	17.3	1.99 (1.13)	153 / 185
4. Lack of available information about a practice	16	14.4	22.7	27.1	19.9	2.24 (1.13)	145 / 181
5. No one else I know is implementing the practice	24.3	8.3	17.7	17.7	32	2.58 (1.22)	123 / 181
6. Approval of my neighbors	38.7	8.3	9.9	10.5	32.6	3.11 (1.16)	122 / 181
7. Don't know where to get information and/or assistance about those practices	23.7	11.3	16.9	20.3	27.7	2.53 (1.22)	128 / 177
8. Environmental damage caused by practice	29.4	6.7	14.4	6.1	43.3	3.05 (1.1)	102 / 180
9. Legal restrictions on my property	30	7.2	10.6	8.3	43.9	3.05 (1.15)	101 / 180
10. Concerns about resale value	30.1	9.3	13.1	13.7	33.9	2.84 (1.21)	121 / 183
11. Not being able to see a demonstration of the practice before I decide	24.9	12.2	18.8	16	28.2	2.64 (1.17)	130 / 181
12. The need to learn new skills or techniques	28.7	12.2	18.2	14.9	26	2.74 (1.18)	134 / 181

About You

1. Do you make the home and lawn care decisions in your household? **(Responses: 204)**

86.8% Yes

13.2% No

2. What is your gender? **(Responses: 205)**

65.9% Male

34.1% Female

3. What is your age? (Mean=59.4; SD = 15.35; Min = 23; Max = 89; Range = 66; n = 196)

4. What is the highest grade in school you have completed? **(Responses: 200)**

6% Some formal schooling

42% High school diploma/GED

18.5% Some college

5% 2 year college degree

15.5% 4 year college degree

13% Post-graduate degree

5. What is the approximate size of your residential lot? **(Responses: 200)**

45% 1/4 acre or less

21% More than 1/4 acre but less than 1 acre

27.5% 1 acre to less than 5 acres

6.5% 5 acres or more

6. Do you own or rent your home? **(Responses: 188)**

86.7% Own

13.3% Rent

7. How long have you lived at your current residence (years)? (Mean=17.26; SD = 14.43; Min = 0.167; Max = 76; Range = 75.833; n = 193)

8. Which of the following best describes where you live? **(Responses: 204)**

60.8% In a town, village, or city

17.2% In an isolated, rural, non-farm residence

14.2% Rural subdivision or development

7.8% On a farm

9. <u>In addition to your residence, which of the following do you own or manage?</u> (check all that apply) **(Responses: 201)**

9% An agricultural operation

5.5% Forested land

1% Rural recreational property

88.1% None of these

10. <u>Do you use a professional lawn care service?</u> **(Responses: 203)**

3.4% Yes, just for mowing

3.4% Yes, for mowing and fertilizing

19.2% Yes, just for fertilizing and pest control

4.9% Yes, for mowing, fertilizing, and pest control

69% No

11. <u>Where are you likely to seek information about water quality issues?</u> **(Responses: 203)**

35% Newsletters/brochure/fact sheet

33% Internet

5.4% Radio

30.5% Newspapers/magazines

8.4% Workshops/demonstrations/meetings

27.1% Conversations with others

22.2% None of the above

Information Sources

People get information about water quality from a number of different sources. To what extent do you trust those listed below as a source of information about soil and water?

	Not at all (1)	Slightly (2)	Moderately (3)	Very much (4)	Am not familiar (9)	Mean (SD)	Valid Responses / Total Responses
1. Local watershed project	10.7	9.1	27.3	17.6	35.3	2.8 (1.02)	121 / 187
2. Local government	20	26.3	23.7	12.1	17.9	2.34 (1.01)	156 / 190
3. University Extension	8.5	13.8	25	30.9	21.8	3 (1.01)	147 / 188
4. State environmental agency	14.4	17.6	29.4	17.6	20.9	2.64 (1.02)	148 / 187
5. Environmental groups	16.5	23.9	25.5	12.8	21.3	2.44 (1)	148 / 188

Information Sources cont.							
6. Neighbors / friends	15	27.8	28.9	12.3	16	2.46 (0.95)	157 / 187
7. County Health department	11.6	21.1	28.9	20.5	17.9	2.71 (1)	156 / 190

Septic Systems

Please use the space below for any additional comments about this survey or water resources in your community.

1. Do you have a septic system? **(Responses: 199)**

54.8% No

6.5% Don't Know

38.7% Yes

2. If you answered 'yes' to the previous question, in what year was it installed? (Mean=1988.78; SD = 16.49; Min = 1952; Max = 2011; Range = 59; n = 41)

3. Within the last five years, have you had any of the following problems? (Check all that apply)- **(Responses: 118)**

22.9% Slow drains

7.6% Sewage backup in house

4.2% Bad smells near tank or drain field

0.8% Sewage on the surface

0.8% Sewage flowing to ditch

1.7% Frozen septic

5.1% Other

61.9% None

11% Don't know

4. In the future, would you like a reminder from your local health department regarding inspection/maintenance of your septic system? **(Responses: 115)**

16.5% Yes

68.7% No

14.8% Don't know

5. Do you have a garbage disposal? **(Responses: 185)**

27% Yes, I use it daily

27% Yes, I use it occasionally

3.8% Yes, but I don't use it

42.2% No

6. Does your septic system have an absorption field (finger system)? **(Responses: 106)**

52.8% Yes

22.6% No

24.5% Don't know

7. Is your septic system designed to treat sewage or get rid of waste? **(Responses: 105)**

4.8% Treat sewage

12.4% Get rid of waste

18.1% Both

9.5% Neither

55.2% Don't know

Dissolved Oxygen

Dissolved oxygen is oxygen that has been dissolved into water. It can come from the atmosphere or from plants through photosynthesis. Oxygen becomes dissolved in water until it reaches a saturation point. However, super saturation can occur – one source being excess oxygen being produce by vegetation through photosynthesis. Cool water can hold more oxygen than warm water. A standard value for DO is greater than 5mg/L and not less than 4mg/L. Typical ranges are from 5.4mg/L to 14.2mg/L, while the Indiana average is 9.8mg/L. When measured as parts per million (ppm), levels of 5-6ppm are considered healthy, levels around 3ppm are considered stressful, and levels ranging from 1-2ppm are when fish die. DO levels are most stressful on aquatic life during hot mornings when the water is less saturated, water flow is low, and aquatic plants haven't begun producing oxygen through photosynthesis since sunset of the previous day.

Temperature

The temperature of the water plays a vital role in the natural processes of aquatic life. Animal metabolic rates are very sensitive to temperature. Animals in the early stages of life are very sensitive to temperature fluctuations. Temperature also affects the rate at which aquatic plants photosynthesize and produce oxygen. Cooler temperatures allow for the water to hold greater concentrations of oxygen which is better for the aquatic wildlife.

pH

pH is a measure of the hydrogen ions in a substance. A lower value represents greater acidity, while higher values represent greater alkalinity. Seven is the middle of the 0 to 14 scale and is considered the most neutral of pH values. pH values from 6.5 to 8.2 are considered best for aquatic animals as they encourage wildlife diversity. Many natural waters can be found to have a pH value ranging from 5 to 8.5. Aquatic plants can impact pH levels during active periods of photosynthesis and respiration, resulting in a more alkaline or acidic environment respectively. As the pH in water decreases, the solubility of some heavy metals in the water increases, this can have detrimental effects on the wildlife.

Phosphorus

Phosphorus is a necessary element for life. It occurs naturally in the environment. However, phosphorus levels can increase because of many reasons. Effluent from waste water treatment plants, fertilizer runoff, animal manure runoff, drained wetlands, different kinds of soils, commercial cleaning products and other sources are potential hazards to the phosphorus levels in natural surface waters. Phosphorus levels greater than 0.03 ppm can encourage excessive plant growth. As this plant matter begins to decompose, microorganisms use up the oxygen in the water leading to low dissolved oxygen levels. Due to the nature of the phosphorus cycle, phosphorus can only be removed from the aquatic system by physical removal. Orthophosphates are a specific form of phosphorus found in nature that is readily available to be taken up by vegetation. Measured orthophosphates can be used as a good indicator of total phosphorus levels.

Nitrogen

Nitrogen is another critical compound for all life. It is commonly found in water as the compounds Nitrate (NO_3), Nitrite (NO_2), and ammonia (NH_3). Nitrogen can enter the water from human and animal wastes, decomposing organic matter, and from fertilizer runoff. Sewage is the greatest source of nitrates in the surface water of Indiana. Generally, waters with nitrate levels below 4 ppm are considered unpolluted. When nitrate levels increase to above 10 ppm and nitrite levels are over 3.3 ppm, the water is considered unsafe to drink. When measured in mg/L, a typical range for nitrates is 0 to 36.08. The average level for this in Indiana is 12.32 mg/L.

Total Suspended Solids

Suspended solids are objects in the water that can be trapped by a filter. Generally, these solids refer to smaller particles that don't dissolve into the water. These suspended solids can block sunlight and keep it from reaching underwater vegetation. They can increase the temperature of the water as they absorb sunlight. They can decrease visibility in the water, reduce growth and decrease disease resistance in animals, clog the gills of fish, smother eggs of aquatic animals, suffocate larvae, and increase the amount of bacteria, nutrients, pesticides, and metals in the water. Waters with faster flows may increase the amount of suspended solids either from land sediment or by resuspending solids that had settled at the bottom of a waterway. These solids can come from a variety of places including runoff from urban areas, erosion, waste water treatment plants, septic systems, and decaying organic matter.

E. Coli

Escherichia coli are a kind of fecal bacteria. Sources of *E. coli* in water include humans, livestock, and even waterfowl. It can enter the water via combined sewers, septic systems, or runoff from agricultural feedlots. It can enter the human body through the mouth, nose, eyes, ears, or cuts or abrasions in the skin. When testing for *E. coli*, it is only considered an indicator for fecal contamination as not all strains of *E. coli* are pathogenic. According to the U.S. Environmental Protection Agency (EPA), counts of *E. coli* colonies greater than 235/100mL indicate that more than 8 people of every 1,000 who come in contact with the water may become ill. Higher counts indicate a greater risk of illness. Factors that increase the chance of illness include duration of contact with the water, whether or not eyes and mouth come into contact, wounds on the skin, age, and overall health.

Qualitative Habitat Evaluation Index (QHEI)

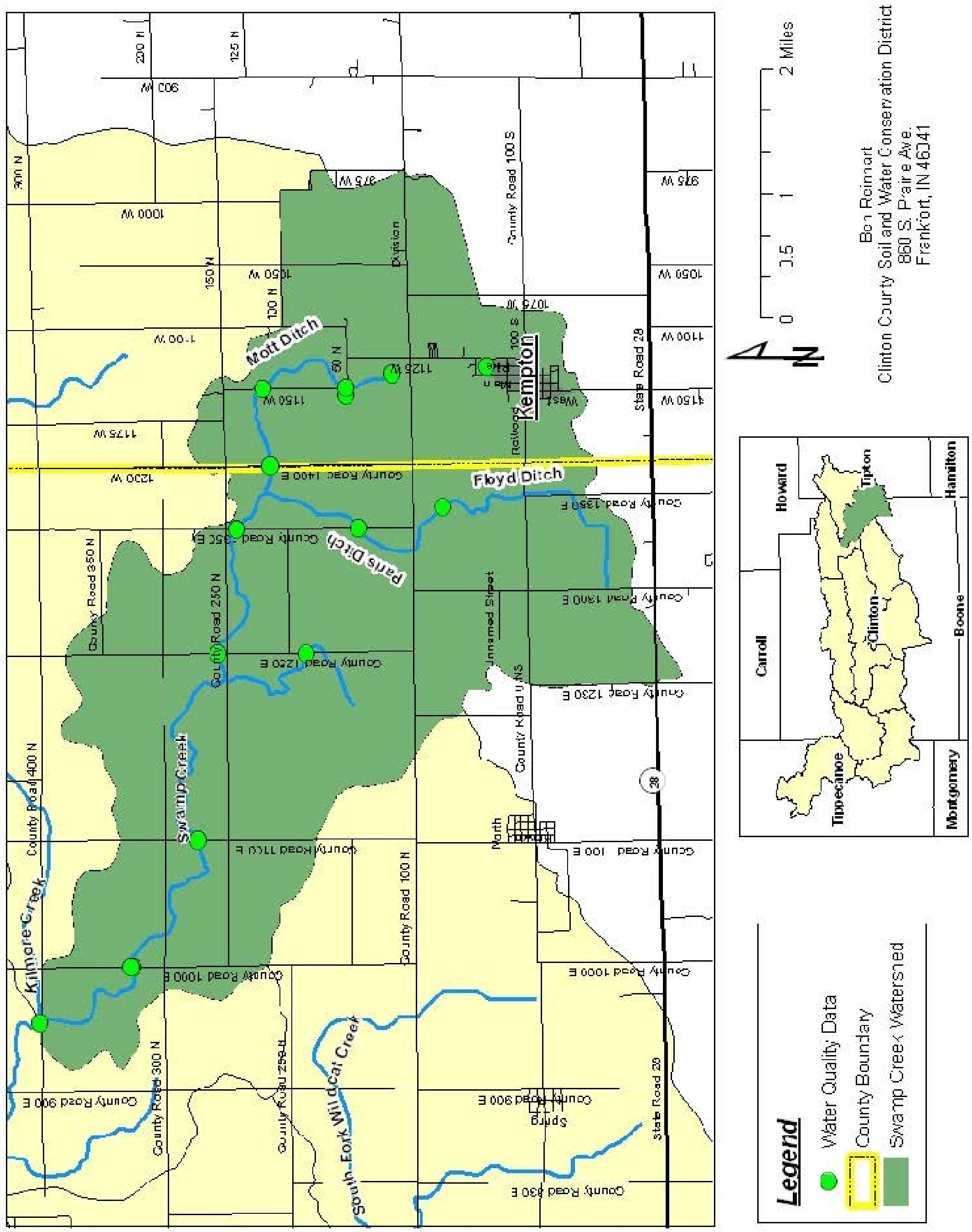
The QHEI is a general assessment of the quality of a stream habitat. A total of seven metrics are measured and scored for a maximum total of 100 points (higher scores being better). The seven metrics (with subcategories) include:

1. Substrate (type and quality)
2. Instream Cover (type and amount)
3. Channel Morphology (sinuosity, development, channelization, and stability)
4. Riparian Zone (width, quality, and bank erosion)
5. Pool Quality (depth, current type, and morphology)
6. Riffle Quality (depth, substrate stability, and embeddedness)
7. Map Gradient

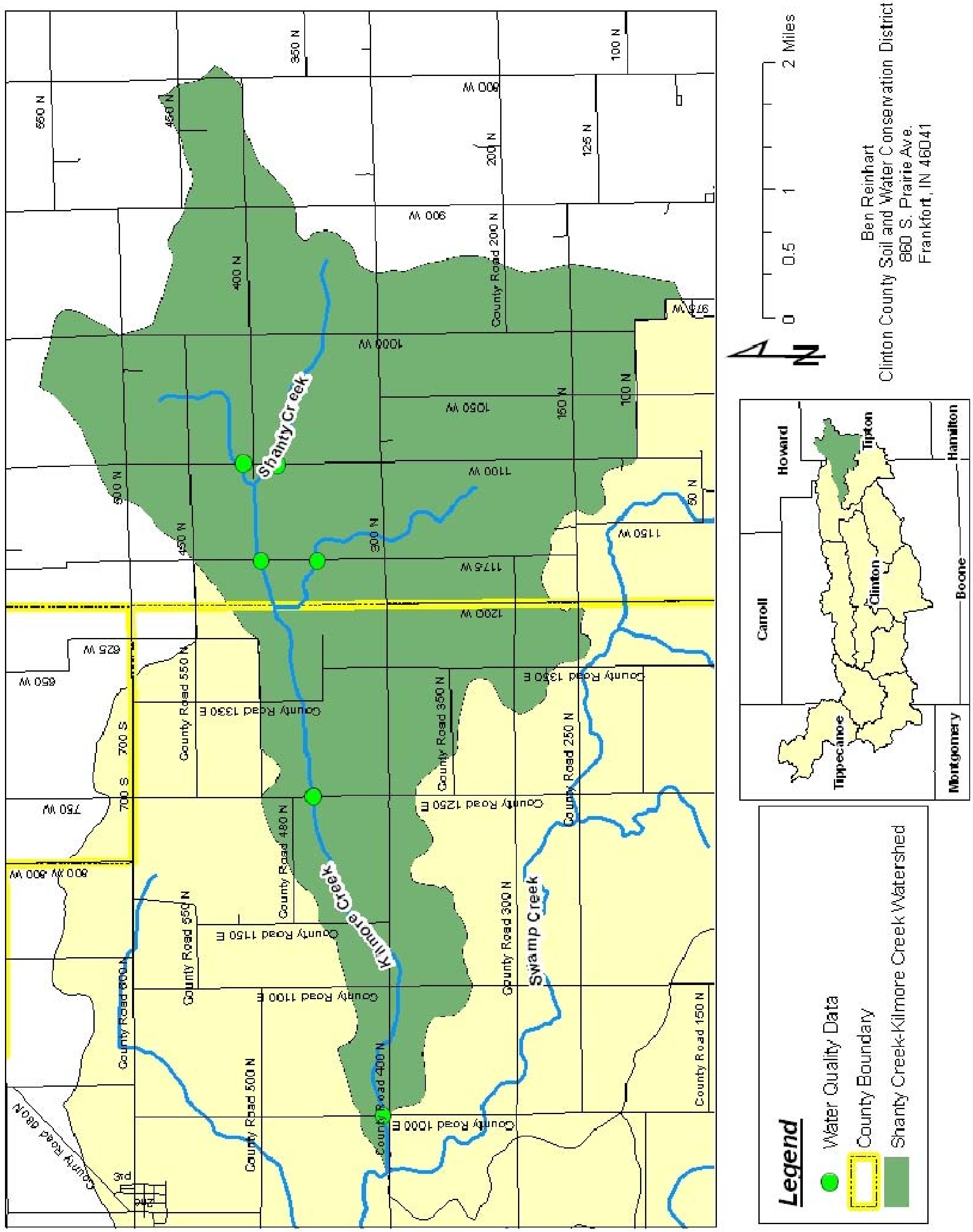
Macroinvertebrate Biotic Integrity Index (mIBI)

This index indirectly measures the quality of the water by evaluating the number, types, and diversity of indicator aquatic invertebrate species in the water. Generally, the inclusion of certain species, a high number of certain species, and a great diversity of various species indicates healthier and more pollutant-free waters.

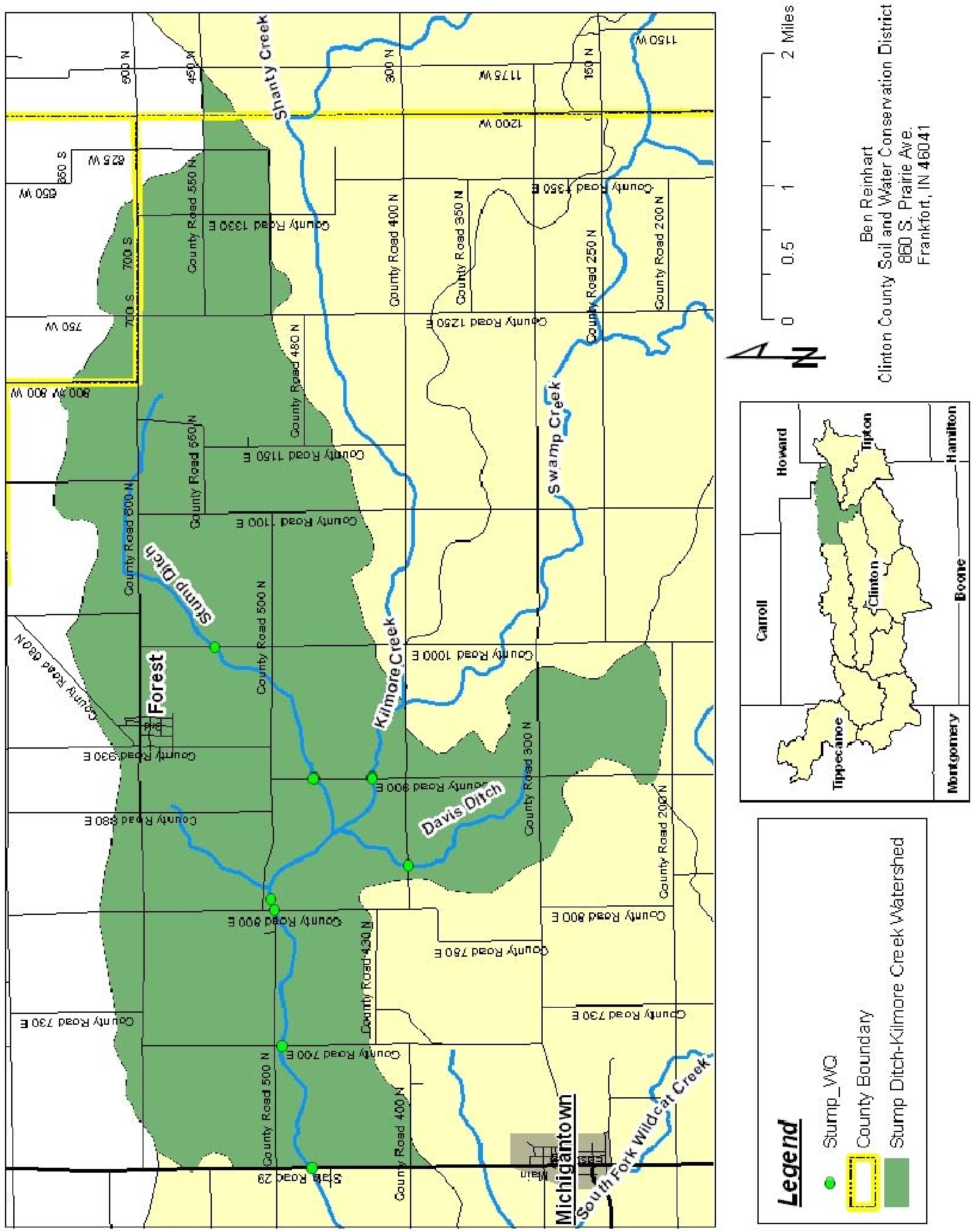
Swamp Creek Subwatershed



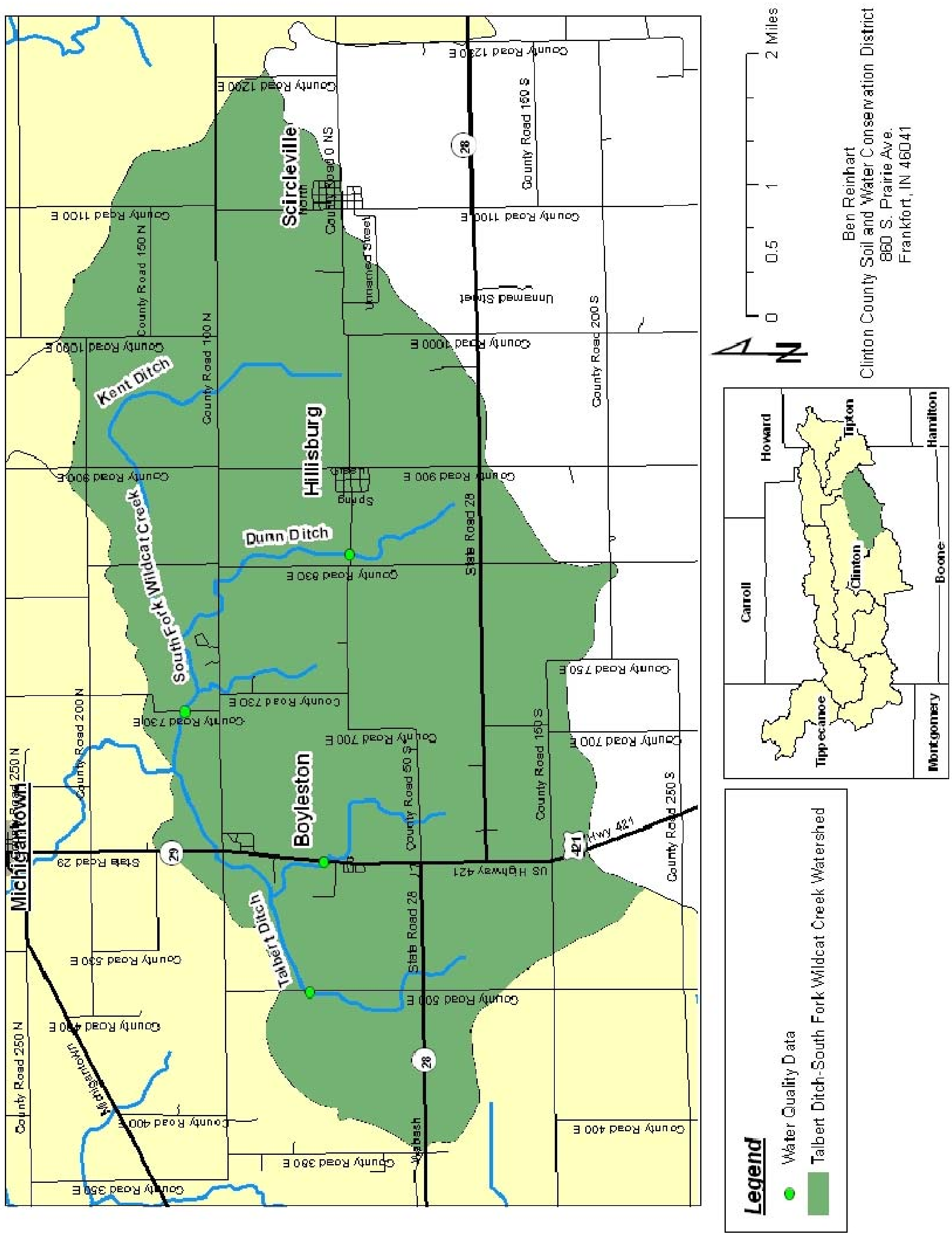
Shanty Creek-Kilmore Creek Subwatershed



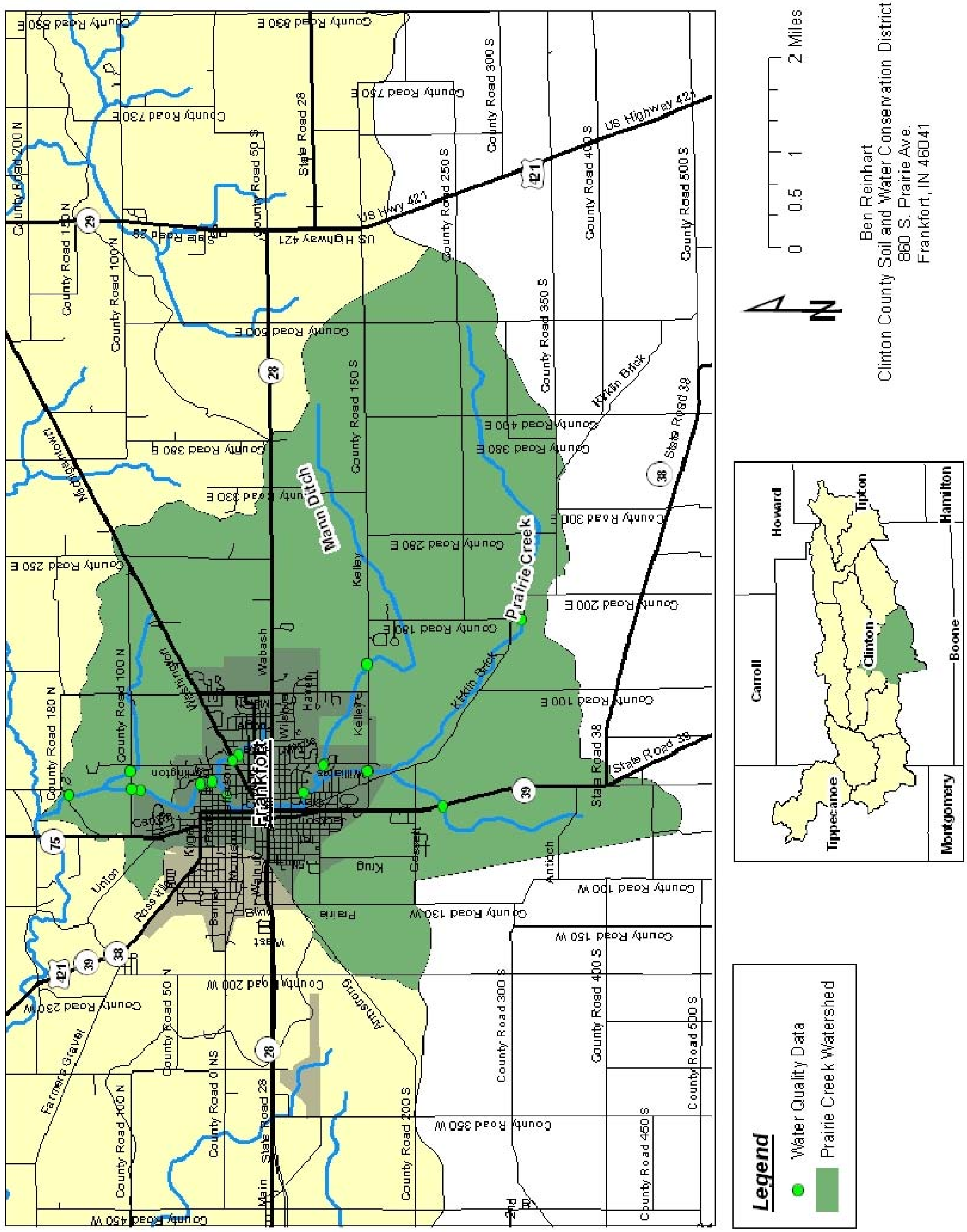
Stump Ditch-Kilmore Creek Subwatershed



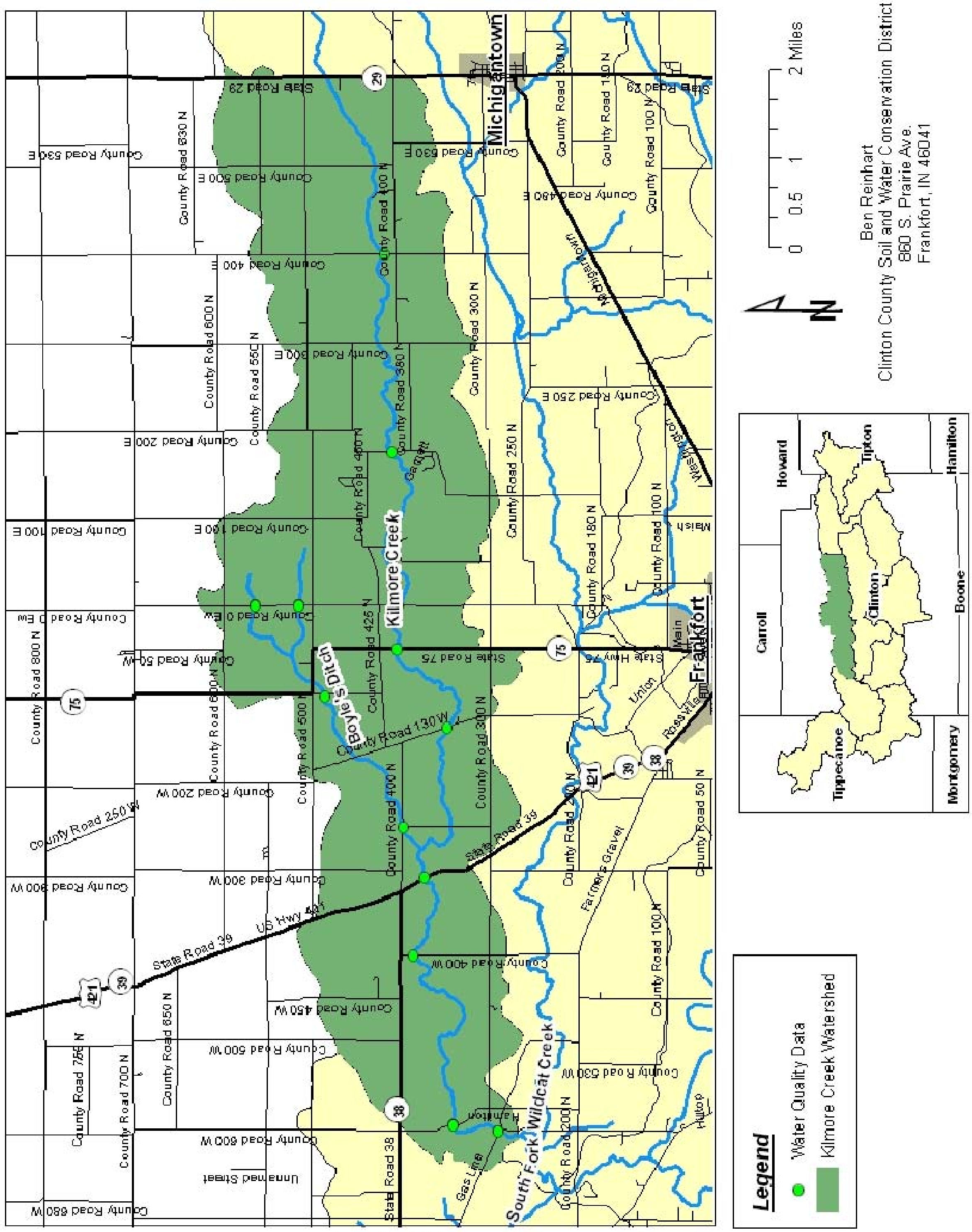
Talbert Ditch-South Fork Wildcat Creek Subwatershed



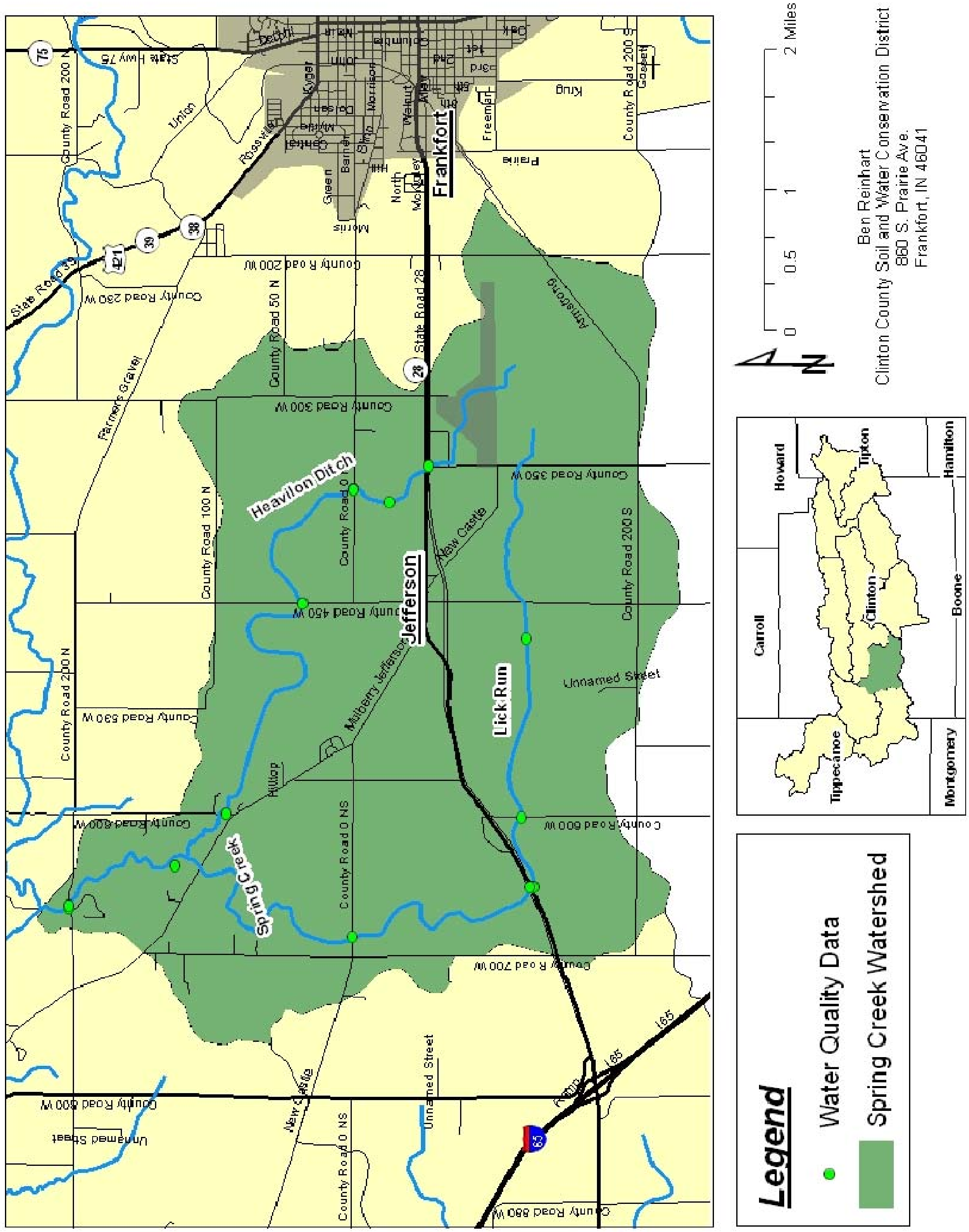
Prairie Creek Subwatershed



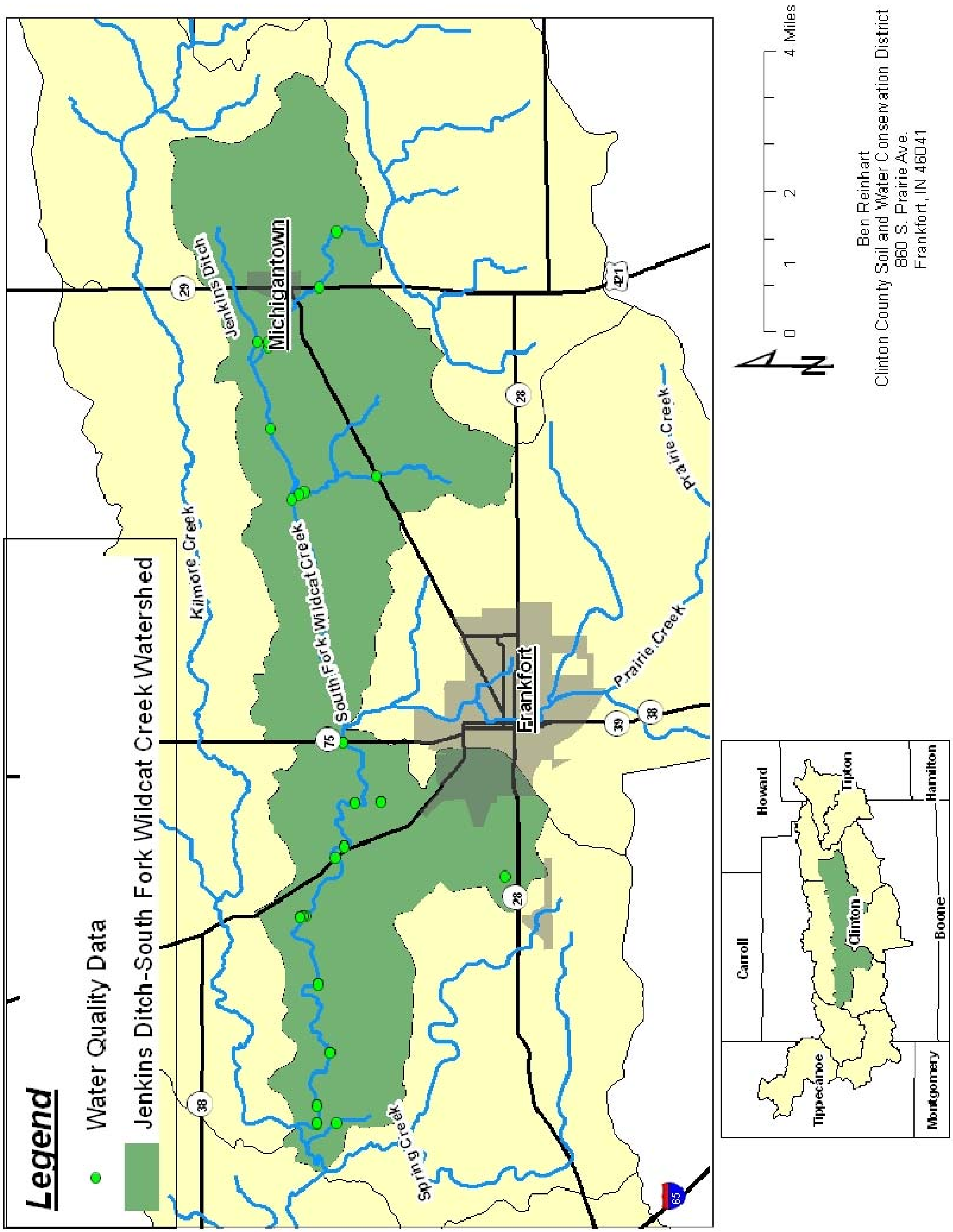
Kilmore Creek Subwatershed



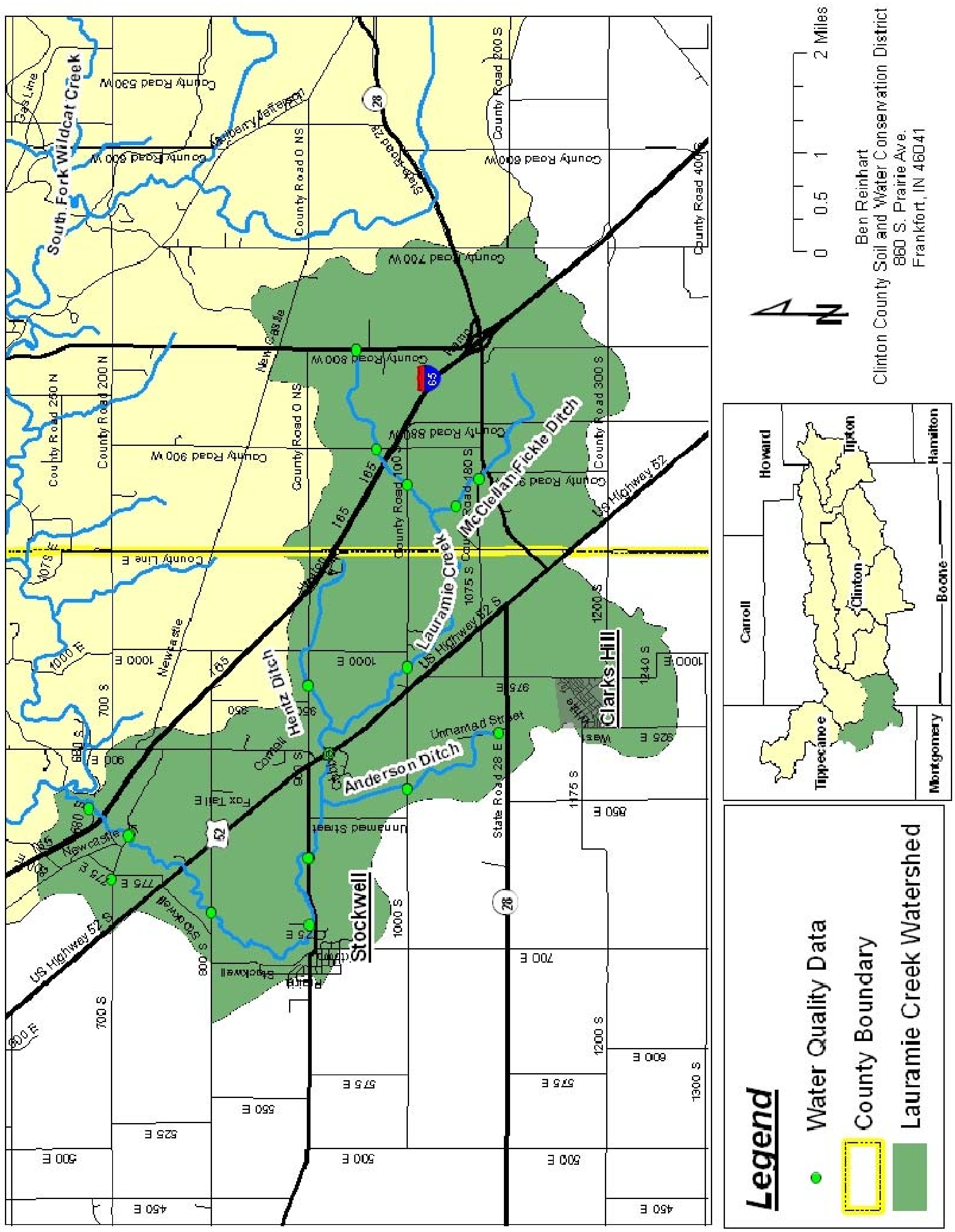
Spring Creek Subwatershed



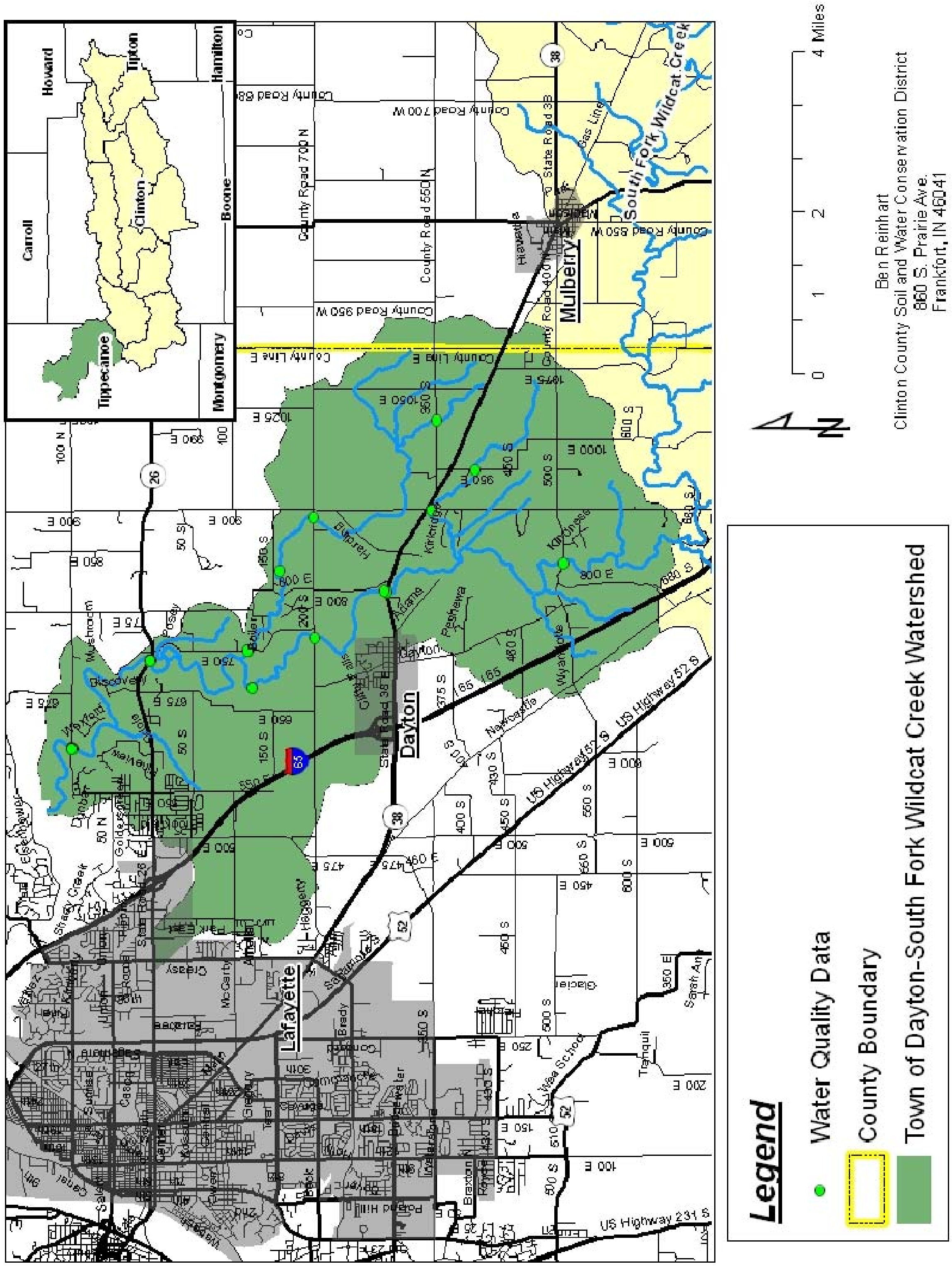
Jenkins Ditch-South Fork Wildcat Creek Subwatershed



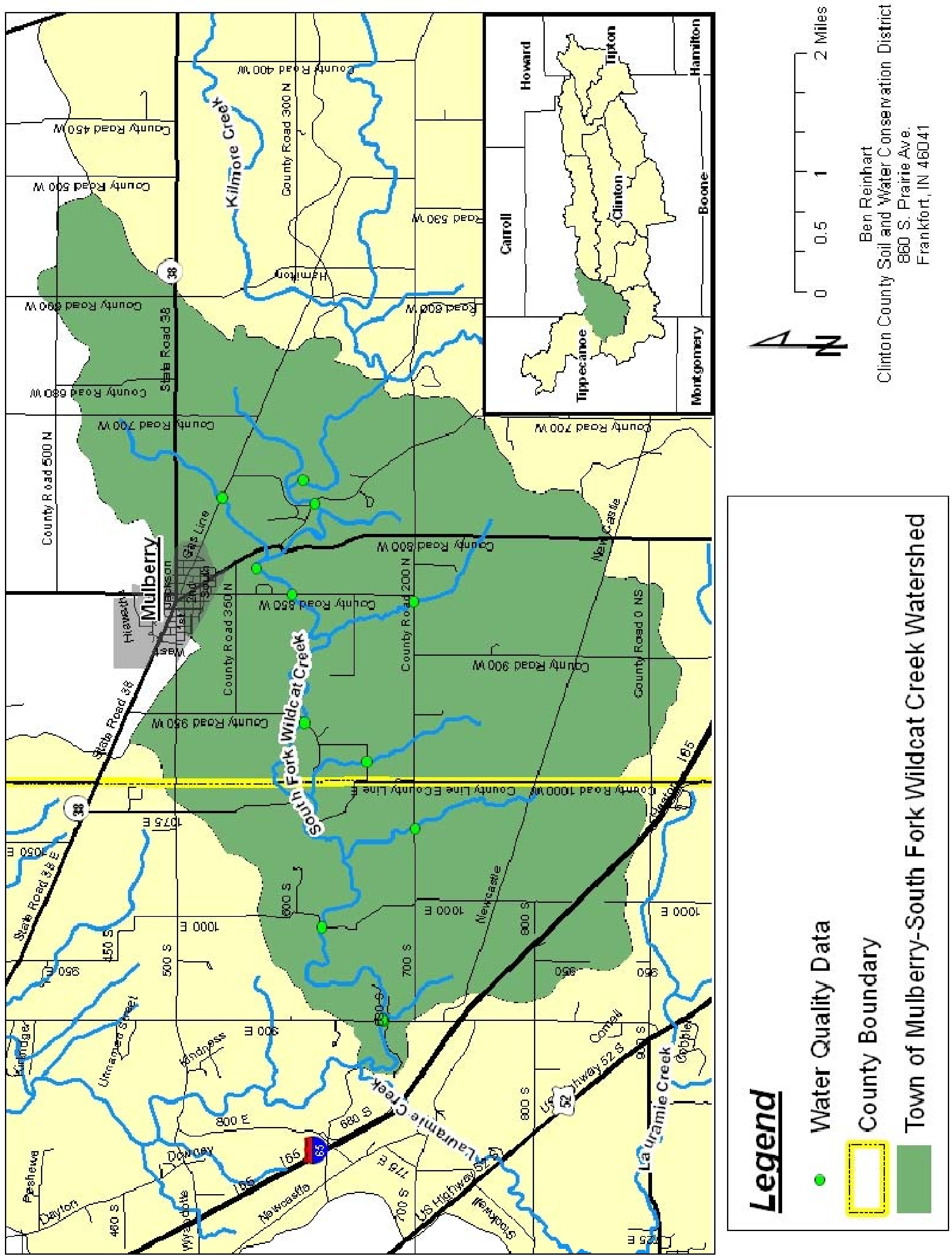
Lauramie Creek Subwatershed



Town of Dayton-South Fork Wildcat Creek Subwatershed



Town of Mulberry-South Fork Wildcat Creek Subwatershed



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We Protect Hoosiers and Our Environment.

Mitchell E. Daniels Jr.
Governor

Thomas W. Easterly
Commissioner

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Devin Bell, Chairman
Clinton County SWCD
860 S. Prairie Ave., Suite 1
Frankfort, IN 46041

September 9, 2010

Dear Mr. Bell:

Re: Subcontract Approval
FFY 2009 Section 205(j) Project
EDS 9-271

This is our approval of the subcontract with Commonwealth Biomonitoring, Inc., to help fulfill Task B of the above grant agreement. Specifically, a Quality Assurance Project Plan will be written for the subtask. Water quality monitoring for chemical parameters and bioassessment for fish and macroinvertebrate communities and a Qualitative Habitat Evaluation Index will be conducted. The total cost will not exceed $40,000. Please note that the subcontract for the Section 205(j) project must not exceed the term of the grant agreement between the Clinton County SWCD and IDEM. Please also note that future subcontracts must be approved prior to being signed by both parties in accordance with the Assignment section of the grant agreement.

This subcontract was reviewed only for consistency with the scope of services, budget, and time frame of the contract. This was not meant in any way to be a legal review. Your office is responsible for obtaining any legal review that you consider necessary.

If you have any questions regarding this letter, please contact your Project Manager, Crystal Rehder, at 317/308-3185.

Sincerely,

Laura M. Bieberich

Laura M. Bieberich, Sr. Environmental Mgr.
NPS/TMDL Section
Office of Water Quality

CC: Cindy Muffett, Resource Conservation Specialist

QUALITY ASSURANCE PROJECT PLAN
FOR
South Fork of Wildcat Creek Watershed Monitoring
ARN: A305-9-271

Prepared by

Greg R. Bright
Commonwealth Biomonitoring, Inc.
8061 Windham Lake Drive
Indianapolis, Indiana 46214

Prepared for

Indiana Department of Environmental Management
Office of Water Management
Watershed Management Section

April 2010

Water Quality Analysis	Greg R. Bright (signature) Greg Bright	May 3, 2010 Date
Bacteria Analysis	(signature) Dennis Shirar	5/3/2010 Date
Watershed Coordinator	Cynthia Muffett (signature) Cynthia Muffett	5/3/2010 Date
QA Project Manager:	Betty Ratcliff	Date
WMS Section Chief:	Andrew Pelloso	Date
WMS Branch Chief:	Marylou Renshaw	Date

Copies of the QAPP have been distributed to Greg Bright, Cynthia Muffett, Dennis Shirar, and Betty Ratcliff, of whom have responsibility for implementation of various tasks in the project.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

1.0 INTRODUCTION

The Clinton County Soil and Water Conservation District has received a 319 water quality grant from the Indiana Department of Environmental Management (IDEM) and the United States Environmental Protection Agency (USEPA). The purpose of the grant is to prepare a watershed management plan for the South Fork of Wildcat Creek. One of the tasks in the project is to monitor water quality using biological and chemical methods and use the information to make decisions that may be used to help prepare the watershed management plan. This document presents a quality assurance plan for monitoring.

2.0 PROJECT DESCRIPTION

2.1 General Overview:

The water quality assessment will use macroinvertebrate monitoring and aquatic habitat assessment to measure an Index of Biotic Integrity (IBI) at sixteen sites in the South Fork of Wildcat Creek watershed within Clinton and Tippecanoe Counties. The biological information will be supplemented by collecting water chemistry and E.coli data at some of these sites as well. The information will be used to diagnose water quality problems and propose solutions. This stream or it's tributaries are on IDEM's 303(d) list of impaired waterbodies (for *E. coli* contamination, impaired aquatic communities, and low dissolved oxygen). A TMDL has been prepared for the watershed. The SWCD is also concerned about higher than recommended levels of the herbicide atrazine measured in previous sampling of the watershed.

2.2 Project Objectives:

The objectives of this project are to characterize the biological, physical, and chemical integrity of a 10-digit watersheds (0512010703) and to make recommendations to solve any identified problems.

In association with routine chemical measurements, bioassessments are extremely valuable tools in determining the ecological health of a waterbody. An accurate and reproducible measure of the ecological health of a stream can be made by comparing the number and kinds of animals present at a study site with those from an unimpacted "reference" site. The bioassessment technique results in a single biotic index value: the higher the value, the more ecologically healthy the site. In Indiana, the "reference" conditions have already been established by the IDEM mIBI.

In addition, bioassessments can diagnose problems. Healthy streams have good aquatic habitat. However, if habitat is good but the stream doesn't support a healthy aquatic community, a diagnosis of poor water quality can be made. The aquatic community can even help in the diagnosis of particular type of water quality problems. Certain animals are sensitive to different types of stresses. Comparison of the numbers and kinds of animals present can give important clues about degraded water quality due to toxic substances, excessive sedimentation, excessive nutrient inputs, or low dissolved oxygen concentrations. Because they are exposed to conditions 24 hours a day for up to a year, macroinvertebrates can detect water quality problems that occasional grab samples for chemical analysis may not discover.

E. coli are a bacteriological indicator of potential human health effects associated with whole body contact in water. Frequent analysis of *E. coli* concentrations at various sites within the watersheds during warm weather will help determine human health risk and potentially help locate problem sources of bacteria.

Excessive nutrient concentrations can create nuisance algae blooms and upset the trophic balance of healthy streams. Excess suspended sediment can clog the gills of aquatic animals and coat the rocky bottom that supports egg production. Atrazine has been found in some previous samples that can create toxicity problems to sensitive forms of aquatic life and make the water unsuitable for drinking.

2.3 Sampling Design:

The overall experimental design is to sample the biological community, the physical integrity of the stream's habitat, and basic water chemistry in a "targeted" manner to answer the following questions:

1) What is the overall ecological health of the watersheds?
2) Are the problems primarily from water quality or degraded habitat?
3) Are water chemistry parameters within normal ranges for aquatic life?
4) What can be done to make the identified problems better?

Table 1. Physical, chemical and biological parameters to be measured at each site

Habitat Measurements

Qualitative Habitat Evaluation Index at 16 sites in the watershed..

Biological Measurements

Macroinvertebrate IBI at 16 sites in the watershed (one sampling event).

Chemical and Physical Measurements

Nitrogen (nitrates+nitrites), total phosphorus, total suspended solids, pH, temperature, conductivity, dissolved oxygen, stream flow. These parameters will be measured at 12 sites. Measurements will be made six times (every other month) for one year. At least two sampling events will be immediately following a storm.

Atrazine analysis at 8 sites. There will be three sampling events (May, July, and September)..

E. coli Measurements

E. coli will be measured at 12 sites.
Samples will be collected and analyzed weekly for five weeks in May and June and another five week period in September and October.

Table 1

Parameter	Method	Detection Limit	Holding Time	Site
Biotic Index	INmIBI	N/A	N/A	Field
QHEI	Ohio EPA	N/A	N/A	Field
NO2+NO3	SM 4500 NO3	0.5 mg/l	28 days	Lab
Total P	SM 4500 P F	0.03 mg/l	2 days	Lab
TSS	SM 2540 B	1 mg/l	7 days	Lab
pH	SM 4500 H+	0.1 SU	N/A	Field
Temp.	Thermocouple	0.1 degree	N/A	Field
Cond.	SM 2510 A	1 uS	N/A	Field
D.O.	SM 4500 O G	0.1 mg/l	N/A	Field
Flow	velocity meter	N/A	N/A	Field
Atrazine	EPA 507	1 ug/l	7 days	Lab
E.coli	SM 9223 B	1 MPN/100ml	6 hrs	Lab

2.4 Project Timetable:

The project will be conducted during 2010 and 2011 with a final report to be available for inclusion in the watershed management plan by May 31, 2011.

QAPP approved	May 2010
Biological Sampling	August 2010
Habitat Analysis	August 2010
Chemical Sampling	May, July, September, November 2010 January, March 2011
Atrazine Sampling	April, May, and June 2006 April, May, and June 2007
E.coli Sampling	May to October 2010
Data Analysis	April 2011

Final Report May 2011

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The Project Manager (Greg R. Bright) is responsible for biological quality assurance, management of the project field logistics, the collection, analysis, and interpretation of biological data, identification of biological specimens, and writing the biological report. A copy of the lab's Standard Operating Procedures is attached in the Appendix. Greg Bright will also be responsible for chemistry quality assurance and laboratory chemical analysis. A copy of the lab's Standard Operating Procedures for the required chemical analysis is attached in the Appendix.

Aquatic biologist Dr. Melody Myers-Kinzie is responsible for assisting in sample collections and for doing the macroinvertebrate identifications and analysis.

Frankfort Wastewater Treatment Plant Superintendent Dennis Shirar is responsible for overseeing the analysis of E.coli samples in the WWTP laboratory.

The Watershed Coordinator (Cynthia Muffett) is responsible for coordinating the project with Commonwealth Biomonitoring, IDEM, and the Clinton County SWCD. She will collect the E.coli samples and deliver them to the Frankfort Wastewater Treatment Lab for analysis.

The IDEM quality assurance coordinator (Betty Ratcliff) is responsible for oversight of the quality assurance portion of the grant.

4.0 DATA QUALITY OBJECTIVES

4.1 Accuracy/Bias

Accuracy and bias in macroinvertebrate and chemical analyses are dependent on maintenance of standard procedures for sample processing, labeling, sorting, identification, counts, and chemistry laboratory procedures. A definitive measurement of accuracy in biological assessments cannot be made because there is no "true" value for reference. However, by stressing conformance with the procedures outlined in this plan, we expect a high degree of accuracy and a low degree of bias.

For both the field and laboratory chemical measurements, we expect accuracies within 10% of the true value, based on previous results obtained by laboratories participating in performance evaluations.

Bias is evaluated by the use of field blanks. We will use field blanks on each sampling trip.

4.2 Precision

Precision of biological sampling will be evaluated by performing analyses on field duplicates of biological community measurements at 10% of the sites. The data quality objective for precision is IBI scores of duplicates within 10% of the mean score.

Sample 1 IBI / (Sample 1 IBI + Sample 2 IBI / 2) is less than 0.1

Habitat assessments are conducted at each site by the same crew member. At one site a duplicate assessment will be conducted by a second trained biologist. If data differs by more than 10% in total QHEI assessment scores, then biologists will discuss and attempt to reach a consensus. Adjustments to assessment scores are then documented and made in the data set.

Precision of the laboratory chemical analyses is expected to result in chemical recoveries of 95 to 105%. Precision will be measured by analyzing the results of duplicate samples collected in the field and measuring the relative percent difference.

4.3 Completeness

Completeness for IBI and chemical measurements should be 90% or 14 valid samples.. Completeness is defined as:

Completeness = v/n * 100

where: v = number of samples necessary to achieve project objectives
n = total number of measurements anticipated.

4.4 Representativeness

The samples collected for chemical and biological analysis should be representative of the biological health of the site where the sample is collected. To assure representativeness, all samples will be collected on the same day, using the same collection technique from the same habitat. The sites that have been selected for analysis represent the entire watershed.

4.5 Comparability

Comparability is ensured through the use of identical sampling techniques at each sample site. The results may be compared to historical samples of water quality collected in the watersheds by IDEM since 1998 and forwarded to the Clinton County SWCD by IDEM staff..

4.6 Sensitivity

Sensitivity is the detection level achievable for each measured parameter. This is listed as “detection limit” in Table 1.

5.0 FIELD PROCEDURES

Benthic macroinvertebrates will be collected by dipnet using a multi-habitat technique (IDEM, 2006).

Chemical and E.coli sampling will consist of grab samples collected from pooled areas. High density plastic containers will be used to collect all chemical samples except atrazine. Atrazine sample containers will be 1-liter amber glass bottles. E.coli containers will be pre-sterilized 100 ml plastic containers. Samples for nitrogen and phosphorus analysis will be preserved with sulfuric acid. All samples will be placed on ice for transport to the lab.

Sample conditions

Macroinvertebrate sampling will be conducted during low- to moderate-stable periods. Periods of high flow will be avoided. For chemical sampling, four of the six samples will be collected during dry weather (no significant rain within the prior 7 days). Two samples will be collected during wet weather (at least 0.3 inches of rain within the previous 24 hours). One E. coli sample will be collected each week during the recreational season (May through October). Both wet and dry conditions are expected to occur during sampling.

Habitat

Qualitative habitat will be measured using the protocol developed by Ohio EPA (1989).

Field Chemistry and Physical Measurements

Field measurements will include temperature, flow, dissolved oxygen, pH, and conductivity. Temperature and dissolved oxygen will be measured with a Hach D.O. meter. Conductivity will be measured with a Hanna instruments conductivity probe. The pH of all samples will be measured with a field pH meter. Flow will be measured by a current meter each time a sample is collected (including all E.coli samples). This flow information will be supplemented by daily flow data collected by the USGS gauging station on the South Fork of Wildcat Creek near Dayton.

6.0 LABORATORY PROCEDURES

Laboratory Chemistry

Additional water quality parameters will be measured in the laboratory, using standard operating procedures outlined in Appendix 3.

Macroinvertebrates

Macroinvertebrate samples will be preserved with 70% isopropanol and returned to the lab. In the lab, each sample will be spread onto a grid and randomly selected grids will be picked for 15 minutes, collecting at least a 100 organism subsample. All macroinvertebrates in the subsample will be identified to genus or species, as outlined in Appendix 4.

7.0 CUSTODY PROCEDURES

Sample custody will begin with the crew chief and samples are to remain in the custody of the field team until the samples are returned to the appropriate laboratory shipping and receiving room for entering into the sample tracking system. A chain-of-custody form will be completed for all samples. This form will include the sample date, sample time, sample site, and ther name of the person collecting the sample. An example chain-of-custody form is attached in Appendix 5.

All sample sites will be assigned a designated number. Sites will be consecutively numbered and all standardized data forms generated from a site will be indexed and computerized according to that number.

Containers will be preserved, labeled, and placed in a sealed cooler for transport to the laboratory. Samples will be retained in the laboratory under chain-of-custody procedures. Samples will be inspected for leakage or damage from transport weekly. Loss of fluid preservatives for community samples will be replaced. Taxonomic composition and relative abundance information is submitted to the Project Manager.

All raw data (including data forms, logbooks, etc.) are retained by the Project Manager in an organized fashion and archived for future reference.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

The dissolved oxygen and pH meters will be calibrated according to the manufacturer's specifications. Calibration records will be maintained in a field notebook. The instruments will be calibrated prior to taking the field measurements and on the same day as the measurements.

9.0 PREVENTATIVE MAINTENANCE

The field crew leader is responsible for maintaining all files for all field equipment. Individual team members may be given responsibility for different equipment and its deployment in the field. All nets will be inspected at the completion of each site for holes caused by snagging or other damage. The nets will be repaired immediately.

A list of critical spare parts that should always accompany field sampling surveys to minimize downtime follows:

- 70% isopropanol
- Dipnet
- Macroinvertebrate sample containers
- Macroinvertebrate sieve
- All equipment required in Standard Operating Procedures.
- QAPP

10.0 DATA REDUCTION, REVIEW AND REPORTING

10.1 Raw Data

Raw data for macroinvertebrates will be in the form of genus and species names and numbers for the biological assessment and in appropriate quantitative values for the habitat assessment.

10.2 Data Reduction

The macroinvertebrate data will be analyzed using genus and species level identifications (EPA Protocol 3) and analyzed using IDEM metrics (IDEM, 2006).. The IBI metrics for this study are shown in Table 2.

Table 2. SCORING VALUES FOR METRICS

	5 points	3 points	1 point
Total Taxa	**>41**	**21 - 41**	**<21**
Total Number of Individuals	**>258**	**129-258**	**<129**
# of EPT Taxa	**Dependent on stream drainage area**		
% Orthoclads & Tanytarsids	**<24**	**24-47**	**>47**
% non-non-insects	**<18**	**18 - 35**	**>35**
# Diptera Taxa	**>14**	**7 - 14**	**<7**
% Intolerant species	**>32**	**16 - 32**	**<16**
% Tolerant species	**<13**	**13 - 25**	**>25**
% Predators	**>36**	**18 - 36**	**<18**
% Shredders & scrapers	**>20**	**10 - 20**	**<10**
% Collector filterers	**<10**	**10 - 20**	**>20**
% Sprawlers	**<6**	**3 - 6**	**>3**

The scores for each metric (1 to 5) will be added (12 metrics) to calculate an IBI score for each site (a range of scores from 12 to 60).

10.3 Data Review

All chemical data will be checked for completeness before leaving a site. Data collected in the laboratory will be checked to assure that the required metrics can be calculated. Data sheets from each site are checked by the field crew leader to verify accuracy and completeness.

10.4 Data Reporting

Biological data will be reported by the names and numbers of the species collected. The IBI will be reported as a value between 12 and 100 Habitat data will be reported as a number between 0 and 100.

Chemical data will be reported in mg/l.

E.coli data will be reported in MPN/100 ml

A final report of the data will be submitted electronically to IDEM using the NPS data spreadsheets provided by IDEM.

11.0 QUALITY CONTROL PROCEDURES

Standard quality control procedures used by Commonwealth Biomonitoring for biological assessments will be employed in this study (Appendix 4). These include checks of identification and enumeration of macroinvertebrates by two different experts at one site during each sampling season.

Voucher specimens of all species collected will be retained and placed in the Purdue University Entomology collection for future reference and inspection by qualified biologists, for checks on species identifications, if necessary

Habitat assessments are conducted at each site by the same crew member. At one site a duplicate assessment will be conducted by a second trained biologist. If data differs by more than 10% in total QHEI assessment scores, then biologists will discuss and attempt to reach a consensus. Adjustments to assessment scores are then documented and made in the data set.

Field chemistry quality control procedures include the analysis of duplicate samples at ten percent of all sample sites.

Laboratory quality control procedures include the analysis of spikes, duplicates, and method blanks every tenth sample (see Appendix 3).

12.0 DATA QUALITY ASSESSMENT

Specific procedures for assessment of precision and accuracy on a routine basis are outlined and described in section 4.0. The data will be evaluated after each sampling event to assure that the data quality objectives are being met. If data fall outside the project goals of the Data Quality Objectives in Section Four, the laboratory will take corrective action, as stated in Section Fourteen. Data falling outside the data quality objectives will be flagged as follows:

R: Rejected Data not used in any evaluations.
J: Estimated. Small errors in QC found but still used in evaluations.
Q: One or more of the QC checks or criteria was out of control.
H: The analysis for this parameter was performed out of the holding time. The results will be estimated or rejected on
the basis listed below:

1) If the analysis was performed between the holding time and 1½ times the holding time the result will be estimated (HJ).
2) If the analysis was performed outside the 1½ times the holding time window the result will be rejected (HR).

D: The Relative Present Difference (RPD) for this parameter was above the acceptable control limits. The parameter will be considered estimated or rejected on the basis listed below:

1) If the RPD is between the established control limits and two times the established control limits then the sample will be estimated (DJ)
2) If the RPD is twice the established control limits then the sample will be rejected (DR)

B: This parameter was found in field or lab blank. Whether the result is accepted, estimated, or rejected will be based upon the level of contamination listed below.

1) If the result of the sample is greater than the reporting limit but less than five times the blank contamination the result will be rejected (BR).
2) If the result of the sample is between five and ten times the blank contamination the result will be estimated (BJ).
3) If the result of the sample is less than the reporting limit or greater than ten times the blank contamination the result will be accepted within the concentration identified (e.g.B,45).

U: The result of the parameter is above the Method Detection Limit (MDL) but below the reporting limit and will be estimated.

13.0 PERFORMANCE AND SYSTEMS AUDITS

Internal performance and system audits required to monitor the capability and performance of the laboratories will be conducted on appropriate log sheets, data sheets, verification sheets, and calibration equipment log sheets at each site in the field and after each of the two sampling seasons after all data have been collected.. All laboratory audits will be conducted by the Project Manager. Calibration logs will be made available to IDEM staff upon request for an external audit.

14.0 CORRECTIVE ACTION

Most of the biological samples will be analyzed by one taxonomic expert (the project manager) to provide consistency between samples. One sample each sampling period will be analyzed by two different people. If there is more than 10% variance in sample numbers, identifications, or IBI scores, the samples will be analyzed again by the project manager. Discrepancies in identification and counts will be noted for that sample. Differences in identification of a particular organism will be discussed between the two to arrive at a consensus. Consultation of an outside taxonomist may be necessary. Changes will be made based on the consensus conclusion.

If water chemistry analyses fall outside the objectives listed in Section Four or if field blanks indicate contamination, the lab or field personnel will not analyze any additional samples until a cause for the discrepancy has been identified. Sample results collected during this time will not be discarded but will be identified as potentially suspect.

15.0 QUALITY ASSURANCE REPORTS

A quality assurance report will be prepared by the project coordinator and will include all pertinent information relating to measurement data accuracy, precision, and completeness, as outlined in the Standard Operating Procedures and this Quality Assurance Program Plan.

Quality Assurance (QA) reports will be submitted to IDEM's Watershed Management Section every year as part of the Quarterly Progress Report. The results will also be included in the project Final Report.

The QA report will include:

- Assessment of the data in terms of its accuracy, precision, and completeness;
- Results of any performance audits performed during the quarter;
- Any significant quality control problems encountered and the recommended solutions. Results that fall outside the precision and accuracy goals will be flagged. Blank samples that are contaminated will be flagged. The flagged samples will be identified in bold print and will not be used in statistical analysis of results.
- Discussion of whether the QA objectives are being met and the resulting impact on decision – making; and
- Any limitations on the use of the data.

REFERENCES CITED

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APPENDIX 1. - Sampling Sites (See Appendix 2 for map locations)

		Latitude	Longitude
Site 1	Shanty Creek (upper Kilmore Creek)	40 21 17.7	86. 20 14.0
Site 2	Swamp Creek (downstream from Michigantown)	40 19 47.7	86 2.4 25.8
Site 3	Kilmore Creek (upstream)	40 20 54.8	86 20 14.0
Site 4	Kilmore Creek (middle)	40 18 53.2	86 30 55.2
Site 5	Kilmore Creek (downstream)	40 20 9.2	86 37 0.0
Site 6	Prairie Creek (downstream)	40 18 37.0	86 30 25.8
Site 7	Prairie Creek (upstream)	40 15 52.1	86 30 10.2
Site 8	Mann Ditch (upstream from Frankfort)	40 16 15.6	86 30 4.7
Site 9.	Spring Creek (mouth)	40 18 57.5	86 37 50.0
Site 10.	Lauramie Creek (mouth)	40 18 48.7	86 44 54.5
Site 11.	Lauramie Creek (upstream)	40 16 21.6	86 43 3.4
Site 12.	Unnamed tributary (mouth)	40 24 1.2	86 45 57.2
Site 13.	South Fork of Wildcat Creek (upstream)	40 19 6.1	86 28 57.0
Site 14.	South Fork of Wildcat Creek (Downstream from Frankfort)	40. 19 14.4	86. 37 5.1
Site 15.	South Fork of Wildcat Creek(middle)	40 19 10.3	86 43 58.5
Site 16.	South Fork of Wildcat Creek (downstream)	40. 25 5.7	86. 46 5.2

Sites for benthic analysis

All 16 sites

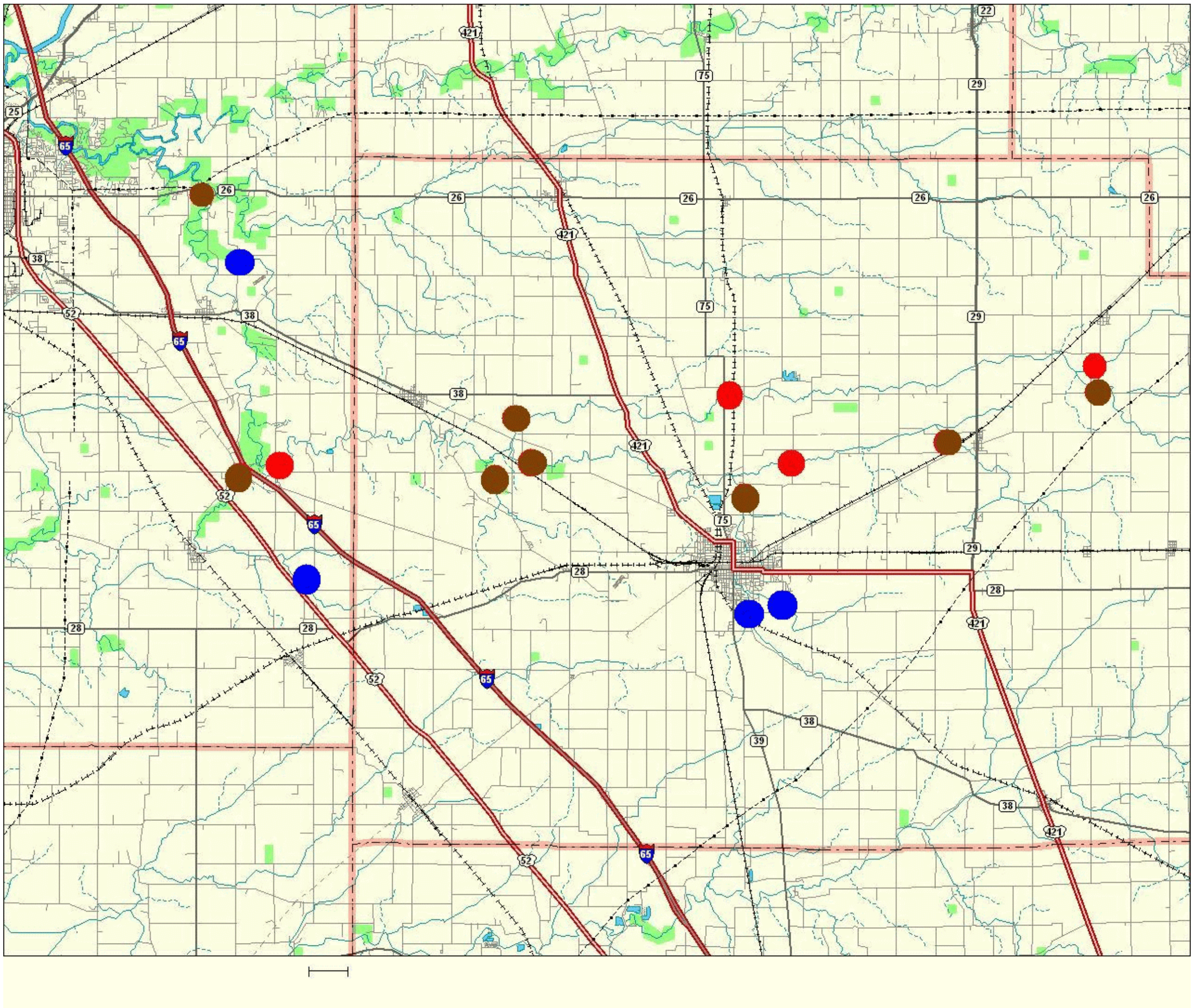
Sites for benthic and chemical analysis:

Sites 1, 2, 3, 4. 5. 6. 9. 10. 13. 14. 15. 16

Sites for benthic, chemical, and atrazine analysis

Site 2, 3, 5, 6, 9, 10, 14, 16

APPENDIX 2. Sampling Site Map



Brown = All Parameters Measured
Red = All Parameters Except Atrazine
Blue = Macroinvertebrates Only

APPENDIX 3 - Standard Operating Procedures for Laboratory Water Chemistry

Total Suspended Solids
Nitrogen (Nitrate + Nitrite)

Total Phosphorus
Atrazine
E. coli

Total Suspended Solids (TSS)

Reference

Standard Method 18th Edition for the Examination of Water and Wastewater, 2540; A, B, or C.

Sample Handling and Preservation

Samples are to be collected without any preservatives being added to them.

Apparatus and Materials

Analytical Balance
Drying Oven
Desiccator
Vacuum pump
Connection Tubing
Baking pans used in drying oven
Pre-weighed paper filters, with trays
Suction Flask
Membrane Filter
Membrane Filter Funnel
Clamp
Metal or Plastic tweezers

Reagents

Deionzied Water

Procedures

Assemble the suctioning apparatus to filtering apparatus.

Place the membrane filter inside the suction flask

On the TSS record sheet write down the pre-weighed filter number and weight in the correct spaces provided. Place that filter on top of the membrane filter, then place the membrane funnel and clamp the funnel down to the suction flask.

Shake the sample to have a representative sample.

Pour off 100 ml of sample into the filtering apparatus

Pump air out of the filtering appratus.

Rinse the sides of the beaker with deionzied water getting all particles off the walls of the beaker. Pour that into the membrane funnel with the rest of the sample. Once the sample has gone through the pre-weighed filter, rinse the funnel for any remaining particles.

After all water has been suctioned through the pre-weighed filter, turn off air manifold valve. Release the clamp. Remove the membrane funnel. Use the tweezers to remove the pre-weighed filter and place that filter in its original tray.

Before placing the next clean pre-weighed filter on the membrane filter, remember to clean the membrane funnel before the next sample is analyzed.

Place the tray in a baking pan that can be placed in the drying oven once the baking pan is full or all of the samples have been analyzed.

Weigh the filter after drying. Calculate TSS as the dry weight of the filter after drying minus then original weight of the filter.

Detection Limit

1 mg/l

Quality Assurance/Quality Control

There should be a duplicate analyzed every tenth sample.

Nitrogen (Nitrate + Nitrite)

1) Scope

This procedure uses cadmium reduction and a colorimetric technique to determine nitrite plus nitrate nitrogen.

2) Reference

Standard Methods 4500 NO3

3) Sample Handling and Preservation

Samples are to be collected with sulfuric acid in a pre-preserved bottle.

9.4 Apparatus and Materials

1) Colorimeter

9.5 Reagents

1) Hach Nitraver 3 and Nitrover 6 reagents

9.6 Procedures

1) Shake the sample container to get a well mixed sample

2) Pour off 5 ml. Add one packet each of Hach Nitraver 3 and Nitraver 6 reagents.

3) Allow color to develop for 30 minutes.

4) Place sample in a colorimeter. Measure absorbance at 540 nm.

5) Determine sample concentration by graphical interpolation.

7) Detection Limit - 0.5 mg/l

8) Quality Assurance/Quality Control

Duplicate every tenth sample. A method blank is analyzed every tenth sample and method blank spike proceeding method blank, should be analyzed every tenth sample. Also a sample spike is to be analyzed with each batch. If a batch does not contain 10 samples, a method blank and method spike blank is to be analyzed along with that batch.

Total Phosphorus

1) Scope

This procedure uses sample digestion, ascorbic acid, and a colorimetric technique to determine total phosphorus.

2) Reference

Standard Methods 4500 P F

3) Sample Handling and Preservation

Samples are to be collected with sulfuric acid in a pre-preserved bottle.

4) Apparatus and Materials

1) Colorimeter
2) Hot Block

5) Reagents

1) Deionzed Water
2) Nitric Acid
3) Hanna Phosphate Reagent (HI 93713-0)

6) Procedures

1) Shake the sample container to get a well mixed sample

2) Take the well-mixed sample and pour 50 mL into the digestion cups.

3) Add 1.5 mL of concentrated nitric acid into the sample.

4) Heat in the hot block at sample temperature of 95°C until sample is approximately 5 ml.

5) Remove samples from the hot block and allow sample to cool. Bring the sample volume back up to 50mL with DI water.

6) Once sample has been digested, pour off 10 ml. Add one packet of Hanna phosphate reagent.

7) Allow color to develop for 30 minutes.

8) Place sample in a colorimeter. Measure absorbance at 660 nm.

9) Determine sample concentration by graphical interpolation.

7) Detection Limit - 0.03 mg/l

8) Quality Assurance/Quality Control

Duplicate every tenth sample. A method blank is analyzed every tenth sample and method blank spike proceeding method blank, should be analyzed every tenth sample. Also a sample spike is to be analyzed with each batch. If a batch does not contain 10 samples, a method blank and method spike blank is to be analyzed along with that batch.

Atrazine

Scope:

This procedure uses gas chromatography to determine atrazine concentrations.

Method Summary:

Method 507 covers 46 nitrogen- and phosphorus-containing pesticides. A one liter sample is fortified with a surrogate standard, salted, buffered, extracted with methylene chloride and concentrated; then the solvent is exchanged with methyl tert-butyl ether (MTBE) and concentrated again, and a 2 µ:L aliquot of a sample extract is injected into a gas chromatographic system equipped with a selective nitrogen-phosphorus detector and a capillary column for analysis.

Instrumentation:

A gas chromatograph system (GC) equipped with a nitrogen-phosphorus detector (NPD) is needed.

<u>Column #1</u>: 30 M x 0.25 mm ID DB-5 bonded fused silica column, 0.25 µ:m film thickness, or equivalent;

<u>Column #2</u>: 30 M x 0.25 mm ID DB-1701 bonded fused silica column, 0.25 µm film thickness, or equivalent.

Sampling Method:

Grab samples are collected in 1 L glass sample bottles (pre-washed with detergent and hot tap water, rinsed with reagent water, and dried in an oven at 400 E/C for 1 hour) with screw caps lined with PTFE-fluorocarbon.

Sample Preservation:

Add mercuric chloride to the sample bottle in amounts to produce a concentration of 10 mg/L. If residual chlorine is present, add 80 mg of sodium thiosulfate per liter of sample to the sample bottle prior to collection. After collection, seal bottle and shake vigorously for 1 minute, then cool the sample to 4 E/C immediately and store it at 4 E/C in the dark until extraction.

Maximum Holding Time:

Maximum holding time of the samples, and in some cases the extracts, is 14 days.

Quality Assurance/Quality Control

Duplicate every tenth sample. A method blank is analyzed every tenth sample and method blank spike proceeding method blank, should be analyzed every tenth sample.

E. coli

Location

This procedure is performed in the bacteriological laboratory of the Frankfort Wastewater Treatment Plant (45 CR 100 N, Frankfort, IN 46041).

Purpose

This method is used to determine the Most Probable Number of Escherichia coli (E. coli) in wastewater, potable waters, and all other water matrixes.

Scope

This procedure uses the Colilerted sample in a Quanti-Tray to determine the MPN for the E. coli present.

Reference

Standard Methods 20th Edition – Method 9223 B

Sample Handling and Preservation

Samples are to be collected in a sterile bottle provide by the lab.

Apparatus and Materials

Quanti-Tray

Quanti-Tray sealer

Incubator

Reagents

Colilert

Procedures

If the bottle is filled past the 100 mL mark on the bottle, dispose of the excess liquid. Add Colilert to the sample, and shake well. Open the Quanti-Tray by squeezing the sides and pulling the foil tab on top, making sure not to touch the inside of the tray. Pour entire sample into the tray. Place the filled tray onto the tray carrier. Slide the tray carrier into the sealer with well side down and open end out. Place tray into incubator (set to 35 degrees C) and wait 24 hours. Remove from incubator 24 hours later and place under a fluorescent light and count the number of wells fluorescing.

Look at the manufactures table to obtain a MPN, which is equivalent to CFU/100 ml

* Make sure to always wear sterile gloves before handling the bottle when opening. Never touch the underside of the bottle lid. This is done to make sure there is no contamination by the lab.

Quality Assurance/Quality Control

A blank sample is analyzed with every batch, to provide assurance of a contamination free work area for that day. Duplications are analyzed every tenth sample.

APPENDIX 4

STANDARD OPERATING PROCEDURE

FOR

BENTHIC MACROINVERTEBRATES

Commonwealth Biomonitoring
Indianapolis, Indiana

February 2010

Sampling Procedure:

Variable (usually by dipnet). Sometimes artificial substrates are used. Animals are sampled from both riffles (1-minute kick sample) and other habitats present within a 50 m length of stream.

Sorting Procedure:

The sample is first thoroughly rinsed in a 500 micron screen or a sampling net to remove fine sediments. Any large organic material (whole leaves, twigs, algal and macrophyte mats) should rinsed thoroughly, visually inspected, and discarded from the sample.

The sample contents are placed in a large, flat pan (approximately 30x45 cm or so) with a light colored bottom. The bottom of the pan will be marked with a numbered grid pattern. Each grid will measure 5x5 cm. Organisms should be evenly distributed in the pan. Samples too large to be effectively sorted in a single pan may be thoroughly mixed in a container with some water, half of the homogenized sample placed in each of two gridded pans. Each half of the sample must be composed of the same kinds and quantity of debris and an equal number of grids must be sorted from each pan, in order to ensure a representative subsample. Also since the samples will be preserved in alcohol it will be necessary to soak the sample contents in water for about 15 minutes to hydrate the benthic organisms, preventing them from floating on the water surface during sorting. Use only enough water to allow complete dispersion of the sample within the pan. An excessive amount of water will allow sample material to shift within the grid during sorting.

A random numbers table is used to select a number corresponding to a square within the gridded pan. Remove all organisms from within that square and proceed with the process of selecting squares and removing organisms until the total number sorted from the sample is within 10% of 100. Any organism which is lying over a line separating two squares is considered to be in the square containing its head. In those cases where it is not possible to determine the location of the head (e.g. worms), the organism is considered to be in the square containing the largest portion of its body. Any square sorted must be sorted in its entirety, even after the 100-organism count has been reached. If many of the organisms are very small use an illuminated 5X magnifier to facilitate sorting. The total number of animals picked in 15 minutes is retained for analysis.

Organism Identification:

All benthic macroinvertebrates in the subsample should be identified to the lowest positively identified taxonomic level (generally genus or species), enumerated, and recorded on the laboratory bench sheet. This accomplished in two phases. Phase I consists of Family level identification of the organisms for a sample and tallying the counts for the families on the computer generated bench sheet for that sample. Organisms are put in alcohol filled 5 dram vials by taxonomic Order and placed in large alcohol filled jars labelled with their respective Orders. HBI and EPT:Chironomiidae calculations are made for preliminary site assessment. Also the preliminary number of taxa, number of individuals in the sample, taxonomist, date and number of vials forwarded are also recorded.

Taxonomic Order, family, organism name, count, life stage, taxonomist and date are recorded. Based on the taxonomic identifications, functional feeding group classifications can be assigned for most aquatic insects using a reference such as Merritt and Cummins (1984). Once a functional feeding group classification list has been established, it can be incorporated into the computer analysis for computation of the metrics. Care should be taken to note the presence of early instars which may represent different functional feeding groups from later instars. The scraper and filtering collector functional groups are considered the important indicators in the riffle/run community; numbers of individuals representing each of these two groups are recorded on the laboratory bench sheet.

CPOM Functional Feeding Group Determination:

If requested, the CPOM sample is collected to provide data on the relative abundance of the shredders at the site. Shredders of large particulate material are important in forested areas of stream ecosystems ranging from stream orders 1 through 4 (Minshall et al., 1985). The absence of large particulate shredders is characteristic of unstable, poorly retentive headwater streams in disturbed watersheds or in dry areas where leaf material processing is accomplished by terrestrial detritivores (Minshall et al., 1985).

CPOM samples are processed separately from the riffle/run samples and used for Functional Feeding Group characterization. Taxonomic identification is not necessary for this component. Sorted organisms (see above) are classified by functional feeding group. Numbers of individuals representing the shredder functional group, as well as total number of macroinvertebrates collected in this sample, are recorded on the CPOM laboratory bench sheet.

Mounting Chironomidae:

Members of this family are mounted directly from the 80% alcohol preservative in which they have been stored in the initial phase I taxonomy. Two drops of mounting medium is placed on each slide allowing enough room for a label on the left end of the slide. Working under the dissection microscope if necessary a group of approximately 10 larvae are gathered up and picked up with a pair of forceps. While holding them firmly with the forceps touch them lightly to a paper towel to remove excess alcohol. This is accomplished by capillary action and there is no need to release the larvae from the forceps. The 10 larvae are then placed into a drop of medium on the microscope slide. This is repeated again to deliver larvae into the other drop of medium previously placed on the slide. The next step is to place the slide under the microscope and pull the larvae into parallel lines within the drop of medium orienting the heads in the same direction (to the right if you are right handed). Once both drops have had their respective larvae arranged the operator should, larvae by larvae, with two minuten needles pop the heads off and orient them ventral side up and tap the head to spread the mandibles. These slides should then have a microscope slide label attached to it containing all the information found on the vial label. Always label all slides with a label prior to processing another sample. This avoids all possibility of mislabeled slides due to sample manipulations.

SAFETY AND WASTE HANDLING

Preserved specimens are handled carefully to avoid skin contact. Waste preservatives are discarded in the sink and flushed with generous amounts of water.

LABORATORY QA/QC

INTRODUCTION:

Comprehensive QA/QC is an end product of careful expediting both the field and laboratory components of the overall project. The whole QA/QC of such a project, particularly when several people of various levels of experience are directly involved in its completion, starts with comprehensive record keeping of all activities. Many such projects compromise the integrity of the final data sets by poor record keeping including inaccurate site descriptions, unreliable labeling of samples, unreliable tracking of specimens, improper curation of samples, lack of voucher specimens, inconsistent taxonomic identifications, absence of cross-checks on data entry and retrieval, etc.

LAB DUPLICATES--Laboratory duplicates are to be carried out on all samples collected at sites where field duplicates were acquired. The two field samples, one being a field duplicate, are each subsampled one additional time in the laboratory to create 2 laboratory duplicates. The staff person performing the subsample must enter certain information into the record in the Laboratory Notebook.

SAMPLE LABELING- Consistent and conscientious record keeping in the field was the foundation for proper sample identification. This is especially critical when large numbers of samples are being taken over a relatively short period of time. The value of any field collection is contingent on the accuracy of the label associated with that sample relative to the where, when, who, and how of its collection. Samples are collected into 1/2 gallon jars and a pre-printed label is filled out by the investigators and placed inside the jar. A tape label is placed on the lid telling the stream name and date. The internal label is the official sample label.

TAXONOMIC IDENTIFICATIONS--Accurate and consistent taxonomic identifications for benthos is critical for correct implementation of metrics associated with biocriteria. The lab supervisor is responsible for all QA/QC procedures and ultimate data consistency and uniformity. This project has resulted updating and standardizing taxonomic references within the laboratory. All staff have been given copies of these sources or have had copies made available to them.

METRICS CALCULATIONS

MODIFIED HILSENHOFF BIOTIC INDEX (if requested)

-Summarizes overall pollution tolerance of the benthic arthropod community (modified to include non-arthropod taxa)

-Range: 0-10 increasing as water quality decreases.

Procedure: $$HBI = \frac{xi \times ti}{n}$$

xi = number of individuals within a taxon.

ti = tolerance value of a taxon.

n = total number of organisms in sample (used for the index)

TOLERANCE VALUES

Those recommended and used by IDEM

FUNCTIONAL FEEDING GROUPS

Those recommended and used by IDEM

REFERENCES

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U.S. Environmental Protection Agency (EPA) 1989. Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish. EPA/444/4-89/001. U.S. EPA, Washington, D.C.

Hilsenhoff, W.L. 1987. An improved biotic index of organic stream pollution. Great Lakes Entomol. 20:31-39.

Shackleford, B. 1988. Rapid Bioassessments of Lotic Macroinvertebrate communities: Biocriteria Development. Arkansas Department of Pollution Control and Ecology, Little Rock, Arkansas.

APPENDIX 5- CHAIN OF CUSTODY FORM

Commonwealth Biomonitoring, Inc
8061 Windham Lake Drive
Indianapolis, IN 46214
317-297-7713

CLIENT NAME: Clinton County SWCD

PURPOSE OF SAMPLE: Water quality monitoring

SAMPLE IDENTIFICATION NUMBERS:

DESCRIPTION: ____

DATE SAMPLE COLLECTED: ____________________________________

NAME OF PERSON COLLECTING SAMPLE:__________________________

VOLUME OF SAMPLE: __________________________

SAMPLE CONTAINER:__________________________

NUMBER OF CONTAINERS:______________________

SAMPLE STORAGE:____________________________

PRESERVATIVES:______________________________

Relinquished by:____

Date:_________________________ Time:_____________________

Received by:____

Date:_________________________ Time:_____________________

Relinquished by:____

Date:_________________________ Time:_____________________

Received by:____

Date:_________________________ Time:_____________________

COMMENTS:

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We Protect Hoosiers and Our Environment.

Mitchell E. Daniels Jr.
Governor

Thomas W. Easterly
Commissioner

100 North Senate Avenue
Indianapolis, Indiana 46204
(317) 232-8603
Toll Free (800) 451-6027
www.idem.IN.gov

December 21, 2010

Cindy Muffett, Watershed Coordinator
Clinton County Soil & Water Conservation District
860 S. Prairie Ave., Suite 1
Frankfort, IN 46041

Dear Ms. Muffett:

Re: QAPP Amendment
FFY 2009 Section 319 Project
ARN 305-9-271

This letter is to inform you that the amendment to the Quality Assurance Project Plan (QAPP) requested in a memo dated December 13, 2010, from the *South Fork Wildcat Creek Watershed Management Plan Project* for the 319 Grant Program has been approved by our office. Because of the late start in the sampling schedule, a schedule revision was requested for sampling to be conducted in September-October of 2010 and May-June 2011.

If you have any questions or if we can be of further assistance, do not hesitate to contact your Project Manager and QA Manager, Betty Ratcliff, at 317/308-3135.

Sincerely,

Andrew Pelloso, Chief
NPS/TMDL Section
Office of Water Quality

CC: Leah Harden, Clinton County SWCD

IDEM Site ID	Stream Name	Latitude (decimal degrees)	Longitude (decimal degrees)	Sample Date/Time	Contractor Sample Number	Protocol/Parameter	Concentration	Unit	Comments
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/25/10 10:30	1-2	EPA Method 507 (Pesticide); Gauge 03334500 - 350 cfs	2.15	ug/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/25/10 11:00	1-3	EPA Method 507(Pesticide); Gauge 03334500 - 350 cfs	0.52	ug/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/25/10 11:30	1-5	EPA Method 507(Pesticide); Gauge 03334500 - 350 cfs	0.74	ug/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/25/10 12:30	1-6	EPA Method 507(Pesticide); Gauge 03334500 - 350 cfs	<.1	ug/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/25/10 13:00	1-9	EPA Method 507(Pesticide); Gauge 03334500 - 350 cfs	0.23	ug/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/25/10 13:30	1-10	EPA Method 507(Pesticide); Gauge 03334500 - 350 cfs	0.1	ug/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/25/10 14:00	1-14	EPA Method 507(Pesticide); Gauge 03334500 - 350 cfs	1.08	ug/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/25/10 14:30	1-16	EPA Method 507(Pesticide); Gauge 03334500 - 350 cfs	0.96	ug/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/7/10 10:30	2-2	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	0.27	ug/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/7/10 11:00	2-3	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	0.31	ug/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/7/10 11:30	2-5	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	0.18	ug/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/7/10 12:30	2-6	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	<.1	ug/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/7/10 13:00	2-9	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	<.1	ug/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/7/10 13:30	2-10	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	<.1	ug/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/7/10 14:00	2-14	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	0.14	ug/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/7/10 14:30	2-16	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	<.1	ug/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/7/10 14:30	2-16	EPA Method 507(Pesticide); Gauge 03334500 - 160 cfs	<.1	ug/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	7/29/10 11:30	3-1	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	5		CFS
WAW-03-0022	Stump Ditch	40.3550	-86.3374	7/29/10 11:30	3-1	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	7/29/10 11:30	3-1	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.2	SU	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	7/29/10 11:30	3-1	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	24.7	°C	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	7/29/10 11:30	3-1	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	560	umho/cm	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	7/29/10 11:30	3-1	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.15	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	7/29/10 11:30	3-1	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.1	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	7/29/10 11:30	3-1	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	4	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/29/10 11:45	3-3	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	3		CFS
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/29/10 11:45	3-3	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.3	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/29/10 11:45	3-3	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8	SU	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/29/10 11:45	3-3	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	24.2	°C	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/29/10 11:45	3-3	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	470	umho/cm	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/29/10 11:45	3-3	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.26	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/29/10 11:45	3-3	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.1	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	7/29/10 11:45	3-3	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	18.5	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/29/10 12:00	3-2	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	15		CFS
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/29/10 12:00	3-2	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.3	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/29/10 12:00	3-2	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/29/10 12:00	3-2	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	22.4	°C	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/29/10 12:00	3-2	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	380	umho/cm	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/29/10 12:00	3-2	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.15	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/29/10 12:00	3-2	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.4	mg/L	

WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	7/29/10 12:00	3-2	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	42.5	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	7/29/10 12:30	3-13	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	25		CFS
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	7/29/10 12:30	3-13	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	7/29/10 12:30	3-13	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	7/29/10 12:30	3-13	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	24.7	°C	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	7/29/10 12:30	3-13	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	320	umho/cm	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	7/29/10 12:30	3-13	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.56	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	7/29/10 12:30	3-13	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.6	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	7/29/10 12:30	3-13	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	71	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/29/10 13:30	3-6	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	16		CFS
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/29/10 13:30	3-6	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/29/10 13:30	3-6	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.7	SU	
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/29/10 13:30	3-6	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	24	°C	
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/29/10 13:30	3-6	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	450	umho/cm	
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/29/10 13:30	3-6	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.5	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/29/10 13:30	3-6	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.8	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	7/29/10 13:30	3-6	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	44.5	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	7/29/10 14:00	3-4	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	50		CFS
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	7/29/10 14:00	3-4	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	7/29/10 14:00	3-4	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	7/29/10 14:00	3-4	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	24.9	°C	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	7/29/10 14:00	3-4	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	430	umho/cm	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	7/29/10 14:00	3-4	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.3	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	7/29/10 14:00	3-4	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.6	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	7/29/10 14:00	3-4	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	45.5	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/29/10 14:30	3-5	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	70		CFS
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/29/10 14:30	3-5	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.6	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/29/10 14:30	3-5	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8	SU	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/29/10 14:30	3-5	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	25.1	°C	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/29/10 14:30	3-5	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	370	umho/cm	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/29/10 14:30	3-5	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.35	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/29/10 14:30	3-5	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.2	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	7/29/10 14:30	3-5	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	35	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/29/10 15:00	3-14	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	180		CFS
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/29/10 15:00	3-14	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.1	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/29/10 15:00	3-14	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/29/10 15:00	3-14	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	24.3	°C	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/29/10 15:00	3-14	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	360	umho/cm	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/29/10 15:00	3-14	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.75	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/29/10 15:00	3-14	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.2	mg/L	

WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	7/29/10 15:00	3-14	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	107	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/29/10 15:15	3-9	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	13		CFS
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/29/10 15:15	3-9	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.1	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/29/10 15:15	3-9	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.1	SU	
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/29/10 15:15	3-9	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	23.5	°C	
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/29/10 15:15	3-9	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	450	umho/cm	
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/29/10 15:15	3-9	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.3	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/29/10 15:15	3-9	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.4	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	7/29/10 15:15	3-9	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	48.5	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/29/10 15:45	3-10	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	18		CFS
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/29/10 15:45	3-10	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.6	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/29/10 15:45	3-10	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/29/10 15:45	3-10	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	25.2	°C	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/29/10 15:45	3-10	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	670	umho/cm	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/29/10 15:45	3-10	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.17	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/29/10 15:45	3-10	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.4	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	7/29/10 15:45	3-10	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	9	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	7/29/10 16:00	3-15	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	400		CFS
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	7/29/10 16:00	3-15	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.2	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	7/29/10 16:00	3-15	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8	SU	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	7/29/10 16:00	3-15	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	25.3	°C	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	7/29/10 16:00	3-15	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	320	umho/cm	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	7/29/10 16:00	3-15	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.2	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	7/29/10 16:00	3-15	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.8	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	7/29/10 16:00	3-15	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	118.5	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	500		CFS
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.65	mg/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.9	mg/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	211	mg/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.2	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8	SU	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	26.4	°C	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	370	umho/cm	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.6	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.9	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	7/29/10 16:15	3-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	231	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	0.3		CFS

WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	54		Index Score
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9.6	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8	SU	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	20.5	°C	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	600	umho/cm	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.38	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	4	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/7/10 11:45	4-1	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	7	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	0.1		CFS
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	47		Index Score
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	0.23	ug/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.1	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.5	SU	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	22.3	°C	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	440	umho/cm	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.04	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	0.5	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/7/10 12:00	4-3	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	1.5	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	0.4		CFS
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	57		Index Score
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	<.1	ug/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.4	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.1	SU	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	20.3	°C	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	710	umho/cm	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.14	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	0.5	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/7/10 12:20	4-2	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	5	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	4		CFS
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	65		Index Score
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	5.1	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	19.3	°C	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	650	umho/cm	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.19	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.5	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/7/10 12:50	4-13	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	4.5	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	4		CFS

WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	56		Index Score
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	<.1	ug/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.9	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8	SU	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	20.8	°C	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	1140	umho/cm	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	2.7	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	7.5	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/7/10 13:00	4-6	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2.5	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	1.2		CFS
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	60		Index Score
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.5	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.1	SU	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	21.8	°C	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	570	umho/cm	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.06	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.1	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/7/10 13:20	4-4	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	6	mg/L	
WAW-03-0031	Blinn Ditch	40.3072	-86.5316	9/7/10 13:35	4-17	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	50		Index Score
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	5		CFS
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	74		Index Score
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	<.1	ug/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.8	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.1	SU	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	20.6	°C	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	660	umho/cm	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.07	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	4.6	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/7/10 13:50	4-5	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3	mg/L	
WAW-03-0028	Mann Ditch	40.2710	-86.5013	9/7/10 14:00	4-8	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	51		Index Score
WAW-03-0027	Prairie Creek	40.2643	-86.5027	9/7/10 14:10	4-7	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	49		Index Score
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	10		CFS
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	77		Index Score
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	<.1	ug/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9.5	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.2	SU	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	21.3	°C	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	890	umho/cm	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.26	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.8	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/7/10 14:30	4-14	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	4		CFS
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	68		Index Score
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	<.1	ug/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10.4	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	20.1	°C	

WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	710	umho/cm	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.05	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.4	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/7/10 14:50	4-9	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	0.5	mg/L	
WAW040-0087	Lauramie Creek	40.2727	-86.7174	9/7/10 15:05	4-11	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	53		Index Score
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	1		CFS
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	70		Index Score
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	<.1	ug/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	20.8	°C	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	710	umho/cm	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.14	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.1	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/7/10 15:15	4-10	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	1.5	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	25		CFS
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	73		Index Score
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10.2	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	22	°C	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	780	umho/cm	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.22	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.4	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/7/10 15:30	4-15	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	5	mg/L	
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	9/7/10 15:45	4-12	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	70		Index Score
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	32		CFS
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Habitat (| IN IDEM QHEI | WATER | TOTAL | N/A | 0)	77		Index Score
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	<.1	ug/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.06	mg/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.5	mg/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3	mg/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	EPA Method 507(Pesticide); Gauge 03334500 - 32 cfs	<.1	ug/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10.7	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	22.4	°C	

WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	690	umho/cm	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.07	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/7/10 16:00	4-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/22/10 10:42	9-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	115	MPN/100mL	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/22/10 10:50	9-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	44	MPN/100mL	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/22/10 11:30	9-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	99	MPN/100mL	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/22/10 11:40	9-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	488	MPN/100mL	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/22/10 11:50	9-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	435	MPN/100mL	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/22/10 12:00	9-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	291	MPN/100mL	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/22/10 12:12	9-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	687	MPN/100mL	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/22/10 12:20	9-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	770	MPN/100mL	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/22/10 12:25	9-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1120	MPN/100mL	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/22/10 12:45	9-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	192	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/22/10 12:55	9-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1203	MPN/100mL	
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	9/22/10 13:40	9-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	MPN/100mL	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/22/10 14:00	9-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	980	MPN/100mL	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	9/29/10 10:36	10-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	82	MPN/100mL	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	9/29/10 10:50	10-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	49	MPN/100mL	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	9/29/10 11:14	10-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	16	MPN/100mL	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	9/29/10 11:30	10-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	276	MPN/100mL	
WAW040-0014	Prairie Creek	40.3100	-86.5072	9/29/10 11:37	10-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	291	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	9/29/10 12:55	10-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	179	MPN/100mL	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	9/29/10 13:10	10-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	365	MPN/100mL	
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	9/29/10 13:33	10-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	271	MPN/100mL	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	9/29/10 13:47	10-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	66	MPN/100mL	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	9/29/10 14:23	10-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	435	MPN/100mL	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	9/29/10 14:41	10-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	236	MPN/100mL	
WAW-03-0029	Spring Creek	40.3161	-86.6304	9/29/10 14:52	10-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	124	MPN/100mL	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	9/29/10 16:07	10-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	108	MPN/100mL	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	10/6/10 9:15	11-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	111	MPN/100mL	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	10/6/10 9:30	11-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	387	MPN/100mL	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	10/6/10 9:45	11-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	214	MPN/100mL	
WAW-03-0029	Spring Creek	40.3161	-86.6304	10/6/10 10:00	11-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	155	MPN/100mL	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	10/6/10 10:20	11-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	81	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	10/6/10 10:30	11-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	81	MPN/100mL	

WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	10/6/10 10:55	11-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	192	MPN/100mL	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	10/6/10 11:11	11-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	79	MPN/100mL	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	10/6/10 11:40	11-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	91	MPN/100mL	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	10/6/10 11:50	11-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	124	MPN/100mL	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	10/6/10 12:10	11-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	93	MPN/100mL	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	10/6/10 12:25	11-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	96	MPN/100mL	
WAW040-0014	Prairie Creek	40.3100	-86.5072	10/6/10 12:45	11-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	249	MPN/100mL	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	10/14/10 9:00	12-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	31	MPN/100mL	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	10/14/10 9:10	12-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	3	MPN/100mL	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	10/14/10 9:30	12-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	16	MPN/100mL	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	10/14/10 9:45	12-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	22	MPN/100mL	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	10/14/10 10:00	12-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	299	MPN/100mL	
WAW040-0014	Prairie Creek	40.3100	-86.5072	10/14/10 10:15	12-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	461	MPN/100mL	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	10/14/10 10:45	12-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	128	MPN/100mL	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	10/14/10 11:00	12-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	326	MPN/100mL	
WAW-03-0029	Spring Creek	40.3161	-86.6304	10/14/10 11:15	12-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	291	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	10/14/10 13:00	12-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	155	MPN/100mL	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	10/14/10 13:06	12-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	17	MPN/100mL	
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	10/14/10 13:30	12-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	206	MPN/100mL	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	10/14/10 14:00	12-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2	MPN/100mL	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	10/16/10 11:00	19-1	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	34		Index Score
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	10/16/10 11:40	19-2	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	36		Index Score
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	10/16/10 12:00	19-13	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	34		Index Score
WAW040-0014	Prairie Creek	40.3100	-86.5072	10/16/10 12:20	19-6	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	32		Index Score
WAW-03-0028	Mann Ditch	40.2710	-86.5013	10/16/10 12:40	19-8	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	32		Index Score
WAW-03-0027	Prairie Creek	40.2643	-86.5027	10/16/10 13:00	19-7	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	38		Index Score
WAW-03-0031	Blinn Ditch	40.3072	-86.5316	10/16/10 13:20	19-17	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	34		Index Score
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	10/16/10 13:40	19-4	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	36		Index Score
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	10/16/10 14:00	19-5	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	44		Index Score
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	10/16/10 14:20	19-14	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	38		Index Score
WAW-03-0029	Spring Creek	40.3161	-86.6304	10/16/10 14:40	19-9	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	38		Index Score
WAW040-0087	Lauramie Creek	40.2727	-86.7174	10/16/10 15:00	19-11	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	38		Index Score
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	10/16/10 15:20	19-10	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	40		Index Score
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	10/16/10 15:40	19-15	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	42		Index Score
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	10/16/10 16:00	19-12	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	40		Index Score
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	10/16/10 16:20	19-16	mIBI (| EPA 841-B-99-002 JULY 1999 | WATER | TOTAL | N/A | 12)	36		Index Score
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	10/20/10 9:30	13-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	78	MPN/100mL	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	10/20/10 9:40	13-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	133	MPN/100mL	

WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	10/20/10 9:45	13-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	147	MPN/100mL	
WAW-03-0029	Spring Creek	40.3161	-86.6304	10/20/10 10:00	13-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	158	MPN/100mL	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	10/20/10 10:25	13-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	112	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	10/20/10 10:35	13-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	649	MPN/100mL	
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	10/20/10 11:00	13-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	649	MPN/100mL	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	10/20/10 11:10	13-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	47	MPN/100mL	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	10/20/10 12:15	13-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	43	MPN/100mL	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	10/20/10 12:20	13-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	727	MPN/100mL	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	10/20/10 12:35	13-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	816	MPN/100mL	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	10/20/10 12:50	13-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	105	MPN/100mL	
WAW040-0014	Prairie Creek	40.3100	-86.5072	10/20/10 12:55	13-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	435	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	11/23/10 9:15	5-10	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	4		CFS
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	11/23/10 9:15	5-10	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10.1	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	11/23/10 9:15	5-10	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	11/23/10 9:15	5-10	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	9	°C	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	11/23/10 9:15	5-10	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	620	umho/cm	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	11/23/10 9:15	5-10	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.08	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	11/23/10 9:15	5-10	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	0.7	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	11/23/10 9:15	5-10	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	5	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	11/23/10 9:30	5-15	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	48		CFS
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	11/23/10 9:30	5-15	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.8	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	11/23/10 9:30	5-15	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	11/23/10 9:30	5-15	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	8.5	°C	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	11/23/10 9:30	5-15	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	840	umho/cm	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	11/23/10 9:30	5-15	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.17	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	11/23/10 9:30	5-15	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.4	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	11/23/10 9:30	5-15	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	6.5	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	11/23/10 10:15	5-16	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	65		CFS
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	11/23/10 10:15	5-16	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.8	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	11/23/10 10:15	5-16	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	11/23/10 10:15	5-16	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	10	°C	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	11/23/10 10:15	5-16	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	730	umho/cm	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	11/23/10 10:15	5-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.19	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	11/23/10 10:15	5-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.2	mg/L	

WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	11/23/10 10:15	5-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.5	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	12		CFS
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.08	mg/L	Duplicate
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.3	mg/L	Duplicate
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	7.5	mg/L	Duplicate
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	10.5	°C	
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	700	umho/cm	
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.07	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.3	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	11/23/10 10:45	5-9	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	6.5	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	11/23/10 11:15	5-14	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	20		CFS
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	11/23/10 11:15	5-14	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.4	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	11/23/10 11:15	5-14	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	11/23/10 11:15	5-14	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	11	°C	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	11/23/10 11:15	5-14	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	630	umho/cm	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	11/23/10 11:15	5-14	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.46	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	11/23/10 11:15	5-14	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	4	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	11/23/10 11:15	5-14	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	31	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	11/23/10 11:30	5-5	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	14		CFS
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	11/23/10 11:30	5-5	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	11/23/10 11:30	5-5	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	11/23/10 11:30	5-5	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	9.5	°C	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	11/23/10 11:30	5-5	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	640	umho/cm	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	11/23/10 11:30	5-5	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.09	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	11/23/10 11:30	5-5	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.5	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	11/23/10 11:30	5-5	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	6	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	11/23/10 12:00	5-6	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	13		CFS
WAW040-0014	Prairie Creek	40.3100	-86.5072	11/23/10 12:00	5-6	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.3	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	11/23/10 12:00	5-6	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.5	SU	
WAW040-0014	Prairie Creek	40.3100	-86.5072	11/23/10 12:00	5-6	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	12	°C	
WAW040-0014	Prairie Creek	40.3100	-86.5072	11/23/10 12:00	5-6	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	720	umho/cm	
WAW040-0014	Prairie Creek	40.3100	-86.5072	11/23/10 12:00	5-6	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	1.5	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	11/23/10 12:00	5-6	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	14	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	11/23/10 12:00	5-6	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	8	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	11/23/10 12:15	5-13	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	5		CFS
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	11/23/10 12:15	5-13	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.7	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	11/23/10 12:15	5-13	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	11/23/10 12:15	5-13	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	9.5	°C	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	11/23/10 12:15	5-13	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	620	umho/cm	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	11/23/10 12:15	5-13	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.08	mg/L	

WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	11/23/10 12:15	5-13	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	1.7	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	11/23/10 12:15	5-13	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	11	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	11/23/10 12:30	5-4	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	5		CFS
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	11/23/10 12:30	5-4	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.6	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	11/23/10 12:30	5-4	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	11/23/10 12:30	5-4	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	10.5	°C	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	11/23/10 12:30	5-4	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	640	umho/cm	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	11/23/10 12:30	5-4	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.22	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	11/23/10 12:30	5-4	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	0.5	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	11/23/10 12:30	5-4	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	16	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	11/23/10 13:00	5-2	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	3		CFS
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	11/23/10 13:00	5-2	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	11/23/10 13:00	5-2	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	11/23/10 13:00	5-2	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	10	°C	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	11/23/10 13:00	5-2	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	680	umho/cm	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	11/23/10 13:00	5-2	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.11	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	11/23/10 13:00	5-2	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	0.7	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	11/23/10 13:00	5-2	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	6.5	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	11/23/10 13:30	5-1	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	1.5		CFS
WAW-03-0022	Stump Ditch	40.3550	-86.3374	11/23/10 13:30	5-1	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10.3	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	11/23/10 13:30	5-1	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.1	SU	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	11/23/10 13:30	5-1	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	10	°C	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	11/23/10 13:30	5-1	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	630	umho/cm	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	11/23/10 13:30	5-1	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.26	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	11/23/10 13:30	5-1	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	0.6	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	11/23/10 13:30	5-1	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	8.5	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	11/23/10 13:45	5-3	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	0.2		CFS
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	11/23/10 13:45	5-3	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9.3	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	11/23/10 13:45	5-3	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	11/23/10 13:45	5-3	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	10	°C	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	11/23/10 13:45	5-3	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	540	umho/cm	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	11/23/10 13:45	5-3	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.12	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	11/23/10 13:45	5-3	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	0.8	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	11/23/10 13:45	5-3	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	41.5	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	1/26/11 10:00	6-16	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	80		CFS
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	1/26/11 10:00	6-16	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.8	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	1/26/11 10:00	6-16	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8	SU	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	1/26/11 10:00	6-16	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	2	°C	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	1/26/11 10:00	6-16	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	715	umho/cm	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	1/26/11 10:00	6-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.03	mg/L	

WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	1/26/11 10:00	6-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.9	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	1/26/11 10:00	6-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	1/26/11 10:30	6-10	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	10		CFS
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	1/26/11 10:30	6-10	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.1	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	1/26/11 10:30	6-10	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	1/26/11 10:30	6-10	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	3	°C	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	1/26/11 10:30	6-10	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	690	umho/cm	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	1/26/11 10:30	6-10	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.06	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	1/26/11 10:30	6-10	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.3	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	1/26/11 10:30	6-10	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	1/26/11 11:00	6-15	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	70		CFS
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	1/26/11 11:00	6-15	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.8	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	1/26/11 11:00	6-15	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	1/26/11 11:00	6-15	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	2	°C	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	1/26/11 11:00	6-15	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	710	umho/cm	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	1/26/11 11:00	6-15	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.1	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	1/26/11 11:00	6-15	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	4.4	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	1/26/11 11:00	6-15	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	1/26/11 11:30	6-9	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	12		CFS
WAW-03-0029	Spring Creek	40.3161	-86.6304	1/26/11 11:30	6-9	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.1	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	1/26/11 11:30	6-9	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8	SU	
WAW-03-0029	Spring Creek	40.3161	-86.6304	1/26/11 11:30	6-9	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	4	°C	
WAW-03-0029	Spring Creek	40.3161	-86.6304	1/26/11 11:30	6-9	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	660	umho/cm	
WAW-03-0029	Spring Creek	40.3161	-86.6304	1/26/11 11:30	6-9	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.04	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	1/26/11 11:30	6-9	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.1	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	1/26/11 11:30	6-9	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2.5	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	1/26/11 12:00	6-14	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	32		CFS
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	1/26/11 12:00	6-14	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.9	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	1/26/11 12:00	6-14	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	1/26/11 12:00	6-14	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	2	°C	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	1/26/11 12:00	6-14	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	750	umho/cm	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	1/26/11 12:00	6-14	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.32	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	1/26/11 12:00	6-14	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.4	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	1/26/11 12:00	6-14	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	1/26/11 12:30	6-4	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	13		CFS
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	1/26/11 12:30	6-4	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.1	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	1/26/11 12:30	6-4	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	1/26/11 12:30	6-4	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	2	°C	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	1/26/11 12:30	6-4	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	580	umho/cm	

WAW-03-0025	Kilmore Creek	40.3448	-86.5152	1/26/11 12:30	6-4	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	<.02	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	1/26/11 12:30	6-4	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.6	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	1/26/11 12:30	6-4	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	1	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	1/26/11 13:00	6-18	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	26		CFS
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	1/26/11 13:00	6-18	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.9	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	1/26/11 13:00	6-18	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	1/26/11 13:00	6-18	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	4	°C	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	1/26/11 13:00	6-18	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	805	umho/cm	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	1/26/11 13:00	6-18	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.26	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	1/26/11 13:00	6-18	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.2	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	1/26/11 13:00	6-18	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.5	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	1/26/11 13:30	6-6	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	11		CFS
WAW040-0014	Prairie Creek	40.3100	-86.5072	1/26/11 13:30	6-6	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.7	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	1/26/11 13:30	6-6	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW040-0014	Prairie Creek	40.3100	-86.5072	1/26/11 13:30	6-6	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	5	°C	
WAW040-0014	Prairie Creek	40.3100	-86.5072	1/26/11 13:30	6-6	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	940	umho/cm	
WAW040-0014	Prairie Creek	40.3100	-86.5072	1/26/11 13:30	6-6	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.65	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	1/26/11 13:30	6-6	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.8	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	1/26/11 13:30	6-6	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	4.5	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	1/26/11 14:00	6-5	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	26		CFS
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	1/26/11 14:00	6-5	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.2	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	1/26/11 14:00	6-5	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	1/26/11 14:00	6-5	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	2	°C	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	1/26/11 14:00	6-5	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	620	umho/cm	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	1/26/11 14:00	6-5	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	<.02	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	1/26/11 14:00	6-5	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.9	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	1/26/11 14:00	6-5	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	1.5	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	1/26/11 14:30	6-13	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	16		CFS
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	1/26/11 14:30	6-13	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.5	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	1/26/11 14:30	6-13	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	1/26/11 14:30	6-13	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	3	°C	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	1/26/11 14:30	6-13	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	525	umho/cm	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	1/26/11 14:30	6-13	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.02	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	1/26/11 14:30	6-13	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	6	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	1/26/11 14:30	6-13	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.5	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	1/26/11 15:00	6-2	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	8		CFS
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	1/26/11 15:00	6-2	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.7	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	1/26/11 15:00	6-2	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	

WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	1/26/11 15:00	6-2	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	3	°C	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	1/26/11 15:00	6-2	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	590	umho/cm	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	1/26/11 15:00	6-2	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.02	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	1/26/11 15:00	6-2	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	6.5	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	1/26/11 15:00	6-2	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	0.5	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	4		CFS
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	1/26/11 15:30	6-3	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	2		CFS
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.06	mg/L	Duplicate
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.6	mg/L	Duplicate
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2	mg/L	Duplicate
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.5	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	2	°C	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	580	umho/cm	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.05	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.4	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	1/26/11 15:30	6-1	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	1/26/11 15:30	6-3	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.9	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	1/26/11 15:30	6-3	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.9	SU	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	1/26/11 15:30	6-3	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	1	°C	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	1/26/11 15:30	6-3	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	525	umho/cm	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	1/26/11 15:30	6-3	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.03	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	1/26/11 15:30	6-3	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	7	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	1/26/11 15:30	6-3	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	0.5	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	3/30/11 10:00	7-3	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	4		CFS
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	3/30/11 10:00	7-3	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.6	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	3/30/11 10:00	7-3	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	3/30/11 10:00	7-3	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	4	°C	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	3/30/11 10:00	7-3	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	560	umho/cm	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	3/30/11 10:00	7-3	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.03	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	3/30/11 10:00	7-3	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.4	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	3/30/11 10:00	7-3	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2.4	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	3/30/11 10:15	7-1	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	8		CFS
WAW-03-0022	Stump Ditch	40.3550	-86.3374	3/30/11 10:15	7-1	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.1	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	3/30/11 10:15	7-1	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	3/30/11 10:15	7-1	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	4.5	°C	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	3/30/11 10:15	7-1	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	610	umho/cm	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	3/30/11 10:15	7-1	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.05	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	3/30/11 10:15	7-1	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	4.6	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	3/30/11 10:15	7-1	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2.4	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	3/30/11 10:45	7-2	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	9		CFS
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	3/30/11 10:45	7-2	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.2	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	3/30/11 10:45	7-2	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	3/30/11 10:45	7-2	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	4.5	°C	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	3/30/11 10:45	7-2	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	600	umho/cm	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	3/30/11 10:45	7-2	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.03	mg/L	

WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	3/30/11 10:45	7-2	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.2	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	3/30/11 10:45	7-2	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.6	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	3/30/11 11:30	7-4	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	17		CFS
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	3/30/11 11:30	7-4	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.3	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	3/30/11 11:30	7-4	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	3/30/11 11:30	7-4	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	5	°C	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	3/30/11 11:30	7-4	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	570	umho/cm	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	3/30/11 11:30	7-4	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.03	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	3/30/11 11:30	7-4	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.4	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	3/30/11 11:30	7-4	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	4	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	3/30/11 12:00	7-13	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	12		CFS
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	3/30/11 12:00	7-13	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	11.8	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	3/30/11 12:00	7-13	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.1	SU	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	3/30/11 12:00	7-13	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	5	°C	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	3/30/11 12:00	7-13	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	630	umho/cm	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	3/30/11 12:00	7-13	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.03	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	3/30/11 12:00	7-13	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	6.5	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	3/30/11 12:00	7-13	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2.8	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	3/30/11 13:00	7-18	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	23		CFS
WAW040-0014	Prairie Creek	40.3100	-86.5072	3/30/11 13:00	7-6	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	10		CFS
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	3/30/11 13:00	7-18	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.8	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	3/30/11 13:00	7-18	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	3/30/11 13:00	7-18	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	7	°C	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	3/30/11 13:00	7-18	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	720	umho/cm	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	3/30/11 13:00	7-18	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.09	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	3/30/11 13:00	7-18	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.4	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	3/30/11 13:00	7-18	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.6	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	3/30/11 13:00	7-6	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.8	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	3/30/11 13:00	7-6	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW040-0014	Prairie Creek	40.3100	-86.5072	3/30/11 13:00	7-6	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	7	°C	
WAW040-0014	Prairie Creek	40.3100	-86.5072	3/30/11 13:00	7-6	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	890	umho/cm	
WAW040-0014	Prairie Creek	40.3100	-86.5072	3/30/11 13:00	7-6	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.34	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	3/30/11 13:00	7-6	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.7	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	3/30/11 13:00	7-6	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	1.2	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	3/30/11 13:15	7-9	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	8		CFS
WAW-03-0029	Spring Creek	40.3161	-86.6304	3/30/11 13:15	7-9	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	14.3	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	3/30/11 13:15	7-9	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0029	Spring Creek	40.3161	-86.6304	3/30/11 13:15	7-9	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	8.5	°C	
WAW-03-0029	Spring Creek	40.3161	-86.6304	3/30/11 13:15	7-9	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	720	umho/cm	

WAW-03-0029	Spring Creek	40.3161	-86.6304	3/30/11 13:15	7-9	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.08	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	3/30/11 13:15	7-9	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	2.6	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	3/30/11 13:15	7-9	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.2	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	3/30/11 13:30	7-10	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	5		CFS
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	3/30/11 13:30	7-10	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	15.3	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	3/30/11 13:30	7-10	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.4	SU	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	3/30/11 13:30	7-10	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	8.5	°C	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	3/30/11 13:30	7-10	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	680	umho/cm	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	3/30/11 13:30	7-10	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	<.02	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	3/30/11 13:30	7-10	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.2	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	3/30/11 13:30	7-10	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2.4	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	3/30/11 14:00	7-5	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	22		CFS
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	3/30/11 14:00	7-5	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	14.5	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	3/30/11 14:00	7-5	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.3	SU	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	3/30/11 14:00	7-5	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	7	°C	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	3/30/11 14:00	7-5	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	590	umho/cm	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	3/30/11 14:00	7-5	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.05	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	3/30/11 14:00	7-5	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	5.4	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	3/30/11 14:00	7-5	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	3/30/11 14:30	7-14	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	25		CFS
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	3/30/11 14:30	7-14	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	15.4	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	3/30/11 14:30	7-14	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.2	SU	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	3/30/11 14:30	7-14	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	8	°C	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	3/30/11 14:30	7-14	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	730	umho/cm	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	3/30/11 14:30	7-14	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.12	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	3/30/11 14:30	7-14	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	3/30/11 14:30	7-14	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.2	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	3/30/11 15:15	7-15	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	50		CFS
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	3/30/11 15:15	7-15	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	13.9	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	3/30/11 15:15	7-15	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.4	SU	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	3/30/11 15:15	7-15	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	8	°C	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	3/30/11 15:15	7-15	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	620	umho/cm	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	3/30/11 15:15	7-15	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.12	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	3/30/11 15:15	7-15	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.8	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	3/30/11 15:15	7-15	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	2	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	65		CFS
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.02	mg/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.5	mg/L	Duplicate

WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.2	mg/L	Duplicate
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.4	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.4	SU	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	9	°C	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	680	umho/cm	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.02	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	3.6	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	3/30/11 16:00	7-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	3.2	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/13/11 7:30	14-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	75	MPN/100mL	
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	5/13/11 7:42	14-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	123	MPN/100mL	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/13/11 8:00	14-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	143	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/13/11 8:13	14-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	219	MPN/100mL	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/13/11 8:43	14-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	378	MPN/100mL	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/13/11 8:52	14-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	461	MPN/100mL	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/13/11 9:02	14-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	326	MPN/100mL	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/13/11 9:20	14-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	548	MPN/100mL	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/13/11 9:34	14-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	613	MPN/100mL	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/13/11 10:15	14-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1203	MPN/100mL	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/13/11 10:31	14-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	921	MPN/100mL	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/13/11 10:48	14-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	435	MPN/100mL	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/13/11 10:54	14-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	461	MPN/100mL	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/17/11 10:15	8-1	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	42		CFS
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/17/11 10:15	8-16	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	600		CFS
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/17/11 10:15	8-1	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	7.8	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/17/11 10:15	8-1	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.4	SU	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/17/11 10:15	8-1	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	13	°C	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/17/11 10:15	8-1	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	440	umho/cm	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/17/11 10:15	8-1	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.24	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/17/11 10:15	8-1	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	14	mg/L	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/17/11 10:15	8-1	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	36.5	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/17/11 10:15	8-16	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.6	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/17/11 10:15	8-16	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.6	SU	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/17/11 10:15	8-16	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	12.5	°C	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/17/11 10:15	8-16	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	430	umho/cm	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/17/11 10:15	8-16	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.32	mg/L	

WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/17/11 10:15	8-16	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	16	mg/L	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/17/11 10:15	8-16	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	149	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/17/11 10:45	8-2	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	80		CFS
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/17/11 10:45	8-15	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	500		CFS
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/17/11 10:45	8-2	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.5	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/17/11 10:45	8-2	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.4	SU	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/17/11 10:45	8-2	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	13.5	°C	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/17/11 10:45	8-2	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	450	umho/cm	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/17/11 10:45	8-2	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.13	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/17/11 10:45	8-2	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	14	mg/L	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/17/11 10:45	8-2	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	41	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/17/11 10:45	8-15	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/17/11 10:45	8-15	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.6	SU	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/17/11 10:45	8-15	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	12	°C	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/17/11 10:45	8-15	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	450	umho/cm	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/17/11 10:45	8-15	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.4	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/17/11 10:45	8-15	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	16	mg/L	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/17/11 10:45	8-15	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	111	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/17/11 11:00	8-10	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	12		CFS
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/17/11 11:00	8-10	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10.7	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/17/11 11:00	8-10	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.1	SU	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/17/11 11:00	8-10	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	11.5	°C	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/17/11 11:00	8-10	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	700	umho/cm	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/17/11 11:00	8-10	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.06	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/17/11 11:00	8-10	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	7	mg/L	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/17/11 11:00	8-10	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	0.5	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/17/11 11:30	8-9	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	18		CFS
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/17/11 11:30	8-9	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	14.3	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/17/11 11:30	8-9	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	8.1	SU	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/17/11 11:30	8-9	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	11.5	°C	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/17/11 11:30	8-9	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	680	umho/cm	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/17/11 11:30	8-9	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.07	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/17/11 11:30	8-9	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	9.5	mg/L	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/17/11 11:30	8-9	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	1.5	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/17/11 12:00	8-14	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	220		CFS
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/17/11 12:00	8-14	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9.1	mg/L	

WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/17/11 12:00	8-14	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.6	SU	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/17/11 12:00	8-14	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	12	°C	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/17/11 12:00	8-14	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	520	umho/cm	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/17/11 12:00	8-14	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.18	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/17/11 12:00	8-14	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	15	mg/L	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/17/11 12:00	8-14	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	7.5	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/17/11 12:30	8-5	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	180		CFS
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/17/11 12:30	8-5	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.7	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/17/11 12:30	8-5	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.6	SU	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/17/11 12:30	8-5	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	12.5	°C	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/17/11 12:30	8-5	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	440	umho/cm	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/17/11 12:30	8-5	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.08	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/17/11 12:30	8-5	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	16	mg/L	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/17/11 12:30	8-5	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	83	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	5/17/11 13:00	8-18	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	200		CFS
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	5/17/11 13:00	8-18	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9.2	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	5/17/11 13:00	8-18	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.6	SU	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	5/17/11 13:00	8-18	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	12.5	°C	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	5/17/11 13:00	8-18	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	510	umho/cm	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	5/17/11 13:00	8-18	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.24	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	5/17/11 13:00	8-18	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	14	mg/L	
WAW-03-0032	South Fork Wildcat Creek	40.3149	-86.5437	5/17/11 13:00	8-18	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	71	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	39		CFS
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.34	mg/L	Duplicate
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	15	mg/L	Duplicate
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	6.5	mg/L	Duplicate
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	10.3	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.8	SU	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	13	°C	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	710	umho/cm	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.34	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	15	mg/L	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/17/11 13:30	8-6	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	6.5	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/17/11 14:00	8-13	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	113		CFS
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/17/11 14:00	8-13	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	12.5	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/17/11 14:00	8-13	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.5	SU	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/17/11 14:00	8-13	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	12.5	°C	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/17/11 14:00	8-13	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	460	umho/cm	

WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/17/11 14:00	8-13	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.07	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/17/11 14:00	8-13	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	16	mg/L	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/17/11 14:00	8-13	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	1.5	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/17/11 14:30	8-4	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	127		CFS
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/17/11 14:30	8-4	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	8.5	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/17/11 14:30	8-4	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.5	SU	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/17/11 14:30	8-4	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	12.5	°C	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/17/11 14:30	8-4	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	460	umho/cm	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/17/11 14:30	8-4	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.16	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/17/11 14:30	8-4	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	14	mg/L	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/17/11 14:30	8-4	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	61.5	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/17/11 15:30	8-3	Flow (| ASTM D3858 | WATER | TOTAL | N/A | 1 CF/SEC)	26		CFS
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/17/11 15:30	8-3	DO (E-14539 | SM4500-OG | WATER | TOTAL | N/A | 1 %)	9.2	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/17/11 15:30	8-3	pH (Field) (E-10139 | SM 4500H | WATER | TOTAL | N/A | 0.1 SU)	7.4	SU	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/17/11 15:30	8-3	Temperature (Thermocouple) (| EPA 170.1 | WATER | TOTAL | N/A | 0.1 °C)	13.5	°C	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/17/11 15:30	8-3	Specific Conductance (Field) (E-10184 | SM2510A | WATER | TOTAL | N/A | 1 UMHO/CM)	470	umho/cm	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/17/11 15:30	8-3	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	0.05	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/17/11 15:30	8-3	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	16	mg/L	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/17/11 15:30	8-3	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	27.5	mg/L	
				5/18/11 12:00	8-0	Phosphorus, Total (7723-14-0 | SM4500P-F | WATER | TOTAL | N/A)	<.02	mg/L	Field Blank
				5/18/11 12:00	8-0	Nitrogen, Nitrate (14797-55-8 | SM4500NO3-E | WATER | TOTAL | N/A | 0.1 MG/L)	<.02	mg/L	Field Blank
				5/18/11 12:00	8-0	Solids, Suspended Total, TSS (E-10151 | SM2540D | WATER | TOTAL | N/A | 6 MG/L)	<.5	mg/L	Field Blank
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/20/11 7:13	15-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	139	MPN/100mL	
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	5/20/11 7:35	15-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	80	MPN/100mL	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/20/11 7:51	15-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	235	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/20/11 8:01	15-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	193	MPN/100mL	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/20/11 8:31	15-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	235	MPN/100mL	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/20/11 8:39	15-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	435	MPN/100mL	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/20/11 8:46	15-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	410	MPN/100mL	
WAW040-0014	Prairie Creek	40.3100	-86.5072	5/20/11 9:36	15-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	325	MPN/100mL	
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/20/11 9:48	15-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	344	MPN/100mL	
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/20/11 10:04	15-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	547	MPN/100mL	
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/20/11 10:17	15-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	517	MPN/100mL	
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/20/11 10:36	15-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	579	MPN/100mL	
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/20/11 10:41	15-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	648	MPN/100mL	
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	5/27/11 7:28	16-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	MPN/100mL	
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	5/27/11 7:40	16-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	MPN/100mL	
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	5/27/11 7:56	16-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	MPN/100mL	
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	5/27/11 8:07	16-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	MPN/100mL	
WAW-03-0029	Spring Creek	40.3161	-86.6304	5/27/11 9:13	16-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1203	MPN/100mL	
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	5/27/11 9:23	16-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	MPN/100mL	
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	5/27/11 9:32	16-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	MPN/100mL	

WAW040-0014	Prairie Creek	40.3100	-86.5072	5/27/11 10:10	16-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1553	ЛPN/100mL
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	5/27/11 10:23	16-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	ЛPN/100mL
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	5/27/11 10:35	16-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	ЛPN/100mL
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	5/27/11 10:46	16-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	2420	ЛPN/100mL
WAW-03-0022	Stump Ditch	40.3550	-86.3374	5/27/11 11:00	16-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1414	ЛPN/100mL
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	5/27/11 11:03	16-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1986	ЛPN/100mL
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	6/2/11 7:16	17-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	548	ЛPN/100mL
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	6/2/11 7:30	17-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	210	ЛPN/100mL
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	6/2/11 7:48	17-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	548	ЛPN/100mL
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	6/2/11 7:58	17-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	727	ЛPN/100mL
WAW-03-0029	Spring Creek	40.3161	-86.6304	6/2/11 8:28	17-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1414	ЛPN/100mL
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	6/2/11 8:37	17-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	461	ЛPN/100mL
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	6/2/11 8:48	17-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	157	ЛPN/100mL
WAW040-0014	Prairie Creek	40.3100	-86.5072	6/2/11 9:38	17-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1553	ЛPN/100mL
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	6/2/11 9:47	17-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	200	ЛPN/100mL
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	6/2/11 10:00	17-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	613	ЛPN/100mL
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	6/2/11 10:13	17-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	980	ЛPN/100mL
WAW-03-0022	Stump Ditch	40.3550	-86.3374	6/2/11 10:31	17-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	866	ЛPN/100mL
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	6/2/11 10:35	17-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	649	ЛPN/100mL
WAW040-0043	South Fork Wildcat Creek	40.4181	-86.7681	6/8/11 10:33	18-16	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	248	ЛPN/100mL
WAW-03-0021	Unnamed Trib of South Fork Wildcat Creek	40.4006	-86.7658	6/8/11 10:48	18-12	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	261	ЛPN/100mL
WAW040-0064	South Fork Wildcat Creek	40.3197	-86.7330	6/8/11 11:05	18-15	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	261	ЛPN/100mL
WAW-03-0020	Lauramie Creek	40.3134	-86.7492	6/8/11 11:14	18-10	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	1986	ЛPN/100mL
WAW-03-0029	Spring Creek	40.3161	-86.6304	6/8/11 11:40	18-9	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	411	ЛPN/100mL
WAW-03-0030	South Fork Wildcat Creek	40.3209	-86.6182	6/8/11 11:46	18-14	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	461	ЛPN/100mL
WAW-03-0026	Kilmore Creek	40.3360	-86.6167	6/8/11 11:53	18-5	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	261	ЛPN/100mL
WAW-03-0025	Kilmore Creek	40.3448	-86.5152	6/8/11 12:10	18-4	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	361	ЛPN/100mL
WAW040-0005	South Fork Wildcat Creek	40.3189	-86.4825	6/8/11 12:20	18-13	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	579	ЛPN/100mL
WAW040-0014	Prairie Creek	40.3100	-86.5072	6/8/11 12:27	18-6	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	921	ЛPN/100mL
WAW-03-0023	South Fork Wildcat Creek	40.3300	-86.4072	6/8/11 13:06	18-2	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	649	ЛPN/100mL
WAW-03-0024	Kilmore Creek	40.3486	-86.3373	6/8/11 13:22	18-3	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	727	ЛPN/100mL
WAW-03-0022	Stump Ditch	40.3550	-86.3374	6/8/11 13:27	18-1	E. Coli (ECOLI | SM9223B | WATER | TOTAL | N/A | 1 MPN/100ML)	435	ЛPN/100mL

1. Input watershed land use area (ac) and precipitation (in)						
Watershed	Watershed	Urban	Cropland	Pastureland	Forest	User Defined
Swamp Creek	W1	415.57	7300.638	0	28.777	0
Shanty Creek	W2	162.959	3065.595	0	19.112	0
Stump Ditch	W3	537.256	9544.838	0	78.297	0
Talbert Ditch	W4	800.894	11950.305	0	150.512	0
Prairie Creek	W5	3063.466	13424.654	18.025	254.745	0
Kilmore Creek	W6	974.686	14244.195	355.109	1274.076	0
Spring Creek	W7	1060.445	7940.05	532.092	517.328	0
Jenkins Ditch	W8	2114.59	18274.812	212.119	1557.667	0
Lauramie Creek	W9	657.386	4452.984	119.101	352.557	0
Town of Dayton	W10	684.442	6921.975	158.075	1409.475	0
Town of Mulberr	W11	55.329	271.823	23.444	72.695	0

Land use area and precipitation (continued)

					Rain correction factors		
					0.833	0.481	
Watershed	Watershed	Feedlots	Feedlot Percent Paved	Total	Annual Rainfall	Rain Days	Avg. Rain/Event
Swamp Creek	W1	0	0-24%	7744.985	35.01	112.5	0.539
Shanty Creek	W2	0	0-24%	3247.666	35.01	112.5	0.539
Stump Ditch	W3	0	0-24%	10160.391	35.01	112.5	0.539
Talbert Ditch	W4	0	0-24%	12901.711	35.01	112.5	0.539
Prairie Creek	W5	3.476	0-24%	16764.366	35.01	112.5	0.539
Kilmore Creek	W6	3.523	0-24%	16851.589	35.01	112.5	0.539
Spring Creek	W7	2.065	0-24%	10051.98	35.01	112.5	0.539
Jenkins Ditch	W8	4.614	0-24%	22163.802	35.01	112.5	0.539
Lauramie Creek	W9	1.152	0-24%	5583.18	35.01	112.5	0.539
Town of Dayton	W10	1.907	0-24%	9175.874	35.01	112.5	0.539
Town of Mulberry	W11	0.088	0-24%	423.379	35.01	112.5	0.539

2. Input agricultural animals										
Watershed	Watershed	Beef Cattle	Dairy Cattle	Swine (Hog)	Sheep	Horse	Chicken	Turkey	Duck	# of months manure applied
Swamp Creek	W1	0	0	0	0	0	0	0	0	6
Shanty Creek	W2	0	0	0	0	0	0	0	0	6
Stump Ditch	W3	0	0	0	0	0	0	0	0	6
Talbert Ditch	W4	0	0	0	0	0	0	0	0	6
Prairie Creek	W5	76	3	9829	76	30	0	0	9	6
Kilmore Creek	W6	76	4	9962	77	30	0	0	10	6
Spring Creek	W7	45	1	5841	45	18	0	0	5	6
Jenkins Ditch	W8	100	4	13045	101	41	0	0	11	6
Lauramie Creek	W9	25	1	3259	25	10	0	0	2	6
Town of Dayton	W10	42	1	5396	42	16	0	0	6	6
Town of Mulberr	W11	1	0	254	1	0	0	0	0	6
	Total	365	14	47586	367	145	0	0	43	

3. Input septic system and illegal direct wastewater discharge data						
Watershed	Watershed	No. of Septic Systems	Population per Septic System	Septic Failure Rate, %	Wastewater Direct Discharge, # of People	Direct Discharge Reduction, %
Swamp Creek	W1	126	2.56	1.09	0	0
Shanty Creek	W2	53	2.56	1.09	0	0
Stump Ditch	W3	165	2.56	1.09	0	0
Talbert Ditch	W4	207	2.56	1.09	0	0
Prairie Creek	W5	274	2.56	1.09	0	0
Kilmore Creek	W6	277	2.56	1.09	0	0
Spring Creek	W7	162	2.56	1.09	0	0
Jenkins Ditch	W8	363	2.56	1.09	0	0
Lauramie Creek	W9	90	2.56	1.09	0	0
Town of Dayton	W10	149	2.56	1.09	0	0
Town of Mulberr	W11	5	2.56	1.09	0	0

4. Modify the Universal Soil Loss Equation (USL											
Watershed	Watershed	Cropland					Pastureland				
		R	K	LS	C	P	R	K	LS	C	P
Swamp Creek	W1	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Shanty Creek	W2	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Stump Ditch	W3	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Talbert Ditch	W4	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Prairie Creek	W5	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Kilmore Creek	W6	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Spring Creek	W7	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Jenkins Ditch	W8	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Lauramie Creek	W9	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Town of Dayton	W10	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1
Town of Mulberr	W11	180	0.331	0.265	0.232	1	180	0.331	0.265	0.04	1

USLE Parameters Modifications (continued)

			Forest					User Defined				
Watershed	Watershed	P	R	K	LS	C	P	R	K	LS	C	P
Swamp Creek	W1	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Shanty Creek	W2	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Stump Ditch	W3	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Talbert Ditch	W4	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Prairie Creek	W5	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Kilmore Creek	W6	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Spring Creek	W7	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Jenkins Ditch	W8	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Lauramie Creek	W9	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Town of Dayton	W10	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1
Town of Mulberry	W11	1	180	0.331	0.265	0.003	1	180	0.331	0.265	0.232	1

Optional Data Input:										
	5. Select average soil hydrologic group (SHG), SHG A = highest infiltration and SHG D = lowest infiltration									
Watershed	Watershed	SHG A	SHG B	SHG C	SHG D	SHG Selected	Soil N conc.%	Soil P conc.%	Soil BOD conc.%
Swamp Creek	W1					C	0.08	0.031	0.16
Shanty Creek	W2					B	0.08	0.031	0.16
Stump Ditch	W3					C	0.08	0.031	0.16
Talbert Ditch	W4					C	0.08	0.031	0.16
Prairie Creek	W5					B	0.08	0.031	0.16
Kilmore Creek	W6					B	0.08	0.031	0.16
Spring Creek	W7					B	0.08	0.031	0.16
Jenkins Ditch	W8					B	0.08	0.031	0.16
Lauramie Creek	W9					C	0.08	0.031	0.16
Town of Dayton	W10					B	0.08	0.031	0.16
Town of Mulberr	W11	FALSE	TRUE	FALSE	FALSE	B	0.08	0.031	0.16

6. Reference runoff curve number (may be modified)				
SHG	A	B	C	D
Urban	83	89	92	93
Cropland	67	78	85	89
Pastureland	49	69	79	84
Forest	39	60	73	79
User Defined	50	70	80	85

6a. Detailed urban reference runoff curve number (may be modified)				
Urban\SHG	A	B	C	D
Commercial	89	92	94	95
Industrial	81	88	91	93
Institutional	81	88	91	93
Transportati	98	98	98	98
Multi-Family	77	85	90	92
Single-Famil	57	72	81	86
Urban-Cultiv	67	78	85	89
Vacant-Deve	77	85	90	92
Open Space	49	69	79	84

7. Nutrient concentration in runoff (mg/l)			
Land use	N	P	BOD
1. L-Cropland	1.9	0.3	4
1a. w/ manure	8.1	2	12.3
2. M-Cropland	2.9	0.4	6.1
2a. w/ manure	12.2	3	18.5
3. H-Cropland	4.4	0.5	9.2
3a. w/ manure	18.3	4	24.6
4. Pastureland	4	0.3	13
5. Forest	0.2	0.1	0.5
6. User Defined	0	0	0

7a. Nutrient concentration in shallow groundwater (mg/l) (n			
Landuse	N	P	BOD
Urban	1.5	0.063	0
Cropland	1.44	0.063	0
Pastureland	1.44	0.063	0
Forest	0.11	0.009	0
Feedlot	6	0.07	0
User-Defined	0	0	0

8. Input or modify urban land use distribution						
Watershed	Watershed	Urban Area (ac.)	Commercial %	Industrial %	Institutional %	Transportation %
Swamp Creek	W1	415.57	1	1	0	38
Shanty Creek	W2	162.959	0	0	0	20
Stump Ditch	W3	537.256	1	1	0	28
Talbert Ditch	W4	800.894	0	0	0	21
Prairie Creek	W5	3063.466	2	2	0	29
Kilmore Creek	W6	974.686	1	1	0	18
Spring Creek	W7	1060.445	1	1	0	10
Jenkins Ditch	W8	2114.59	2	2	0	30
Lauramie Creek	W9	657.386	2	2	0	29
Town of Dayton	W10	684.442	1	1	0	34
Town of Mulberr	W11	55.329	2	2	0	20

Urban Land Use Distribution (continued)

Watershed	Watershed	Multi-Family %	Single-Family %	Urban-Cultivated %	Vacant (developed) %	Open Space %	Total % Area
Swamp Creek	W1	1	38	3	9	9	100
Shanty Creek	W2	0	20	0	30	30	100
Stump Ditch	W3	1	29	0	20	20	100
Talbert Ditch	W4	0	23	0	28	28	100
Prairie Creek	W5	2	29	12	12	12	100
Kilmore Creek	W6	1	19	0	30	30	100
Spring Creek	W7	1	11	22	27	27	100
Jenkins Ditch	W8	2	30	16	9	9	100
Lauramie Creek	W9	2	29	30	3	3	100
Town of Dayton	W10	1	34	17	6	6	100
Town of Mulberry	W11	2	20	30	12	12	100

9. Input irrigation area (ac) and irrigation amount (in)						
Watershed	Watershed	Total Cropland (ac)	Cropland: Acres Irrigated	Water Depth (in) per Irrigation - Before BMP	Water Depth (in) per Irrigation - After BMP	Irrigation Frequency (#/Year)
Swamp Creek	W1	7300.638	0	0	0	0
Shanty Creek	W2	3065.595	0	0	0	0
Stump Ditch	W3	9544.838	0	0	0	0
Talbert Ditch	W4	11950.305	0	0	0	0
Prairie Creek	W5	13424.654	0	0	0	0
Kilmore Creek	W6	14244.195	0	0	0	0
Spring Creek	W7	7940.05	0	0	0	0
Jenkins Ditch	W8	18274.812	0	0	0	0
Lauramie Creek	W9	4452.984	0	0	0	0
Town of Dayton	W10	6921.975	0	0	0	0
Town of Mulberr	W11	271.823	0	0	0	0

Load Reduction Efficiencies for BMPs

Implementation Strategy	Estimated Pollutant Reduction				Notes
	Sediment/Solids	Phosphorus	Nitrogen	E.coli	
Conservation Tillage	30-70	20-40	10-15	-	Higher reductions come from continuous no-till systems. Costs highly dependent on equipment costs required. High end cost associated with organic corn.
Agricultural Waste Management	-	75	75	+	CBP Model; Cost of waste transfer systems highly dependent on system design
Conservation Cover & Buffers	58	52	54	+	PA BMP Manual, Reductions are based on per mile of installed practice
Cover Crops	15	32	43	-	PA BMP Manual, Reductions are based on per acre of installed practice
Streambank Stabilization	76	78	65	+**	PA BMP Manual; Reductions base on per mile of installed practice; Costs of bank stabilization highly dependent on severity of problem and techniques used
Nutrient Management	-	5	7	+*	Pollutant reductions from CBP Model and Past Cost-Share; Estimated costs do not include cost of equipment upgrades
Drainage Water Management	-	30	33	-	CBP Model (Water Control Structure)
Denitrifying Bioreactors	+	80	50	+	Minnesota Presentation
Septic System Upgrades	-	+	55	+	CBP Model (Septic Pumping)
Stormwater Infiltration	90	85	85	+	CBP Model; Costs from LID Center
Critical Area Stabilization	40	20	20	-	CBP Model (Loafing Lot Management)
Pasture Management	30	24	9	+	CBP Model
Conservation Planning	8-25	5-15	3-8	+	CBP Model; Load reductions vary based on resource concerns and land uses addressed by Conservation Plan
Water and Sediment Control Basins	60	20	20	-	CBP Model (Dry ED Basin)

+ Postive Removal of Pollutant

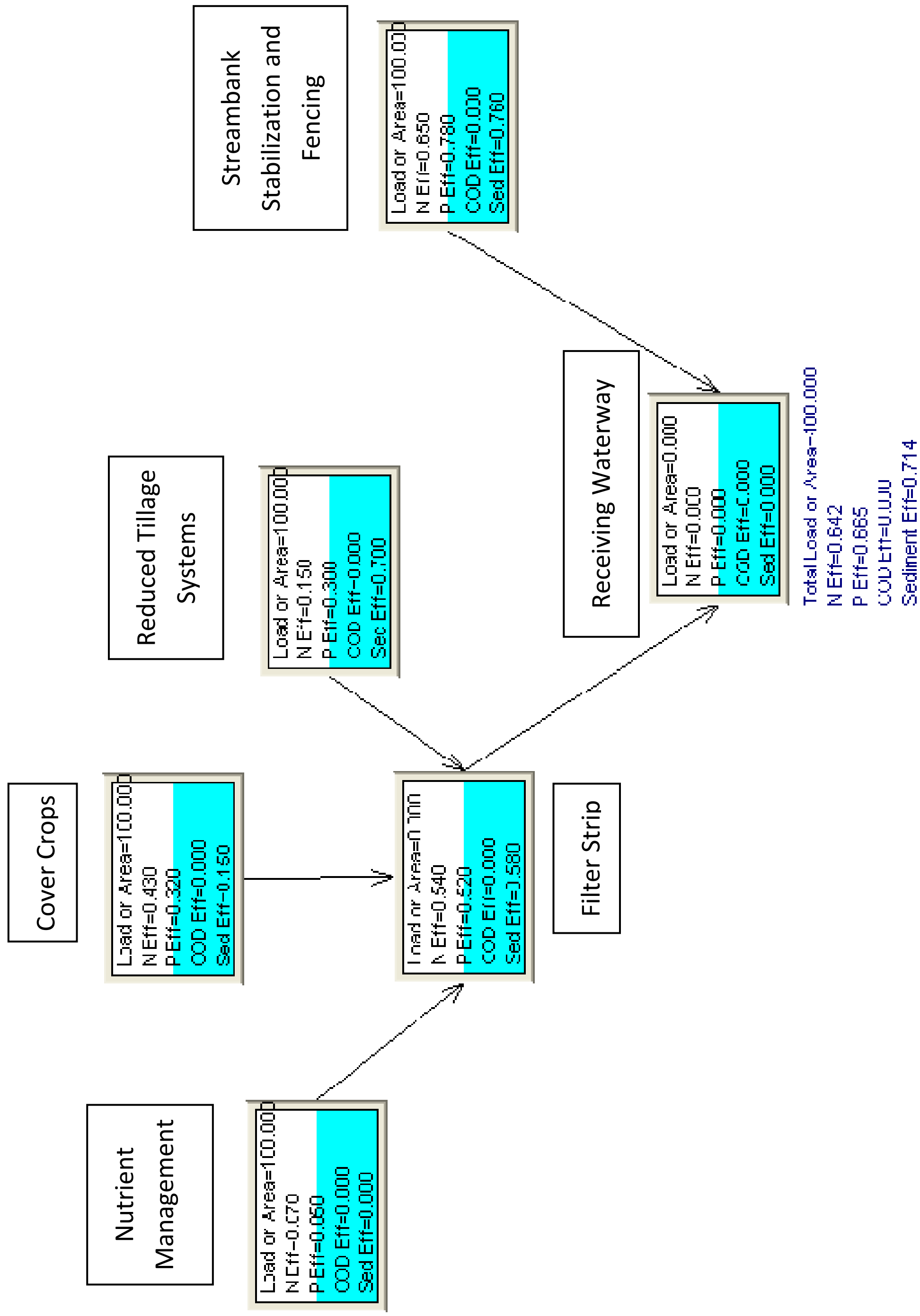
- Minimal Removal of Pollutant

*** When manure is used as nutrient source**

**** If excluding livestock**

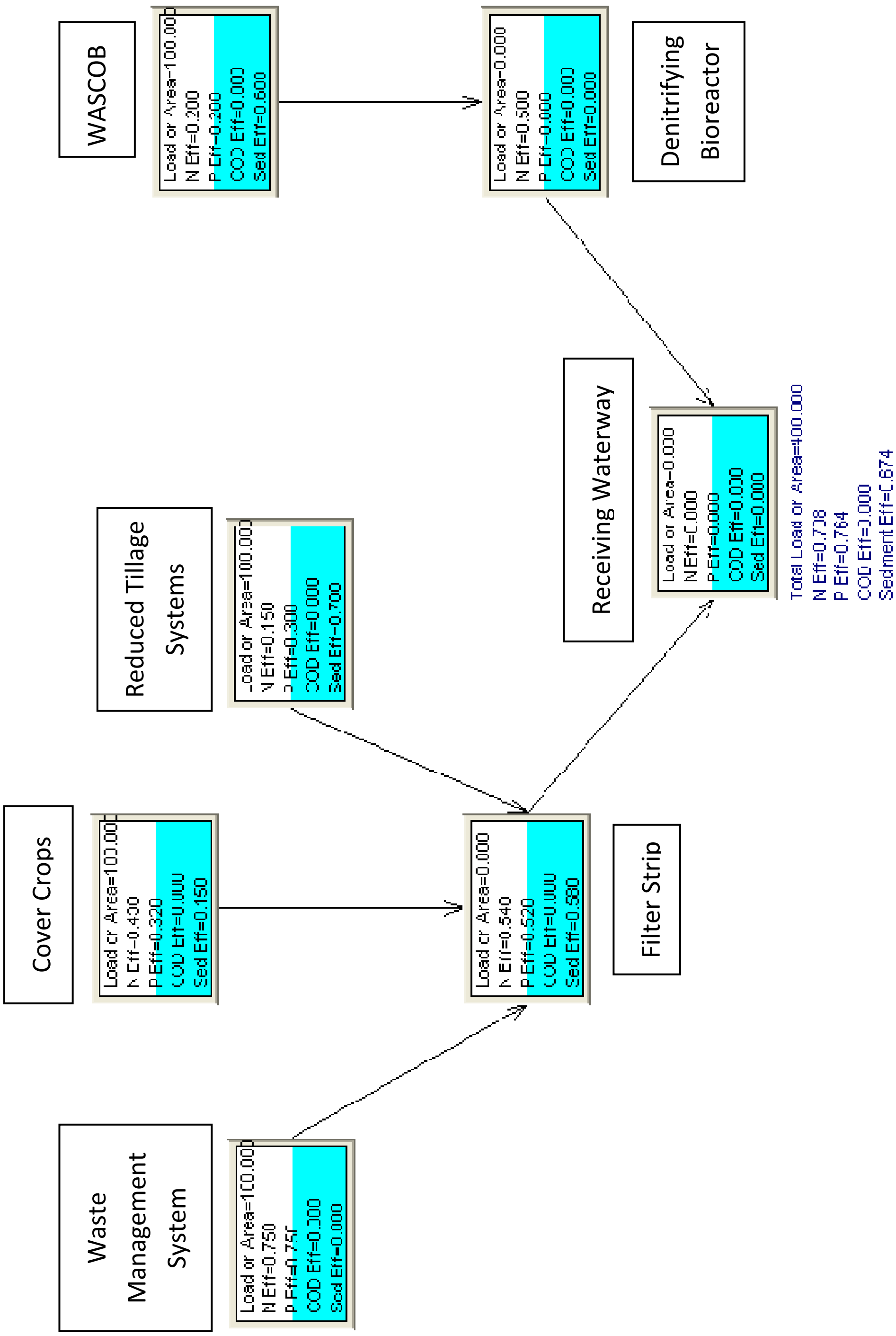
Modeled Conservation Scenarios

Crop 1_Drain 3 – Modeled in the Prairie Creek Subwatershed



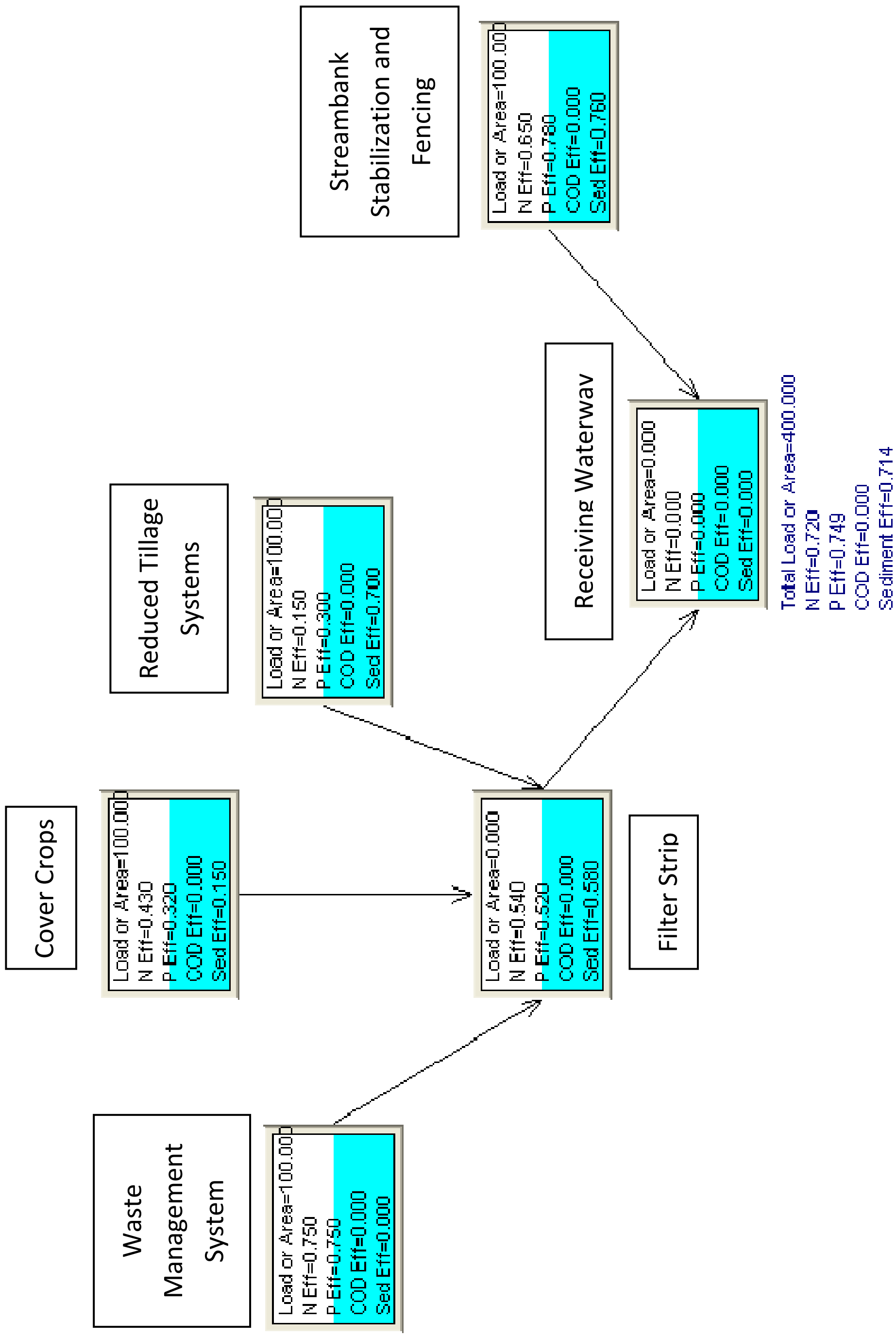
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Crop 2_Drain 2 – Modeled in the Kilmore Creek and Town of Mulberry Subwatersheds



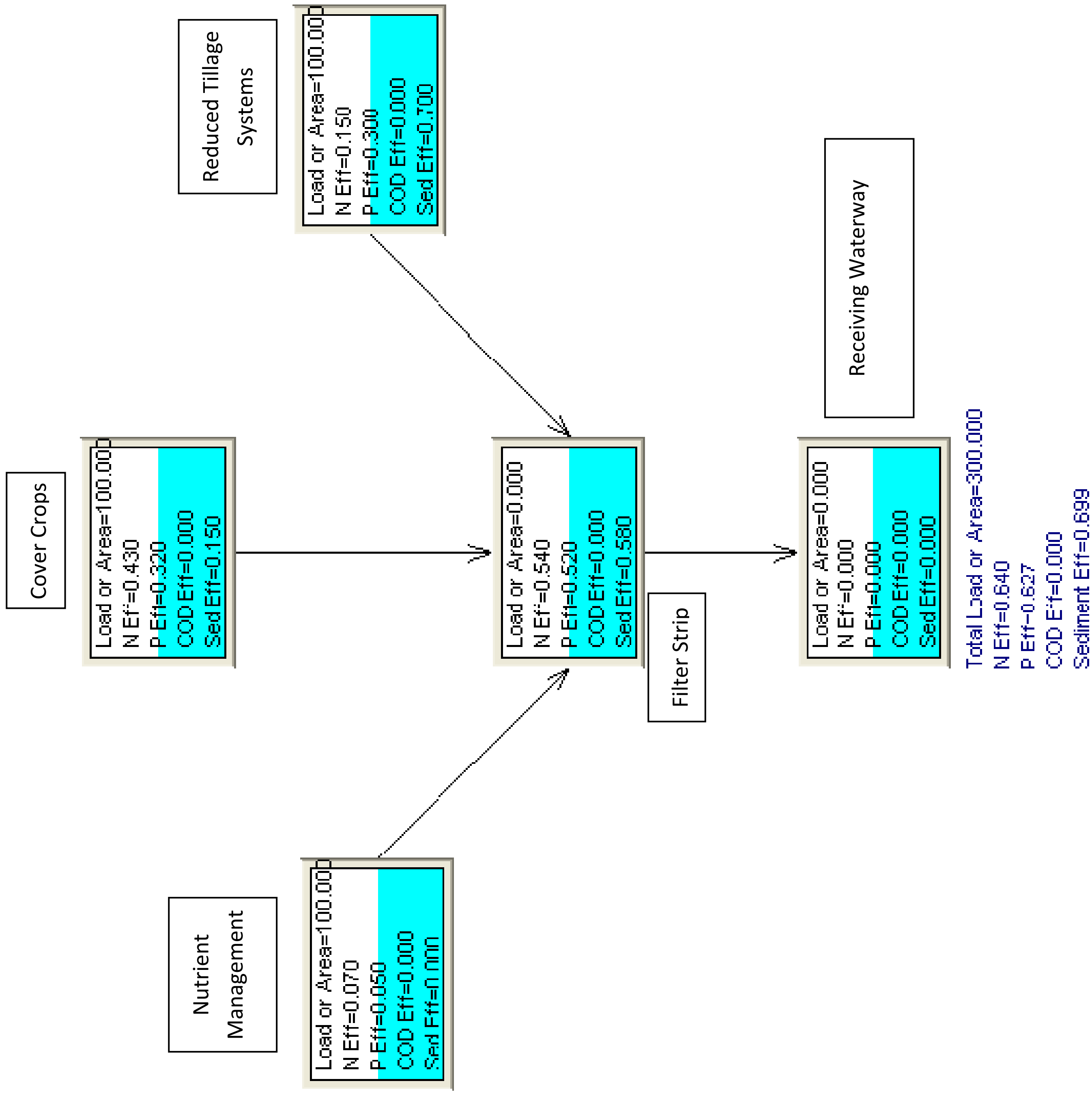
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Crop 2_Drain 3 – Modeled in the Talbert Ditch Subwatershed



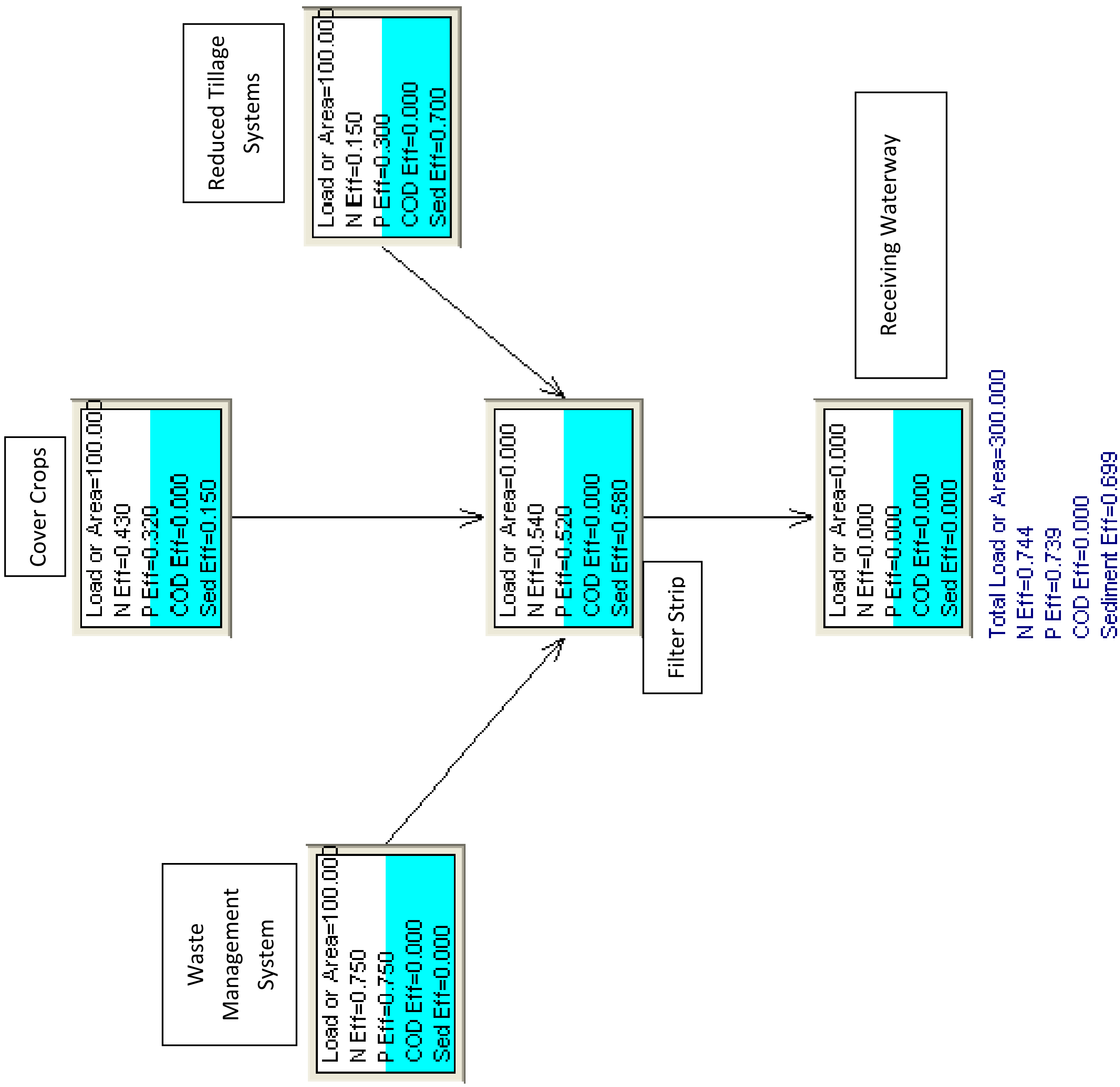
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Cropland 1 – Modeled in the Lauramie Creek and Town of Dayton Subwatersheds



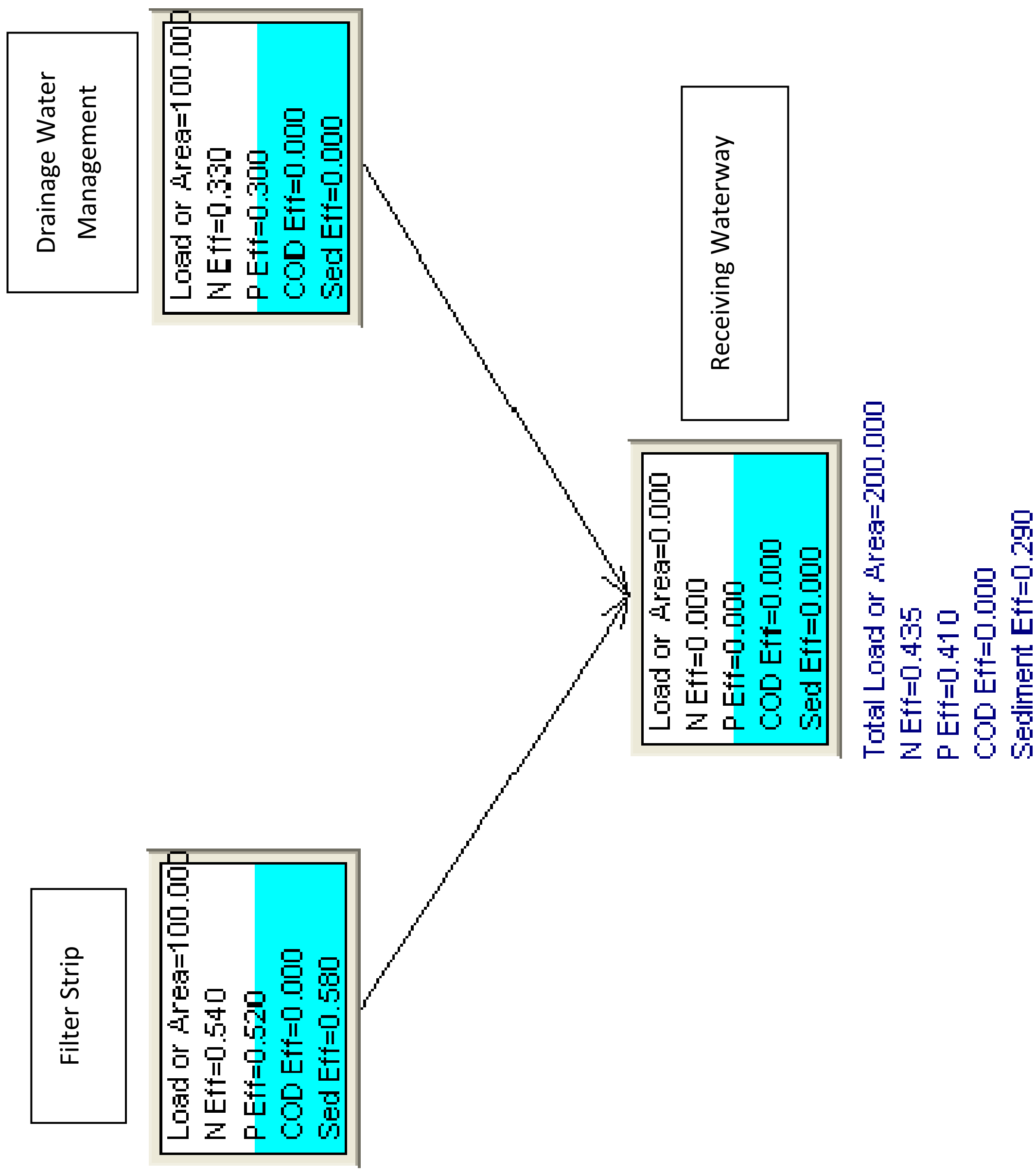
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Cropland 2 – Modeled in the Stump Ditch and Jenkins Ditch Subwatersheds



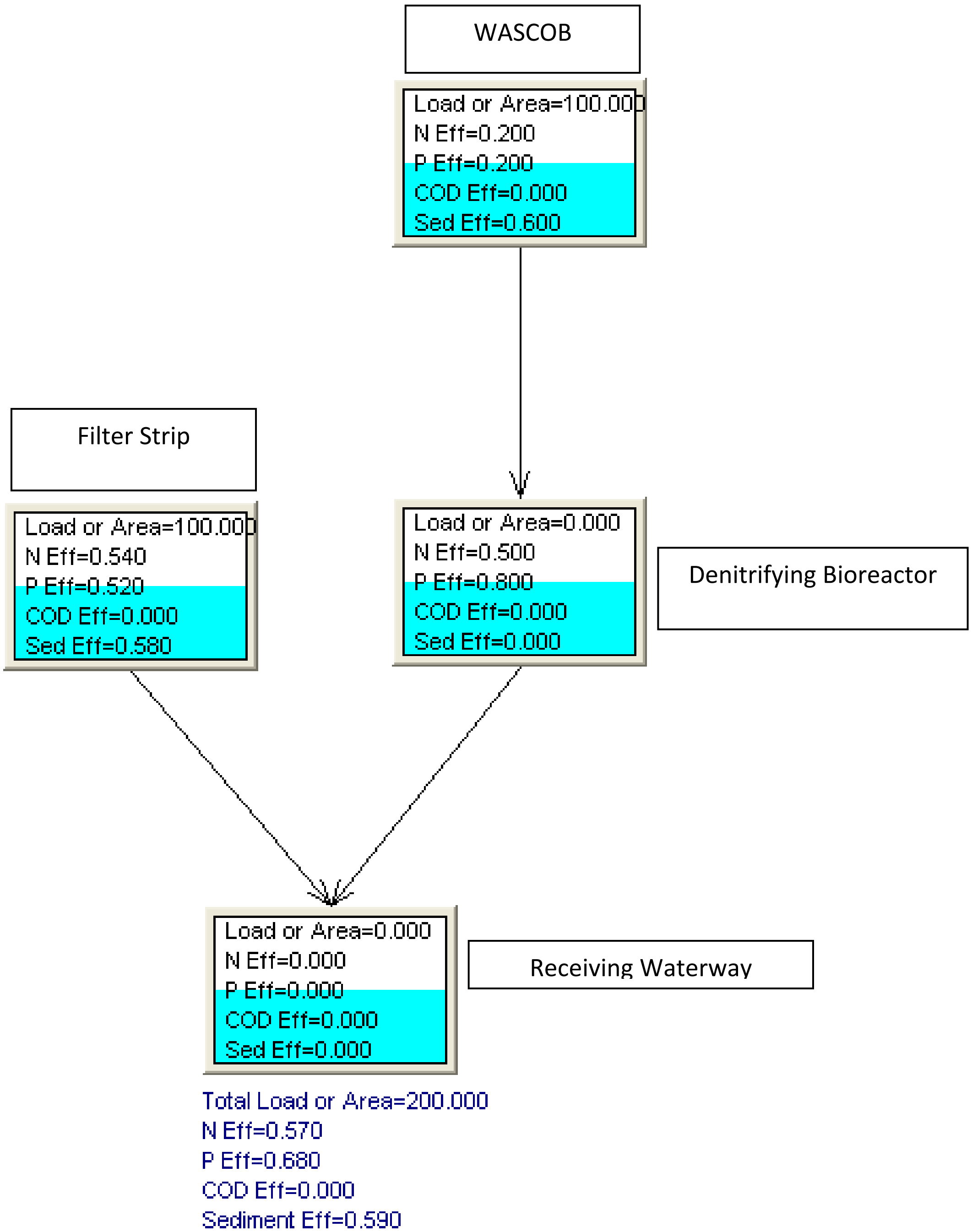
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Drainage 1 – Modeled in the Swamp Creek and Shanty Creek Subwatersheds



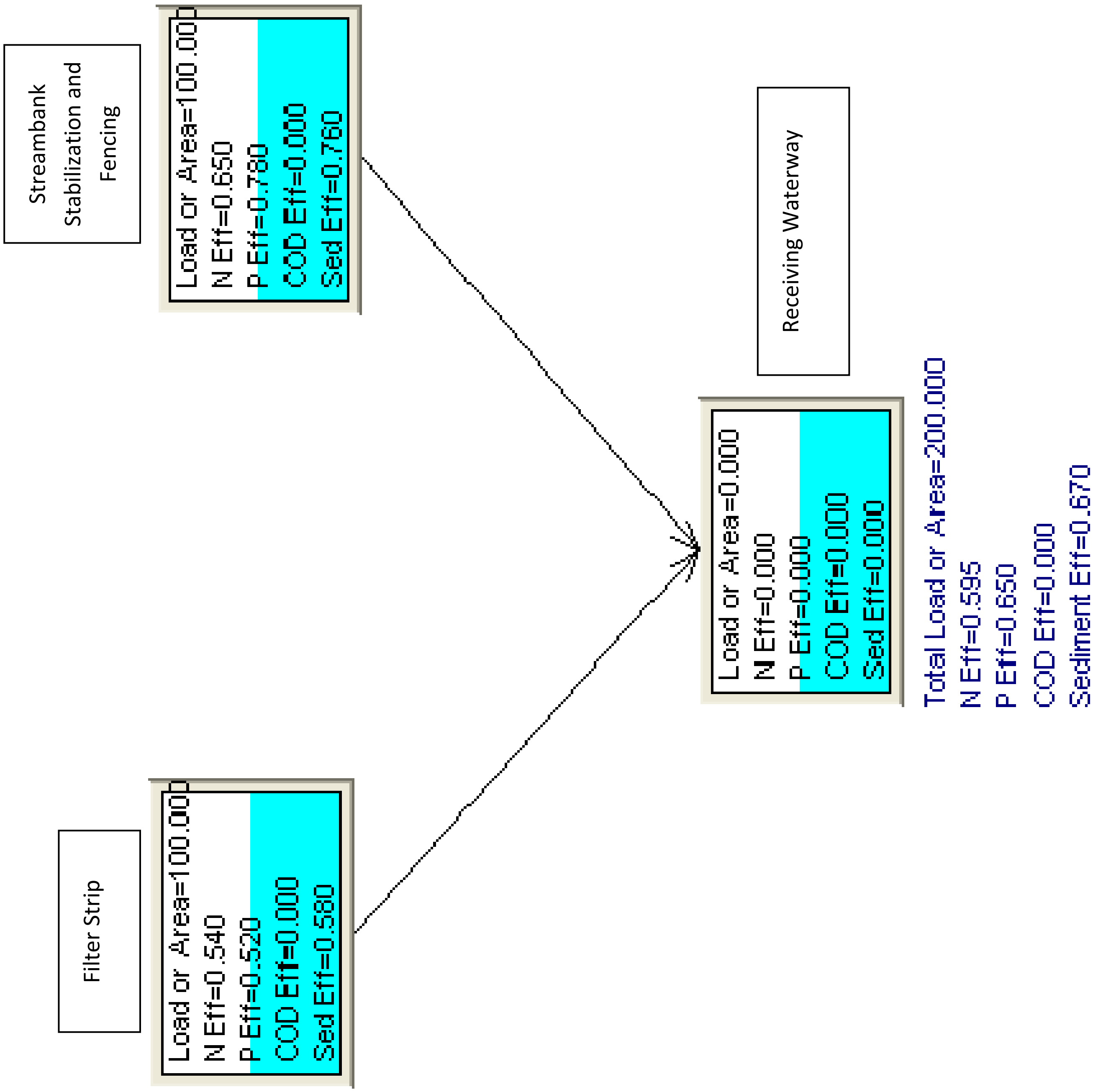
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Drainage 2 – Modeled in the Spring Creek Subwatershed



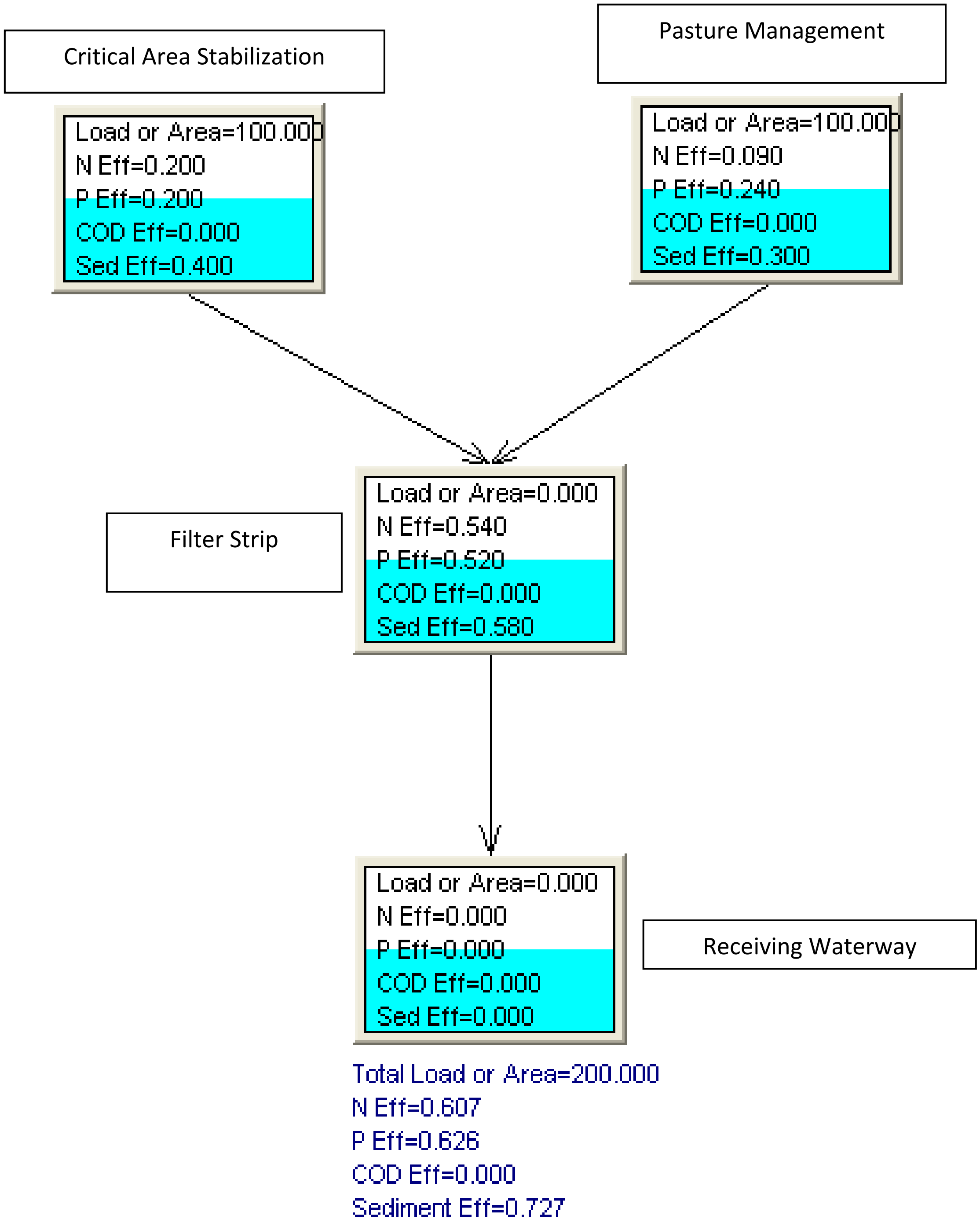
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Drainage 3 – Modeled with other RMS packages (Talbert Ditch and Prairie Creek Subwatersheds)



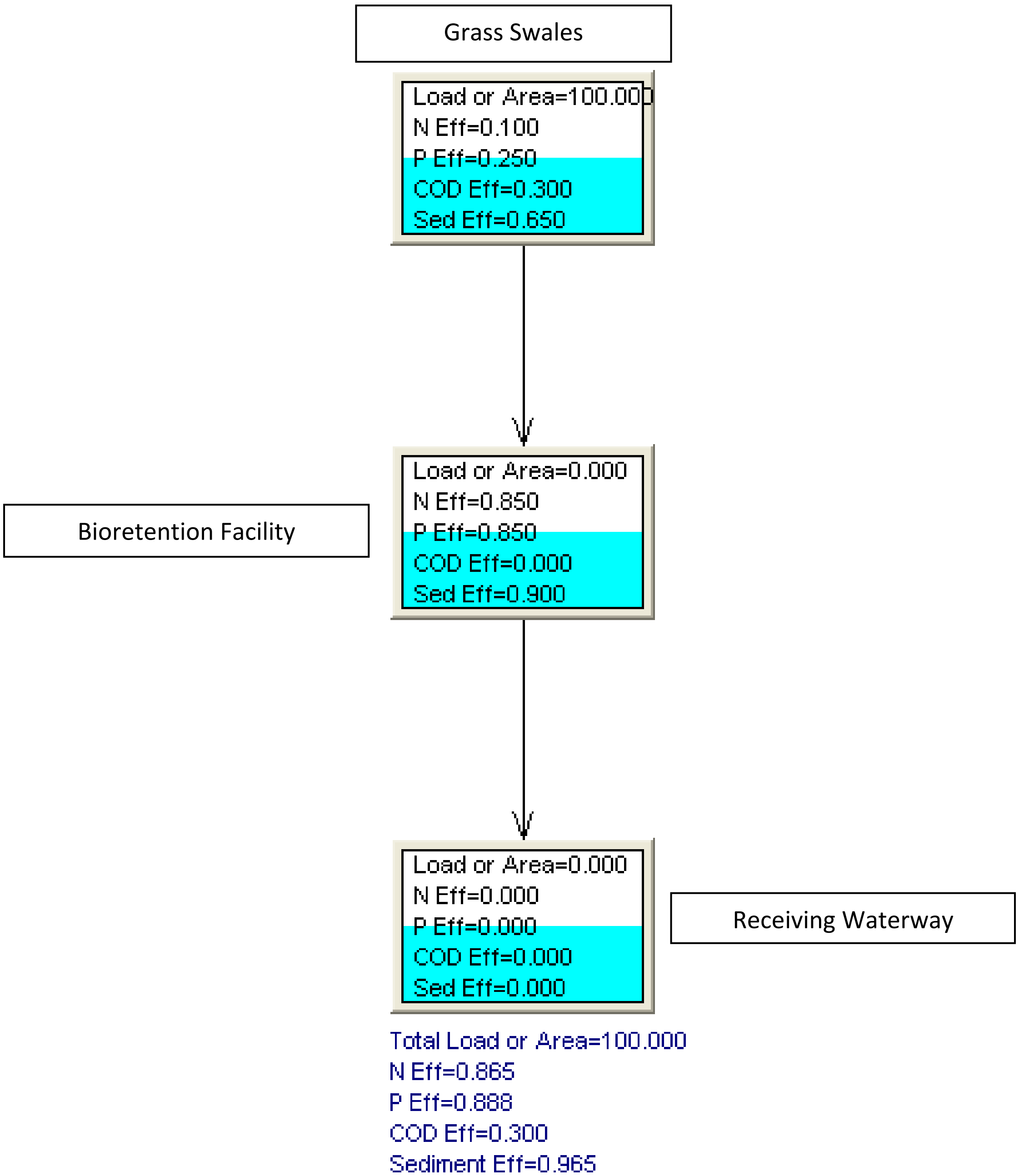
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Pasture 1 – Modeled in the Lauramie Creek Subwatershed



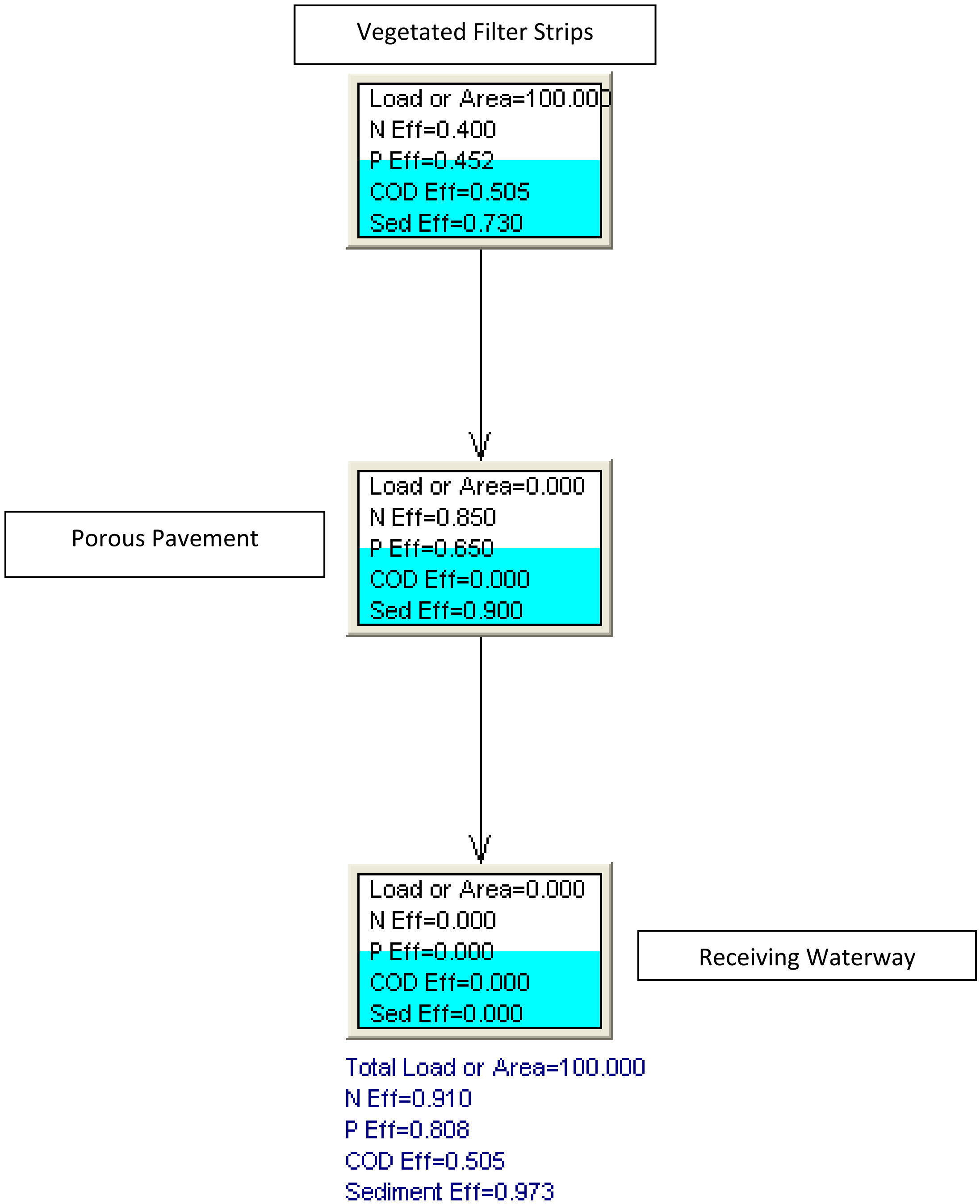
N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Urban 1 – Modeled in the Prairie Creek and Jenkins Ditch Subwatersheds



N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Urban 2 – Modeled in the Prairie Creek and Jenkins Ditch Subwatersheds



N Eff – Nitrogen Effect
P Eff – Phosphorus Effect
Sed Eff – Sediment Effect

Agricultural Waste Management

-working with animal waste materials in ways conducive to improvement of agricultural operations. Practices include:

Utilization
Transfer
Closure

Utilization involves using manure, wastewater, or other organic residues on land. Benefits include a decrease in water quality impacts, optimum nutrient levels for crops, forage, fiber production and forest products, improve or maintain soil structure, and an energy source.

Transfer is the practice of using various structures, conduits, and/or machinery to move waste from its origin to a storage/treatment facility, a loading area, and/or agricultural land for utilization practices.

Closure is the ending of use of a waste impoundment that is no longer used for its intended purpose. Doing this helps protect the quality of surface and groundwater, eliminate human and livestock safety hazards, and safeguard public health. Old structures can be made to hold fresh water or can be filled in or removed.

Estimated costs include:

\$46.50/acre (ac) for waste application
\$0.31/yd^3 for waste closure
\$9,519/ Comprehensive Nutrient Management Plan
\$53/ft^3 for waste transfer

Conservation Cover and Buffers

-using vegetation as a sediment and erosion control method in key areas. Practices include

Filter Strips
Grassed Waterways
Swales

Filters Strips are areas of herbaceous vegetation that remove contaminants from overland flow. Benefits include a reduction in suspended solids and decreases in dissolved contaminate loadings in runoff. This practice is most suitable to sensitive areas in need of sediment protection, and that have many suspended solids and dissolved contaminants in the runoff.

Grassed Waterways are drainage channels with suitable vegetation to carry surface water at non-erosive velocities to a stable outlet. Benefits include a conveyance of runoff, a reduction in gully erosion, and protection or improvements in water quality. This practice is suggested for areas in need of erosion control from concentrated runoff.

Swales are similar to Grassed Waterways, but are usually made with more than just grasses. Various bushes and trees are also implemented. Swale implementation is common in urban settings.

Estimated costs include:

$452/ac for seedings and plantings
$4,345/ac for installed waterways and swales

Conservation Tillage

-year-round surface soil residue management practices. Two practices are

Mulch Till
No Till/Strip Till

Mulch Till refers to the limiting of soil-disturbing activities used to grow crops where an entire field is tilled. Benefits of Mulch Till include a reduction in sheet, wind, and rill erosion, a decrease in soil particulate emissions, a management or improvement of soil conditions, an increase in moisture available to plants, and an increase in food and escape cover for wildlife.

No Till or Strip Till is similar, but is applicable to crops in narrow slots, tilled or residue-free strips in soil that was previously untilled by full-width inversion implements. All the benefits of Mulch Till practices can be found in No Till or Strip Till practices in addition to improving soil organic matter content and decreasing carbon dioxide soil losses. Implements not considered to be full-width or capable of full disturbance are used in these practices.

Estimated costs can range anywhere from $11 to $52 per acre.

Cover Crops

-planting of non-income crop for improved soil health and erosion control.

Various grasses, legumes, and forbs can be planted on any land in need of cover during non-growing seasons. Benefits of using cover crops include a reduction in soil erosion and compaction, an increase in soil organic matter content and biodiversity, the ability to capture and recycle or redistribute nutrients in the profile of the soil and more properly manage soil moisture, the promotion of biological nitrogen fixation, a decrease in energy use, and weed suppression. A few example crops that can be used are clovers, oats, rye, and radishes.

Estimated costs can range around $56 per acre.

Critical Area Stabilization

-protection of heavy use areas.

This practice involves stabilizing areas that are frequently and intensively used by people, animals, or vehicles. This is accomplished by establishing a vegetative cover, surfacing it with suitable mats, and/or installing needed structures. Benefits of area stabilization include a stable, non-eroding surface and protection and possible improvement of water quality. This practice is applicable to agricultural, urban, recreational, and other non-linear areas. Surface treatment materials can include various concrete applications, aggregates, sprays and mulches, and other various surfacing materials.

Estimated costs can range around $1.50 per square foot.

Denitrifying Bioreactors

-removing excess nitrogen using a carbon source within a structure.

This practice uses a special structure with a built-in source of carbon to reduce the nitrate content of subsurface and ground water. This practice helps improve overall water quality. It can be used for at least 10 years. It can be used separately from or in conjunction with a Nutrient Management Plan and/or a Drainage Water Management plan.

Estimated costs for this practice can be around $7,830 per structure.

Drainage Water Management

-managing water discharge from ground water and tile drainage systems.

This practice involves planning to allow for proper use and release of water. Benefits of this practice include a decrease in nutrient, pathogen, and/or pesticide loading from drainage systems, a decrease in oxidation of organic matter in soils, a reduction in wind erosion or particulate matter (dust) emissions, an increase in productivity, health, and vigor of plants, and to provide seasonal habitats for wildlife. This is applicable to lands with drainage systems that are adapted to allow management of drainage discharge. This practice is not for irrigation water of subsurface drainage supply. Control structures can be used as a part of this practice. Water control structures convey water, control the direction or rate of flow, maintain desired water surface elevation, or can measure water. They can control the stage, discharge, distribution, delivery, or direction of water flow.

Estimated costs for this practice can range from $24 per acre for annual labor costs and around $1,465 per control structure.

Media Filters

-filtering storm water using materials such as sand, mulch, or other organic materials.

This practice involves building structures (usually with 2 chambers) to help filter out solids and excess nutrients from storm water runoff. The initial chamber is for settling of larger sediment. The second chamber is the filter bed with the media filter. These structures are commonly found in urban areas, but can be used in almost any area in need of filtration. The most common material of sand can be used in combination with peat to help remove more metals from the water. Several modifications are available for various spatial and design applications. Aboveground and underground structures can be implemented.

Estimated costs can average around $5 per cubic foot of storm water to be treated.

Nutrient Management

-managing multiple aspects of nutrient concerns.

This practice involves managing the amount, source, placement, form and timing of nutrient applications, and soil amendments. The reasons to implement this practice include budgeting and supplying nutrients for plant production, properly utilizing commercial fertilizers, animal manures, and other materials as resources for plant nutrients and soil amendments, minimizing agricultural pollution of surface and groundwater resources, and to maintain or improve the physical, chemical, and biological condition of the soil.

Estimated costs for this practice can range from $13.25 per acre for adaptive nutrient management to around $2,128 dollars for a Nutrient Management Plan.

Pasture Management

-prescribed rotational grazing for livestock.

This practice involves strategically moving livestock across sections of a pasture (paddocks) at set intervals of time so that the vegetation of the pasture can be managed at growth rates best suited to each producer. Benefits of rotational grazing include a reduction in weeds and erosion, limiting soil compaction, lengthening the grazing season, improving the productivity of the animals, and improved nutrient distribution across the pasture.

Estimated costs for this practice can be around $28 per acre. Startup costs include those for fencing and water distribution.

Septic System Upgrades

-improving a septic system in various ways.

This practice involves improving or updating parts of a septic system. This could involve repairing or replacing tanks or drainage systems, or even adding a denitrification unit. Benefits of this practice include a decrease in nitrogen, phosphorus, bacteria, and algae, and an increase in oxygen in the water.

Costs can vary greatly depending on the upgrades implemented.

Stormwater Infiltration

-guiding precipitation to drain more naturally.

This practice is more applicable to urban settings since impervious covers can have negative impacts on natural environments. Many different things can be implemented, but some of the smaller-scale practices include permeable pavement, filter strips, rain gardens, and subsurface infiltration systems. These practices allow stormwater to drain in a proper manner by having it absorbed through the soil profile, transferring it through planned channels, or storing it for future usage.

Estimated costs can vary greatly depending on the type and extent of practices implemented.

Streambank Stabilization

-preventing erosion on the banks of waterways. Preventing erosion allows for waterways to be more stable, which in turn can lower land management costs. Practices include:

Exclusion Fencing
Bank/Channel Stabilization
Channel Reconstruction (2-stage ditch)

Exclusion fencing involves the installation of a fence between livestock and water bodies and waterways. Preventing them from entering these waters will help stop erosion from the livestock being on the banks, and will decrease the amount of bacteria in the waters from waste of the livestock.

Bank or channel stabilization involves using suitable structures on the bank of a waterway to help stop erosion. This will help control aggradation and degradation within the waterway. It can help prevent land loss. It can help maintain flow capacity within the channel, reduce the downstream effects of sediment, and improve or enhance the corridor for fish and wildlife habitat, aesthetics, and recreation.

Channel reconstruction, or a 2-stage ditch, is a practice commonly implemented on headwater streams in agricultural settings. It involves adding vegetated floodplain benches of at least twice the width of the channel to the waterway. Benefits of this practice include improving invertebrate community diversity, increasing the number of sensitive intolerant indicator species, diversifying the habitat (riffle-pool flow), decreasing nitrogen levels, bank sloughing, and maintenance activity, improving sediment removal and ditch bank stability, and increasing the capacity of the waterway.

Estimated costs can range from $1.50 per foot of fencing to $11.50 per foot of a 2-stage ditch.

Water and Sediment Control Basins

-constructions across the slope of a watercourse to control sediment and water flows.

Earth embankments or ridge and channel combinations can be constructed across the slope of minor watercourses to form sediment traps and water detention basins with stable outlets. Benefits of this practice include reducing the erosion in a watercourse or gully, a reduction in onsite and downstream runoff, and the trapping of sediment. These basins are most suitable for areas with irregular topography, where watercourse or gully erosion is a problem, where sheet and rill erosion is controlled by other conservation practices, where runoff and sediment damages land and works of improvement, and where adequate outlets can be provided.

Estimated costs can be around $2,884 per structure.

APPENDIX J. Action Register & Schedule

5-YEAR NUTRIENT GOAL. Reduce average annual Total Phosphorus and Nitrate-Nitrite concentrations by 13%

Objectives	Target Audience	Milestones	Estimated Costs	Potential Partners/Technical Assistance	Potential Funding Sources
Install 5 Bioreactors on Drained Cropland	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue University, ISDA, IDNR, IDEM, Soil and Water Conservation Districts, Greater Wabash River RC&D, County Surveyors	IDEM Non-Point Source Grants
		Install at least 1 demonstration area to showcase the practice by the end of 2013	$7,829 [2]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$280 [3]		
		Host an annual Ag Drainage Field Day (2013-2017)	$1,000		ISDA Clean Water Indiana Grants
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [4]		
		Annually implement at least 1 bioreactor within identified critical areas (2013-2017)	$7,829 [2]		Wallace Genetic Foundation
Plant 2,500 Acres of Cover Crops	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue University, ISDA, IDNR, IDEM, Soil and Water Conservation Districts, Greater Wabash River RC&D	IDEM Non-Point Source Grants
		Install plots of different cover crops and cover crop mixes by the end of 2013	$200 [5]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$280 [3]		ISDA Clean Water Indiana Grants
		Establish On-Farm Soil Health Demonstration Area (2014-2017)	$2,410 [6]		IDNR Lake and River Enhancement Program
		Encourage participation in the Clinton County On-Farm Network (Ongoing)	$1,000		Wallace Genetic Foundation
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [4]		Farm Aid Grants
		Annually implement at least 500 acres of cover crop (2013-2017)	$28,000 [2]		BMP Challenge
Complete Drainage Water Management Plans on 200 Acres of Drained Cropland	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue University, ISDA, IDNR, IDEM, Soil and Water Conservation Districts, Greater Wabash River RC&D, County Surveyors	IDEM Non-Point Source Grants
		Install at least 1 demonstration area to showcase the practice by the end of 2013	$2,420 [2]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$280 [3]		ISDA Clean Water Indiana Grants
		Host an annual Ag Drainage Field Day (2013-2017)	$1,000		County Surveyor Funds
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [4]		Wallace Genetic Foundation
		Annually implement at least 1 Drainage Water Management Plan within identified critical areas (2013-2017)	$2,420 [2]		Farm Aid Grants
Complete Nutrient Management Plans on 8,000 Acres of Cropland	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue University, ISDA, IDNR, IDEM, Soil and Water Conservation Districts, Greater Wabash River RC&D	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$280 [3]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Host Nutrient Management Planning/Precision Agriculture Workshop (2014, 2015, 2016)	$1,000		ISDA Clean Water Indiana Grants
		Establish On-Farm Soil Health Demonstration Area (2014-2017)	$2,410 [6]		IDNR Lake and River Enhancement Program
		Encourage participation in the Clinton County On-Farm Network (Ongoing)	$1,000		Indiana On-Farm Network
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [4]		Wallace Genetic Foundation
		Annually implement at least 1,600 acres of Nutrient Management Plans (2013-2017)	$21,200 [2]		BMP Challenge Farm Aid Grants
Increase awareness regarding nutrient runoff from developed areas	Residential Landowners & Local Government	Develop centralized website for distribution of technical fact sheets and online newsletter regarding Best Management Practices (2013)	$9,250 [7]	IDEM, Purdue Extension, Greater Wabash River RC&D, Soil & Water Conservation Districts, MS4 Communities	IDEM Non-Point Source Grants
		Showcase current water quality data being collected by partner groups in public on-line map (2013)	$750 [8]		IDNR Lake and River Enhancement Program
		Host Landscaping for Water Quality Workshop (2013-2017)	$1,000		EPA Urban Waters Grant
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [9]		EPA Environmental Education Grant
		Organize professional training for local lawn care providers (2013-2017)	$1,000		The Gannett Foundation
Complete 25 Conservation Plans for Urban/Residential Landowners	Residential Landowners & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	IDEM, Purdue Extension, Greater Wabash River RC&D, Soil & Water Conservation Districts, MS4 Communities	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [9]		EPA Urban Waters Grant
		Host Landscaping for Water Quality Workshop (2013-2017)	$1,000		RBC Blue Water Project Community Action Grants
		Annually develop at least 5 Conservation Plans for Urban/Residential Landowners	$1,440 [10]		The Gannett Foundation
Locate Funding Sources to Establish Septic System Upgrade and Maintenance Program	Residential Landowners & Local Government	Work with local partners to evaluate potential funding sources and develop program structure for Septic System Cost-Share Program (2013)	$3,700 [4]	Purdue Extension, County Health Departments, Greater Wabash River RC&D, USDA-Rural Development, Soil & Water Conservation Districts	Indiana State Revolving Loan Funds
		Submit proposals to potential funding organizations for Septic System Cost-Share Program (2014)	750 [8]		USDA Rural Development
		Begin implementing Septic System Cost-Share Program (2015-2017)	$9,250 [7]		North Central Health Services
Complete 2.5 Miles of Urban Stream Buffer	Residential Landowners & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	IDEM, Purdue Extension, Greater Wabash River RC&D, Soil & Water Conservation Districts, County Surveyors, MS4 Communities	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [9]		IDNR Lake and River Enhancement Program
		Host Landscaping for Water Quality Workshop (2013-2017)	$1,000		IDNR Community & Urban Forestry Grants
		Host Annual Native Plant Sale (2013-2017)	$1,000		EPA Urban Waters Grant
		Annually implement at least 0.5 mile of Urban Stream Buffers	$825 [2]		RBC Blue Water Project Community Action Grants
Install 25 Rain Gardens in Priority Urban Areas	Residential Landowners & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	IDEM, Purdue Extension, Greater Wabash River RC&D, Soil & Water Conservation Districts, County Surveyors, MS4 Communities	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [9]		EPA Urban Waters Grant
		Host Landscaping for Water Quality Workshop (2013-2017)	$1,000		Jimmy F. New Foundation
		Host Annual Native Plant Sale (2013-2017)	$1,000		RBC Blue Water Project Community Action Grants
		Annually implement at least 5 rain gardens	$18,750 [11]		The Gannett Foundation

1. Calculated as 50% of salary for Watershed Coordinator
2. Based on FY2012 NRCS Statewide Cost Estimates
3. Calculated as printing/postage for 200 color copies + labor
4. Calculated as 10% of annual salary for Watershed Coordinator
5. Calculated as $141 Cash Rent (1ac.) and $59 for seeding of cover crops
6. Calculated as $141 Cash Rent (10ac.) and $100/ac. For Farm Operation
7. Calculated as 25% of annual salary for Watershed Coordinator
8. Calculated as approximately one week of salary for Watershed Coordinator
9. Calculated as printing/postage for 1,000 color copies + labor
10. Calculated as 2 work days per plan
11. Calculated at $2.50/s.f., avg. 1500 s.f.

5-YEAR TOTAL SUSPENDED SOLIDS GOAL. Reduce average annual TSS concentrations by 13%

Objectives	Target Audience	Milestones	Estimated Costs	Potential Partners/Technical Assistance	Potential Funding Sources
Establish 5 Miles of Conservation Cover and Buffers Along Waterways	Agricultural Producers, Residential Landowners, & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDNR, IDEM, Greater Wabash River RC&D, Soil & Water Conservation Districts, County Surveyors, MS4 Communities	IDEM Non-Point Source Grants NRCS Farm Bill Conservation Programs and Special Initiatives
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [2]		ISDA Clean Water Indiana Grants IDNR Lake and River Enhancement Program
		Develop local Drainage Handbook and distribute to riparian landowners (2013-2017)	$3,700 [3]		Wallace Genetic Foundation
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		The Conservation Fund
		Annually complete at least 1 mile of conservation cover and buffers along waterways	$1,800 [4]		National Fish and Wildlife Foundation County Surveyor Drain Maintenance Funds
Increase conservation tillage by 3,750 Acres	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDNR, IDEM, Greater Wabash River RC&D, Soil & Water Conservation Districts	IDEM Non-Point Source Grants
		Host "Never Till" Farm Management Workshop (2013-2017)	$1,000		NRCS Farm Bill Conservation Programs and Special Initiatives
		Establish On-Farm Soil Health Demonstration Area (2014-2017)	$2,500 [5]		ISDA Clean Water Indiana Grants IDNR Lake and River Enhancement Program
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		Wallace Genetic Foundation Farm Aid Grants
		Annually implement at least 750 acres of conservation tillage	$19,470 [4]		BMP Challenge
Complete 5 Miles of Streambank Stabilization	Agricultural Producers, Residential Landowners, & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDNR, IDEM, Greater Wabash River RC&D, Soil & Water Conservation Districts, TNC	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [2]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Develop local Drainage Handbook and distribute to riparian landowners (2013-2017)	$3,700 [3]		ISDA Clean Water Indiana Grants IDNR Lake and River Enhancement Program
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		Wallace Genetic Foundation National Fish and Wildlife Foundation
		Annually complete at least 1 mile of streambank stabilization	$70,000 [6]		County Surveyor Drain Maintenance Funds
Increase Prescribed Grazing and Pasture Management by 500 Acres	Agricultural Producers, Residential Landowners	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDEM, Greater Wabash River RC&D, SWCDs	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [2]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Host Pasture Management Field Day (2013-2017)	$1,000		ISDA Clean Water Indiana Grants
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		IDNR Lake and River Enhancement Program Farm Aid Grants
		Annually complete at least 100 acres of prescribed grazing or pasture management	$3,000 [4]		Wallace Genetic Foundation
Install 10 Water and Sediment Control Basins	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDNR, IDEM, Greater Wabash River RC&D, Soil & Water Conservation Districts, County Surveyors	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$280 [7]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Host an annual Ag Drainage Field Day (2013-2017)	$1,000		ISDA Clean Water Indiana Grants
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		IDNR Lake and River Enhancement Program Wallace Genetic Foundation
		Annually install at least 2 WASCOB's	$6,000 [4]		County Surveyor Drain Maintenance Funds
Install 25 Rain Gardens in Priority Urban Areas	Residential Landowners & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	Purdue Extension, IDEM, Greater Wabash River RC&D, SWCDs, MS4 Communities	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [2]		EPA Urban Waters Grant
		Host Landscaping for Water Quality Workshop (2013-2017)	$1,000		Jimmy F. New Foundation
		Host Annual Native Plant Sale (2013-2017)	$1,000		RBC Blue Water Project Community Action Grants
		Annually implement at least 5 rain gardens	$18,750 [8]		The Gannett Foundation
Identify Opportunities for Stormwater Retrofits and Redevelopment in Developed Areas	Local Government	Work with local government officials to evaluate potential funding sources for developing stormwater retrofit and redevelopment plans (2013)	$3,700 [3]	IDEM, Greater Wabash River RC&D, SWCDs, MS4 Communities	Indiana State Revolving Loan Funds
		Develop and submit funding proposal for the development of a stormwater retrofit and redevelopment plan (2014)	$750 [9]		Indiana Pollution Prevention Grants
		Create publicly available mapping program to allow community members to prioritize sites for retrofitting/redevelopement (2014)	$750 [9]		Indiana Community Focus Funds
		Begin developing retrofit and redevelopment plan (2015-2017)	$9,250 [10]		Indiana Brownfields Grants & Loans
Complete 25 Conservation Plans for Urban/Residential Landowners	Residential Landowners & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	IDEM, Purdue Extension, Greater Wabash River RC&D, Soil & Water Conservation Districts, MS4 Communities	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [2]		EPA Urban Waters Grant
		Host Landscaping for Water Quality Workshop (2013-2017)	$1,000		RBC Blue Water Project Community Action Grants
		Annually develop at least 5 Conservation Plans for Urban/Residential Landowners	$1,440 [11]		The Gannett Foundation

1. Calculated as 50% of salary for Watershed Coordinator
2. Calculated as printing/postage for 1,000 color copies + labor
3. Calculated as 10% of annual salary for Watershed Coordinator
4. Based on FY2012 NRCS Statewide Cost Estimates
5. Calculated as $141 Cash Rent (10ac.) and $100/ac. For Farm Operation
6. Based on FY2012 NRCS Statewide Cost Estimate for 2-Stage Ditch Construction
7. Calculated as printing/postage for 200 color copies + labor
8. Calculated at $2.50/s.f., avg. 1500 s.f.
9. Calculated as approximately one week of salary for Watershed Coordinator
10. Calculated as 25% of annual salary for Watershed Coordinator
11. Calculated as 2 work days per plan

30-YEAR BACTERIA & PATHOGENS GOAL. Reduce Average Annual E.coli Concentration by 69%

Objectives	Target Audience	Milestones	Estimated Costs	Potential Partners/Technical Assistance	Potential Funding Sources
Install 5 Bioreactors on Drained Cropland	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue University, ISDA, IDNR, IDEM, Soil and Water Conservation Districts, Greater Wabash River RC&D, County Surveyors	IDEM Non-Point Source Grants
		Install at least 1 demonstration area to showcase the practice by the end of 2013	$10,000 [2]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$280 [3]		
		Host an annual Ag Drainage Field Day (2013-2017)	$1,000		ISDA Clean Water Indiana Grants
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [4]		
		Annually implement at least 1 bioreactor within identified critical areas	$10,000 [2]		Wallace Genetic Foundation
Locate funding sources to establish septic system upgrade and maintenance program	Residential Landowners & Local Government	Work with local partners to evaluate potential funding sources and develop program structure for Septic System Cost-Share Program (2013)	$3,700 [4]	Purdue Extension, County Health Departments, Greater Wabash River RC&D, USDA-Rural Development, Soil & Water Conservation Districts	Indiana State Revolving Loan Funds
		Submit proposals to potential funding organizations for Septic System Cost-Share Program (2014)	$750 [5]		USDA Rural Development
		Begin implementing Septic System Cost-Share Program (2015-2017)	$9,250 [6]		North Central Health Services
Complete Waste Management Activities on 3,750 Acres	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDNR, IDEM, Greater Wabash River RC&D, Soil & Water Conservation Districts	IDEM Non-Point Source Grants
		Evaluate the potential for a locally-based Manure Banking System to better distribute nutrients across the landscape (2014)	$9,250 [6]		NRCS Farm Bill Conservation Programs and Special Initiatives
					ISDA Clean Water Indiana Grants
		Host Manure Management Workshop (2013-2017)	$1,000		IDNR Lake and River Enhancement
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [4]		Wallace Genetic Foundation
		Annually complete waste management activities on at least 750 acres	$37,500 [2]		Farm Aid Grants
					BMP Challenge

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5. Calculated as approximately one week of salary for Watershed Coordinator
6. Calculated as 25% of annual salary for Watershed Coordinator

APPENDIX J. Action Register & Schedule

30-YEAR ENVIRONMENTAL QUALITY GOAL. Increase stakeholder awareness of the protection and management of natural floodplains and riparian areas. All waterways which are currently listed on the 303(d) Impaired Waters List will be restored to their aquatic life use designation

Objectives	Target Audience	Milestones	Estimated Costs	Potential Partners/Technical Assistance	Potential Funding Sources
Establish 5 Miles of Conservation Cover and Buffers Along Waterways	Agricultural Producers, Residential Landowners, & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDNR, IDEM, Greater Wabash River RC&D, Soil & Water Conservation Districts, County Surveyors, MS4 Communities	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [2]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Develop local Drainage Handbook and distribute to riparian landowners (2013-2017)	$3,700 [3]		ISDA Clean Water Indiana Grants IDNR Lake and River Enhancement Program
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		Wallace Genetic Foundation The Conservation Fund
		Annually complete at least 1 mile of conservation cover and buffers along waterways	$1,800 [4]		National Fish and Wildlife Foundation County Surveyor Drain Maintenance Funds
Complete 5 Miles of Streambank Stabilization	Agricultural Producers, Residential Landowners, & Local Government	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDNR, IDEM, Greater Wabash River RC&D, Soil & Water Conservation Districts, TNC	IDEM Non-Point Source Grants
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$760 [2]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Develop local Drainage Handbook and distribute to riparian landowners (2013-2017)	$3,700 [3]		ISDA Clean Water Indiana Grants IDNR Lake and River Enhancement Program
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		Wallace Genetic Foundation National Fish and Wildlife Foundation
		Annually complete at least 1 mile of streambank stabilization	$70,000 [5]		County Surveyor Drain Maintenance Funds
Increase conservation tillage by 3,750 Acres	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue Extension, ISDA, IDNR, IDEM, Greater Wabash River RC&D, Soil & Water Conservation Districts	IDEM Non-Point Source Grants
		Host "Never Till" Farm Management Workshop (2013-2017)	$1,000		NRCS Farm Bill Conservation Programs and Special Initiatives ISDA Clean Water Indiana Grants
		Establish On-Farm Soil Health Demonstration Area (2014-2017)	$2,410 [6]		IDNR Lake and River Enhancement Program
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		Wallace Genetic Foundation Farm Aid Grants
		Annually implement at least 750 acres of conservation tillage	$19,470 [4]		BMP Challenge
Complete Drainage Water Management Plans on 200 Acres of Drained Cropland	Agricultural Producers	Establish Cost-Share Program in 2013	$18,500 [1]	NRCS, Purdue University, ISDA, IDNR, IDEM, Soil and Water Conservation Districts, Greater Wabash River RC&D, County Surveyors	IDEM Non-Point Source Grants
		Install at least 1 demonstration area to showcase the practice by the end of 2013	$3,400 [4]		NRCS Farm Bill Conservation Programs and Special Initiatives
		Conduct targeted mailings of practice fact sheet and available assistance (2013-2017)	$280 [7]		ISDA Clean Water Indiana Grants
		Host an annual Ag Drainage Field Day (2013-2017)	$1,000		County Surveyor Funds
		Identify alternative funding strategies for installation of practice (Ongoing)	$3,700 [3]		Wallace Genetic Foundation
		Annually implement at least 1 Drainage Water Management Plan within identified critical areas	$3,400 [4]		Farm Aid Grants
Identify Opportunities for Stormwater Retrofits and Redevelopment in Developed Areas	Local Government	Work with local government officials to evaluate potential funding sources for developing stormwater retrofit and redevelopment plans (2013)	$3,700 [3]	IDEM, Greater Wabash River RC&D, SWCDs, MS4 Communities	Indiana State Revolving Loan Funds
		Develop and submit funding proposal for the development of a stormwater retrofit and redevelopment plan (2014)	$750 [8]		Indiana Pollution Prevention Grants
		Create publicly available mapping program to allow community members to prioritize sites for retrofitting/redevelopement (2014)	$750 [8]		Indiana Community Focus Funds
		Begin developing retrofit and redevelopment plan (2015-2017)	$9,250 [9]		Indiana Brownfields Grants & Loans
Create/Update Ordinances for Stormwater Management and Stream Protection	Local Government	Work with local government officials to evaluate timeline for ordinance updates and creation (2013)	$3,700 [3]	IDEM, IDNR, Purdue Extension, Greater Wabash River RC&D, SWCDs, MS4 Communities	IDEM Non-Point Source Grants
		Review various template ordinances for storm water management and stream protection (2013)	$750 [8]		ISDA Clean Water Indiana Grants
		Draft ordinances for storm water management and stream protection (2014-2015)	$1,500 [10]		IDNR Lake and River Enhancement Program
		Host public meetings to discuss storm water and stream protection ordiancnes (2014-2015)	$1,000		Indiana Pollution Prevention Grants Indiana Community Focus Funds
		Begin implementing new/updated storm water management and stream protection ordinances (2016-2017)	$3,700 [3]		CHS Foundation Wallace Genetic Foundation

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9. Calculated as 25% of annual salary for Watershed Coordinator
10. Calculated as 2-weeks salary for Watershed Coordinator