Office of Water Quality
Total Maximum Daily Load Program

DRAFT
Total Maximum Daily Load for *Escherichia coli* (*E. coli*) For the Lower Wildcat Creek Watershed, Carroll, Clinton, Howard, Tippecanoe, and Tipton Counties

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Total Maximum Daily Load (TMDL) for *Escherichia coli* (*E. coli*) in Lower Wildcat Creek watershed, Carroll, Clinton, Howard, Tippecanoe, and Tipton Counties, Indiana

Introduction

Section 303(d) of the Federal Clean Water Act and the United States Environmental Protection Agency's (USEPA's) Water Quality Planning and Management Regulations (Title 40 of the Code of Federal Regulations (CFR), Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for waterbodies that are not meeting Water Quality Standards (WQS). TMDLs provide states a basis for determining the pollutant reductions necessary from both point and nonpoint sources to restore and maintain the quality of their water resources. The purpose of this TMDL is to identify the sources and determine the allowable levels of *E. coli* bacteria that will result in the attainment of the applicable WQS in the Lower Wildcat Creek watershed in Carroll, Clinton, Howard, Tippecanoe, and Tipton Counties in Indiana.

Background

In 1998, several mainstem segments of the Wildcat Creek were listed as impaired for *E. coli.* In 2002, West Honey Creek was listed on Indiana's 303(d) list as impaired for *E. coli*. Kelly West Ditch Unnamed Tributary was listed on Indiana's 303(d) list in 2004 for *E. coli.* All other streams in this TMDL were listed on Indiana's 2006 303(d) list for *E. coli* (Attachment A). Based on an intensive survey of the watershed in 2003 by IDEM, a reassessment of water quality condition was warranted. This reassessment was completed in January 2006, for the Lower Wildcat Creek Watershed. The reassessment for the *E. coli* impairment resulted in the addition of the following segments in the Lower Wildcat Creek Watershed to the 2006 303(d) List (Table 1). All other impaired segments were unaffected by this reassessment. (Figure 1, Table 1).

Recently IDEM began using the high resolution National Hydrography Dataset (NHD) created by USGS. Previously IDEM could only view streams at medium resolution (1:100,000 scale). The high resolution streams are at the 1:24,000 scale, which allows for a more detailed view of the watershed. These high resolution waters have always been present; however, they have not been visible in electronic maps until now. A reassessment of the Lower Wildcat Creek watershed was completed with regard to both medium and high resolution streams in this watershed.

This TMDL will address approximately two hundred forty (240) stream miles of the Lower Wildcat Creek watershed in Carroll, Clinton, Howard, Tippecanoe, and Tipton Counties where recreational uses are impaired by elevated levels of *E. coli* during the recreational season. The Lower Wildcat Creek is part of the larger Wildcat Creek watershed, 05120107 (Figure 1). The Lower Wildcat Creek watershed is in Central Indiana and extends from Kokomo, Indiana to Lafayette, Indiana (Figure 2). The forty (40) impaired assessment units (Table 1) for this TMDL are located in the Wildcat Creek Basin in hydrologic unit code 05120107 (Figure 3). The description of the study area, its topography, and other particulars are as follows:

Table 1: Impaired Assessment Units in the Lower Wildcat Creek Watershed

AUNAME_2010	Assessment Unit ID	Impairment	Miles
WILDCAT CREEK, LITTLE, EAST FORK	INB0741_03	*E. coli*	8.43
WILDCAT CREEK, LITTLE, WEST FORK	INB0741_04	*E. coli*	9.37
KELLY DITCH	INB0741_T1006	*E. coli*	2.04
WILDCAT CREEK, LITTLE	INB0742_04	*E. coli*	8.86
CLAW CREEK	INB0742_T1004	*E. coli*	2.49
REED DITCH	INB0742_T1005	*E. coli*	1.84
VOGUS DITCH	INB0742_T1006	*E. coli*	9.99
WILDCAT CREEK	INB0743_04	*E. coli*	13.32
SHAMBAUGH RUN	INB0743_T1006	*E. coli*	1.00
KITTY RUN	INB0743_T1007	*E. coli*	2.20
EDWARDS DITCH	INB0743_T1008	*E. coli*	3.16
HALIHAN DITCH	INB0743_T1010	*E. coli*	3.94
WILDCAT CREEK	INB0745_04	*E. coli*	19.20
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0745_T1008	*E. coli*	1.46
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0745_T1009	*E. coli*	1.10
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0745_T1012	*E. coli*	3.07
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0745_T1013	*E. coli*	4.72
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0745_T1014	*E. coli*	2.26
WILDCAT CREEK	INB0746_03	*E. coli*	3.31
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0746_03A	*E. coli*	0.36
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0746_03B	*E. coli*	0.79
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0746_03C	*E. coli*	0.48
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0746_03D	*E. coli*	0.83
PETES RUN	INB0746_T1005	*E. coli*	13.08
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0746_T1006	*E. coli*	1.99
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0746_T1007	*E. coli*	1.51
WILDCAT CREEK - UNNAMED TRIBUTARIES (BURLINGTON, IN)	INB0746_T1008	*E. coli*	2.03
WILDCAT CREEK	INB0747_01	*E. coli*	24.61
HURRICANE CREEK	INB0747_T1004	*E. coli*	3.44
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0747_T1005	*E. coli*	3.42
WILDCAT CREEK	INB0748_01	*E. coli*	13.89
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0748_01A	*E. coli*	0.61
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0748_T1001	*E. coli*	1.99
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0748_T1002	*E. coli*	3.76
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0748_T1003	*E. coli*	6.86
WILDCAT CREEK - UNNAMED TRIBUTARY	INB0748_T1004	*E. coli*	1.38
WILDCAT CREEK	INB0749_01	*E. coli*	36.01
WILDCAT CREEK	INB0749_02	*E. coli*	5.26

WILDCAT CREEK	INB0749_03	*E. coli*	7.85
DRY RUN	INB0749_T1006	*E. coli*	8.30

IDEM conducted an intensive survey of thirty-seven (37) sites in the Lower Wildcat Creek watershed in 2003. Sites 1 through 12 were sampled September 9, 2003 through October 15, 2003. Sites 13 through 37 were sampled September 11, 2003 through October 16, 2003 (Figure 4; Attachment A). All sites were sampled for the 2003 Wildcat Creek Watershed Project. All sites were sampled five (5) times, evenly spaced over a thirty (30) day period. Site 29, did not have data collected two of the five times needed to calculate a geometric mean; therefore, no geometric mean could be calculated. One hundred (100%) percent of the sites sampled violate the geometric mean of 125 MPN (Most Probable Number)/100 mL. The single sample maximum of 235 MPN/ 100 mL is violated 77 % of the time.

Historic data collected by IDEM's Assessment Branch in 1993, 1994, 1998, and 2002 indicate high levels of *E. coli* in the Lower Wildcat Creek watershed. Violations ranged from 250 CFU/100 mL (CFU = Colony Forming Units) to 190000 CFU/100 mL. Fixed station sampling in 2005 indicates elevated levels of *E. coli* ranging from 440 MPN/100 mL to 770 MPN/100 mL, indicating that high levels of *E. coli* still exist in the Lower Wildcat Creek (Figure 4; Attachment B).

Volunteers for Hoosier Riverwatch sampled for *E. coli* in the Lower Wildcat Creek watershed from 2001 through 2006 (Attachment C). These samples were collected using the Coliscan Easygel Method. Four (4) of the fifteen (15) Hoosier Riverwatch samples were collected outside of the recreational season (April 1 to October 31). The eleven (11) samples taken within the recreational season (April 1 to October 31) ranged from 40 colonies/100 mL to 700 colonies/100 mL.

The TMDL development schedule corresponds with IDEM's basin-rotation water quality monitoring schedule. To take advantage of all available resources for TMDL development, impaired waters are scheduled according to the basin-rotation schedule unless there is a significant reason to deviate from this schedule. Waterbodies could be scheduled based on the following:

1) Waterbodies may be given a high or low priority for TMDL development depending on the specific designated uses that are not being met, or in relation to the magnitude of the impairment.

2) TMDL development of waterbodies where other interested parties, such as local watershed groups, are working on alleviating the water quality problem may be delayed to give these other actions time to have a positive impact on the waterbody. If water quality standards still are not met, then the TMDL process will be initiated.

3) TMDLs that are required due to water quality violations relating to pollutant parameters where no EPA guidance is available, may be delayed to give EPA time to develop guidance.

This TMDL was scheduled based on the data available from the basin-rotation schedule, which represents the most accurate and current information available on water quality within waterbodies covered by this TMDL.

Numeric Targets

The impaired designated use for the waterbodies in the Lower Wildcat Creek watershed is for total body contact recreational use during the recreational season, April 1 through October 31.

327 IAC 2-1-6(d) establishes the total body contact recreational use *E. coli* Water Quality Standard (WQS[1]) for all waters in the non-Great Lakes system as follows:

(3) For full body contact recreational uses, E. coli bacteria shall not exceed the following:
(A) One hundred twenty-five (125) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period.
(B) Two hundred thirty-five (235) per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period, except that in cases where there are at least ten (10) samples at a given site, up to ten percent (10%) of the samples may exceed two hundred thirty-five (235) cfu or MPN per one hundred (100) milliliters where the:
(i) E. coli exceedances are incidental and attributable solely to E. coli resulting from the discharge of treated wastewater from a wastewater treatment plant as defined at IC 13-11-2-258; and
(ii) criterion in clause (A) is met.
However, a single sample shall be used for making beach notification and closure decisions.
If a geometric mean cannot be calculated because five (5) equally spaced samples are not available, then the criterion stated in clause (B) must be met.

The sanitary wastewater *E. coli* effluent limits from point sources in the non-Great Lakes system during the recreational season, April 1st through October 31st, are also covered under 327 IAC 2-1-6(d).

For the Lower Wildcat Creek watershed during the recreational season (April 1 through October 31) the target level is set at the *E. coli* WQS of 125 per one hundred milliliters as a 30-day geometric mean based on not less than five samples equally spaced over a thirty day period.

Source Assessment

Watershed Characterization

Water in the Lower Wildcat Creek flows East to West from Kokomo, Indiana to Lafayette, Indiana. The Lower Wildcat Creek watershed flows through five (5) Counties. The majority of the watershed is located in Howard County (46.95%); 27.81% of the watershed is in Carroll County; 14.80% of the watershed is in Tippecanoe County; 8.52% of the watershed is in Tipton County; and 1.93% of the watershed is in Clinton County (Figure 4).

Landuse information was assembled in 1992 using the Gap Analysis Program (GAP). In 1992, approximately 88.60% of the landuse in the Lower Wildcat Creek watershed was Agriculture. The remaining landuse for the Lower Wildcat Creek watershed consisted of approximately 4.53% Wetland, 4.12% Forest, 2.53% Urban, and 0.23% Water (Figure 5). In the 1970's, 88.78% of the landuse was Agriculture, 5.57% was Urban, 5.50% was Forest, and 0.15% was Water. Recent site visits report that this watershed is still primarily agricultural.

Wildlife is a known source of *E. coli* impairments in waterbodies. Many animals spend time in or around waterbodies. Deer, geese, ducks, raccoons, turkeys, and other animals all create potential

[1] *E. coli* WQS = 125 cfu/100ml or 235 cfu/100ml; 1 cfu (colony forming units)= 1 mpn (most probable number)

sources of *E. coli*. Wildlife contributes to the potential impact of contaminated runoff from animal habitats, such as urban park areas, forest, and cropland.

Failing septic tanks are known sources of *E. coli* impairment in waterbodies. There are four unsewered communities in the Lower Wildcat Creek watershed, Cutler, Pyrmont, Oswasco, and West Middleton (Figure 6). Conversations with staff from the Carroll, Clinton, Howard, Tippecanoe, and Tipton County Health Departments indicate that septic system failure does occur. The Carroll County Health Department estimates that there are about 4000 households on septic systems. There is no septic system failure rate estimation available at this time; however, an average of 15 septic repairs take place per year. Repairs include the installation of a septic system connecting to a previously illicitly discharging system. These types of repairs are brought to the attention of the Carroll County Health Department when an older property is sold (Jones, Personal Communication, 2007). The Clinton County Health Department estimates that there are about 4700 households on septic systems. It is estimated that 45% are non-permitted systems. A majority of the non-permitted systems are illicitly discharging and contributing to the *E. coli* and nutrient impairments in the watershed. Clinton County is working with the Indiana Rural Community Assistance Program to help mitigate the problem along with seeking alternative solutions on their own (Yeary, Personal Communication, 2007). The Howard County Health Department has no specific information concerning the number of homes on septic systems or the failure rate of septic systems; however, a septic system permitting system is in place (Vest, Personal Communication, 2007). The Tippecanoe County Health Department estimates that there are about 12000 households on septic systems and there is a 3-5% failure rate for permitted systems. An estimated 125 septic repairs take place per year. Repairs include connecting a septic system to a previously illicitly discharging structure. An estimated 200 new septic installations are built each year at new dwellings (Noles, Personal Communication, 2007). The Tipton County Health Department indicated that septic system failure does occur, but no tangible septic failure rate has been established by the Tipton County Health Department at this time (Pike, Personal Communication, 2007).

National Pollutant Discharge Elimination System (NPDES) Permitted Dischargers

There are seventeen (17) NPDES permitted facilities in the Lower Wildcat Creek watershed (Figure 7, Table 2). Eleven (11) of the total seventeen (17) permitted discharges have *E. coli* limits in their permits.

- Russiaville Municipal STP, Western Elementary and High School, Billy Bob Mobile Home Park, and Devon Woods Utilities, INC had *E. coli* violations within the past 5 years, but no violations were noted during the sampling period.
- Four Mile Hill STP, Prairie Utilities, INC, and Devon Woods Utilities, INC had *E. coli* limits added to their permits in 2005.
- Hershey Elementary School, Green Acres Golf Course and Subdivision, and Village Green Mobile Home Park had *E. coli* limits added in 2006.
- Russiaville Municipal STP had an agreed order for *E. coli* violations in 1999. The agreed order case has been closed and no violations were reported during the sampling period.
- Burlington Municipal STP had no violations reported in the past 5 years.

One (1) of the seventeen (17) NPDES permitted facilities, New London C.D., has total residual chlorine limits in the permit. This discharger does have possible sanitary components in their discharge. Previously, facilities with design flows under 1 MGD (typically minor municipals and semipublics) were not required to have *E. coli* effluent limits or conduct monitoring for *E. coli*

bacteria, provided they maintained specific total residual chlorine levels in the chlorine contact tank. The assumption was that as long as chlorine levels were adequate in the chlorine contact tank, the *E. coli* bacteria would be deactivated and compliance with the *E. coli* WQS would be met by default. The original basis for allowing chlorine contact tank requirements to replace bacteria limits was based on fecal coliform, not *E. coli*. No direct correlation between the total residual chlorine levels and *E. coli* bacteria can be conclusively drawn. Further, it has been shown that exceedances of *E. coli* bacteria limits may still occur when the chlorine contact tank requirements are met.

Due to the complications of comparing total residual chlorine to *E. coli*, it is difficult to determine to what extent, if any, this one discharger could be a source of *E. coli* in the Lower Wildcat Creek watershed.

The remaining five (5) of seventeen (17) dischargers including Speedway #7675, Speedway 5163, Martin Marietta Kokomo Stone, Martin Marietta Kokomo Sand, and Linton Oil Company do not have *E. coli* or total residual chlorine limits in their permits. None of these five (5) dischargers have a sanitary component to their discharge; therefore, *E. coli* limits do not apply to their permits. These permitted dischargers are not contributing to the sources of *E. coli* in the Lower Wildcat Creek watershed.

Storm Water General Permit Rule 13

There is one (1) municipal separate storm sewer systems (MS4) community, Kokomo (INR04104), in the Lower Wildcat Creek watershed. Guidelines for MS4 permits and timelines are outlined in Indiana's Municipal Separate Storm Sewer System (MS4) Rule 13 (327 IAC 15-13-10 and 327 IAC 15-13-11). It is difficult to determine if these MS4 communities are a significant source of *E. coli* in the Lower Wildcat Creek watershed.

Combined Sewer Overflows (CSO)

There is one (1) CSO community in the Lower Wildcat Creek watershed, Kokomo (IN0032875). There are three (3) outfalls located on the Wildcat Creek. The Long Term Control Plan (LTCP) was submitted to IDEM February 1, 2003. The target for the final LTCP to be completed was September 28, 2007 and is enforceable by a State Judicial Agreement. CSO outfalls are considered a source of *E.coli* to the Lower Wildcat Creek (Figure 8).

Concentrated Animal Feeding Operations

The removal and disposal of the manure, litter, or processed wastewater that is generated as the result of confined feeding operations falls under the regulations for confined feeding operations (CFOs) and concentrated animal feeding operations (CAFOs). The CFO and CAFO regulations (327 IAC 16, 327 IAC 15) require that operations "not cause or contribute to an impairment of surface waters of the state". IDEM regulates these confined feeding operations under IC 13-18-10, the Confined Feeding Control Law. The rules at 327 IAC 16, which implement the statute regulating confined feeding operations, were effective on March 10, 2002. The rule at 327 IAC 15-15, which regulates concentrated animal feeding operations and complies with most federal CAFO regulations, became effective on March 24, 2004, with two exceptions. 327 IAC 15-15-11 and 327 IAC 15-15-12 became effective on December 28, 2006. Point Source rules can be found at 327 IAC 5-4-3 (effective 12/28/06) and 327 IAC 5-4-3.1 (effective 3/24/04). The difference between the two feeding operation is that Concentrated Animal Feeding operations fall under

Federal regulation and Confined feeding operations fall under State regulations. Due to this difference CAFO loads fall under WLA and CFO loads fall under LA.

Due to size, some confined feeding operations are defined as CAFOs. For purposes of discussion, it is important to remember that all CAFOs are confined feeding operations. The CAFO regulation, however, contains more stringent operational requirements and slightly different application requirements. Of the thirty-one (31) CFOs in the Lower Wildcat Creek, two (2) are CAFOs: Etherington (1906) and Wise (3673).

Confined Feeding Operations

The animals raised in confined feeding operations produce manure that is stored in pits, lagoons, tanks and other storage devices. The manure is then applied to area fields as fertilizer. When stored and applied properly, this beneficial re-use of manure provides a natural source for crop nutrition. It also lessens the need for fuel and other natural resources that are used in the production of fertilizer. Confined feeding operations, however, can also pose environmental concerns, including the following:

- Manure can leak or spill from storage pits, lagoons, tanks, etc.
- Improper application of manure can contaminate surface or ground water.
- Manure overapplication can adversely impact soil productivity.

The locations of confined feeding operations in the Lower Wildcat Creek watershed are shown in Figure 9. There are thirty-one (31) CFOs in the Lower Wildcat Creek Watershed (Table 3). No information was available to estimate loads associated with each individual operation in the watershed; therefore loads for CFOs fall under LA. One CFO in this watershed, Ritchey farms (log number 3576), had an agreed order in 2004.

There are many smaller livestock operations in the watershed. These operations, due to their small size, are not regulated under the CFO or CAFO regulations. These operations may still have an impact on the water quality and the *E. coli* impairment. No specific information on these small livestock operations is currently available for the Lower Wildcat Creek watershed however; it is believed that these small livestock operations may be a source of the *E. coli* impairment.

Outstanding State Resource Water

Outstanding State Resource Waters (OSRW) are waters "that have unique or special ecological, recreational, or aesthetic significance" (IC 13-11-2-149.6). The OSRW designation on Wildcat Creek runs from river mile 4.82 to river mile 43.11 (327 IAC 2-1-2). OSRW waters "shall be maintained and protected in their present high quality without degradation" (327 IAC 2-1.5-4(c)).

Linkage Analysis and *E. coli* Load Duration Curves

The linkage between the *E. coli* concentrations in the Lower Wildcat Creek watershed and the potential sources provides the basis for the development of this TMDL. The linkage is defined as the cause and effect relationship between the selected indicators and the sources. Analysis of this relationship allows for estimating the total assimilative capacity of the stream and any needed load reductions. Analysis of the data for the Lower Wildcat Creek watershed indicates that a significant amount of the *E. coli* load enters the Lower Wildcat Creek watershed through both wet (nonpoint) and dry (point) weather sources.

To investigate further the potential sources mentioned above, an *E. coli* load duration curve analysis, as outlined in an unpublished paper by Cleland (2002), was developed for each sampling site in the Lower Wildcat Creek watershed. The load duration curve analysis is a relatively new method utilized in TMDL development. The method considers how stream flow conditions relate to a variety of pollutant loadings and their sources (point and nonpoint).

In order to develop a load duration curve, continuous flow data is required. The USGS gage for the Wildcat Creek near Lafayette, Indiana (0335000) located at the downstream end of the Lower Wildcat Creek watershed was used for the development of the *E. coli* load duration curve analysis for the Lower Wildcat Creek watershed TMDL. USGS gage 0335000 is located on the Wildcat Creek in Tippecanoe County.

The flow data is used to create flow duration curves, which display the cumulative frequency of distribution of the daily flow for the period of record. The flow duration curve relates flow values measured at the monitoring station to the percent of time that those values are met or exceeded. Flows are ranked from extremely low flows, which are exceeded nearly 100 percent of the time, to extremely high flows, which are rarely exceeded. Flow duration curves are then transformed into load duration curves by multiplying the flow values along the curve by applicable water quality criteria values for *E. coli* and appropriate conversion factors. The load duration curves are conceptually similar to the flow duration curves in that the x-axis represents the flow recurrence interval and the y-axis represents the allowable load of the water quality parameter. The curve representing the allowable load of *E. coli* was calculated using the daily and geometric mean standards of 235 *E. coli* per 100 ml and 125 *E. coli* per 100 ml, respectively. The final step in the development of a load duration curve is to add the water quality pollutant data to the curves. Pollutant loads are estimated from the data as the product of the pollutant concentrations, instantaneous flows measured at the time of sample collection, and appropriate conversion factors. In order to identify the plotting position of each calculated load, the recurrence interval of each instantaneous flow measurement was defined. Water quality pollutant monitoring data are plotted on the same graph as the load duration curve that provides a graphical display of the water quality conditions in the waterbody. The pollutant monitoring data points that are above the target line exceed the water quality standards (WQS); those that fall below the target line meet the WQS (Mississippi DEQ, 2002).

Load duration curves were created for all the sampling sites in the Lower Wildcat Creek watershed. However, sampling sites 3, 9, 17, 21, and 30 provide the best description of the sources of *E. coli* to the Lower Wildcat Creek watershed and will be discussed in this TMDL (Figure 4, Attachment D). Site 3 (WAW020-0009) is located on the Little Wildcat Creek at State Road 26. Site 9 (WAW020-0020) is located on Wildcat Creek at County Road 750 West. Site 17 (WAW020-0032) is located on Wildcat Creek at County Road 1150 West. Site 21 (WAW020-0036) is located on Wildcat Creek at County Road 500 East. Site 30 (WAW020-0099) is located on Wildcat Creek at County Road 900 West. These sampling sites were intensively sampled for *E. coli* September through October 2003. The data indicate that the largest exceedances of the *E. coli* WQS are prevalent during wet weather events (noted by diamonds above the curve on the far left side of the figure in Attachment D). Dry weather contributions are also a source of *E. coli* to the Lower Wildcat Creek watershed (noted by the diamonds above the curve on right side of the figure in Attachment D). However, the dry weather contributions are less influential in this watershed as indicated by the diamonds on the right side of the graph being near or under the WQS target line.

To further investigate sources of pollution, *E. coli* counts in Most Probable Number (MPN)/100 mL have been plotted on precipitation graphs (Attachment D). Elevated levels of *E. coli* during and soon after rain events indicate *E. coli* contribution due to runoff. The precipitation data was collected by a weather station in Patton, IN located in northwest Carroll County and managed by the Indiana State Climate Office at Purdue University.

Site 3 (WAW020-0009) is located on the Little Wildcat Creek at State Road 26. This site receives both urban and agricultural inputs and is in southern Howard County. The geometric mean at this site is 1349.67 MPN/100 mL. All samples collected during the 2003 intensive sampling were above the single standard maximum of 235 MPN/100 mL. The lowest sample collected was 770.1 MPN/100 mL. The two highest samples collected were 2420 MPN/100 mL. The two highest samples were collected during rain events of 0.64 inches and 0.23 inches, indicating that *E. coli* contributions come from nearby runoff; though point sources are likely contributing due to the high exceedance of the WQS even during dry conditions.

Site 9 (WAW020-0020) is located on Wildcat Creek at County Road 750 West. This area is primarily agricultural with a few rural homes and is located in southwestern Howard County. The stream in this area has a riparian buffer. The geometric mean at this site is 521.14 MPN/100 mL. Of the samples collected during the 2003 intensive sampling, two samples at this site were below the single sample maximum of 235 MPN/100 mL. These samples occurred during drier periods indicating a lesser degree of input from point sources in this area. The highest exceedance at this site is 2420 MPN/100 mL, which occurred during a rain event if 0.64 inches indicating that *E. coli* contributions are from nearby runoff.

Site 17 (WAW020-0032) is located on Wildcat Creek at County Road 1150 West. This area is primarily agricultural with a few rural homes and is located in western Howard County. There is a thick riparian buffer on the north side of the stream and a thin riparian buffer on the south side of the stream. The geometric mean at this site is 744.68 MPN/100 mL. All of the samples collected during the 2003 intensive sampling at this site were above the single sample maximum of 235 MPN/100 mL. The smallest exceedance of the single sample maximum is 325.5 MPN/100 mL. The highest exceedance of the single sample maximum is 2420 MPN/100 mL, which occurred during a rain event of 0.64 inches indicates that *E. coli* contributions are coming from nearby runoff.

Site 21 (WAW020-0036) is located on Wildcat Creek at County Road 500 East. This area is primarily agricultural with a few rural homes and is located in eastern Carroll County. There is a thin riparian buffer along the stream. The geometric mean at this site is 641.58 MPN/100 mL. All samples collected during the 2003 intensive sampling at this site violated the single sample maximum of 235 MPN/100 mL. The smallest exceedance is 325.5 MPN/100 mL. The greatest exceedance of the single sample maximum at this site is 2420 MPN/100 mL. This exceedance occurred during a rain event indicating that *E. coli* contributions are coming from nearby runoff. Violations still occur during drier periods indicating that point sources are contributing to the *E. coli* impairment at this site.

Site 30 (WAW-020-0099) is located on Wildcat Creek at County Road 900 West. This area is primarily agricultural and is located on the Tippecanoe/Carroll County line. There is a thin riparian buffer along the stream. The geometric mean at this site is 389.56 MPN/100 mL. Of the samples collected during the 2003 intensive sampling, two of the samples did not violate the single sample maximum of 235 MPN/100 mL. The highest violations of the single sample maximum were 2420 MPN/100 mL, which occurred on two separate days, both days experienced rain events of 0.64 inches and 0.23 inches respectively, indicating that *E. coli* contributions are

coming from nearby nonpoint source runoff. Two of the three samples that occurred during drier conditions did not violate the single sample maximum.

While there are point source contributions, compliance with the numeric *E. coli* WQS in the Lower Wildcat Creek watershed most critically depends on controlling nonpoint sources using best management practices (BMPs). If the *E. coli* inputs can be controlled, then total body contact recreational use in Lower Wildcat Creek watershed will be protected.

TMDL Development

The TMDL represents the maximum loading that can be assimilated by the waterbody while still achieving the Waters Quality Standard (WQS). As indicated in the Numeric Targets section of this document, the target for this *E. coli* TMDL is 125 per one hundred milliliters as a geometric mean based on not less than five samples equally spaced over a thirty-day period from April 1 through October 31. Concurrent with the selection of a numeric concentration endpoint, TMDL development also defines the critical conditions that will be used when defining allowable levels. Many TMDLs are designed as the set of environmental conditions that, when addressed by appropriate controls, will ensure attainment of WQS for the pollutant. For example, the critical conditions for the control of point sources in Indiana are given in 327 IAC 5-2-11.1(b). In general, the 7-day average low flow in 10 years (Q7, 10) for a stream is used as the design condition for point source dischargers. However, *E. coli* sources to Lower Wildcat Creek watershed arise from a mixture of dry and wet weather-driven conditions, and there is no single critical condition that would achieve the *E. coli* WQS. For the Lower Wildcat Creek watershed and the contributing sources, there are a number of different allowable loads that will ensure compliance, as long as they are distributed properly throughout the watershed.

For most pollutants, TMDLs are expressed on a mass loading basis (e.g. pounds per day). For *E. coli* indicators, however, mass is not an appropriate measure because *E. coli* is expressed in terms of organism counts (or resulting concentration) (USEPA, 2001). The geometric mean *E. coli* WQS allows for the best characterization of the watershed. Therefore, this *E. coli* TMDL is concentration-based consistent with 327 IAC 5-2-11.1(b) and 40 CFR, Section 130.2 (i) and the TMDL is equal to the geometric mean *E. coli* WQS for each month of the recreational season (April 1 through October 31).

Allocations

TMDLs are comprised of the sum of individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include a Margin of Safety (MOS), either implicitly or explicitly, that accounts for uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. Conceptually, this definition is denoted by the equation:

$$TMDL = \sum WLAs + \sum LAs + MOS$$

The term TMDL represents the maximum loading that can be assimilated by the receiving water while still achieving WQS. The overall loading capacity is subsequently allocated into the TMDL components of WLAs for point sources, LAs for nonpoint sources, and the MOS. This *E. coli* TMDL is concentration-based consistent with USEPA regulations at 40 CFR, Section 130.2(i).

<u>Wasteload Allocations</u>

As previously mentioned, there are seventeen (17) permitted dischargers in the Lower Wildcat Creek watershed. Twelve (12) of the seventeen (17) permitted dischargers have a sanitary component to their discharge. Eleven (11) of these twelve (12) permitted dischargers with a sanitary component already have *E. coli* limits in their permits. New London C.D., the remaining one (1) of these twelve (12) permitted dischargers with a sanitary component has total residual chlorine limits in the permit. IDEM's TMDL program recommends the addition of *E. coli* limits to this permit during the next permit renewal.

The remaining five (5) of seventeen (17) permits in this watershed do not have a sanitary component to their discharge; therefore *E. coli* limits do not apply to their permits.

There is one (1) MS4 community, Kokomo (INR040104), in the Lower Wildcat Creek watershed. A permit has been issued for this MS4 community. The LTCP was submitted February 1, 2003 and the target for the final LTCP to be completed was September 28, 2007 and is enforceable by a State Judicial Agreement.

There is one (1) CSO community in the Lower Wildcat Creek Watershed, Kokomo (IN0032875). The Long Term Control Plan (LTCP) for Kokomo was submitted to IDEM February 1, 2003. A community with a CSO that believes it is not possible to meet existing water quality based requirements may develop information that supports a use attainability analysis. Such information may be included in the CSO LTCP. The use attainability analysis may result in the revision of designated uses and associated criteria if the applicable requirements of state and federal law, including 40 CFR 131.10 are met. However, states may remove a designated use that is not an existing use. Additionally, any existing use, even if not a designated use, must be protected. Furthermore, downstream water quality standards must be maintained and protected. The Kokomo LTCP was submitted to IDEM February 1, 2003. The target for the final LTCP to be completed was September 28, 2007 and is enforceable by a State Judicial Agreement.

In the event that designated uses and associated water quality criteria applicable to the Lower Wildcat Creek are revised in accordance with applicable requirements of state and federal law, this TMDL may be revised to be consistent with such revisions.

The WLA is set at the WQS of 125 per one hundred milliliters as a geometric mean based on not less than five samples equally spaced over a thirty-day period from April 1 through October 31.

Load Allocations

The LA for nonpoint sources is equal to the WQS of 125 per one hundred milliliters as a geometric mean based on not less than five samples equally spaced over a thirty-day period from April 1 through October 31. The LA will use the geometric mean of each sampling location to determine the reduction necessary to comply with WQS at each site (Attachment E & F).

Load allocations may be affected by subsequent work in the watershed. Currently there are three watershed projects in this area. It is anticipated that watershed projects will be useful in continuing to define and address the nonpoint sources of the *E. coli* in the Wildcat Creek watershed.

Margin of Safety

A Margin of Safety (MOS) was incorporated into this TMDL analysis. The MOS accounts for any uncertainty or lack of knowledge concerning the relationship between pollutant loading and water quality. The MOS can be either implicit (i.e., incorporated into TMDL analysis thorough conservative assumptions) or explicit (i.e., expressed in the TMDL as a portion of the loadings). This TMDL uses an implicit MOS by applying a couple of conservative assumptions. First, no rate of decay for *E. coli* was applied. *E. coli* bacteria have a limited capability of surviving outside of their hosts and therefore, a rate of decay normally would be applied. However, applying a rate of decay could result in a discharge limit that would be greater than the *E. coli* WQS, thus no rate of decay was applied. Second, the *E. coli* WQS was applied to all flow conditions. This adds to the MOS for this TMDL. IDEM determined that applying the *E. coli* WQS of 125 per one hundred milliliters to all flow conditions and with no rate of decay for *E. coli* is a more conservative approach that provides for greater protection of the water quality.

Seasonality

Seasonality in the TMDL is addressed by expressing the TMDL in terms of the *E. coli* WQS for total body contact during the recreational season (April 1 through October 31) as defined by 327 IAC 2-1-6(d). There is no applicable total body contact *E. coli* WQS during the remainder of the year in Indiana. Because this is a concentration-based TMDL, *E. coli* WQS will be met regardless of flow conditions in the applicable season.

Monitoring

Future *E. coli* monitoring of the Lower Wildcat Creek watershed will take place during IDEM's five-year rotating basin schedule and/or once TMDL implementation methods are in place. Monitoring will be adjusted as needed to assist in continued source identification and elimination. IDEM will monitor at an appropriate frequency to determine whether Indiana's 30-day geometric mean value of 125 *E. coli* per one hundred milliliters is being met. When results indicate that the waterbody is meeting the *E. coli* WQS, the waterbody will then be removed from the 303(d) list.

Reasonable Assurance Activities

Reasonable assurance activities are programs that are in place or will be in place to assist in meeting the Lower Wildcat Creek watershed TMDL allocations and the *E. coli* Water Quality Standard (WQS).

<u>National Pollutant Discharge Elimination System (NPDES) Permitted Dischargers</u>

For the permitted dischargers that have only total residual chlorine limits in their current permits, IDEM's TMDL program proposes that *E. coli* limits and monitoring be added when the next permit renewals are issued.

<u>Storm Water General Permit Rule 13</u>

MS4 permits have been issued in the state of Indiana. The one (1) MS4 community in the Lower Wildcat Creek watershed is Kokomo (INR04104). Once the permit has been implemented, the water quality in the Lower Wildcat Creek watershed will improved. Guidelines for MS4 permits and timelines are outlined in Indiana's Municipal Separate Storm Sewer System (MS4) Rule 13 (327 IAC 15-13-10 and 327 IAC 15-13-11). These permits will be used to address storm water impacts in the Lower Wildcat Creek watershed. The LTCP for Kokomo was submitted February

1, 2003 and the target for the final LTCP to be completed was September 28, 2007 and is enforceable by a State Judicial Agreement.

Confined Feeding Operations and Concentrated Animal Feeding Operations

CFO and CAFO are required to manage manure, litter, and process wastewater pollutants in a manner that does not cause or contribute to the impairment of *E. coli* WQS.

Watershed Projects

There are several watershed projects in the Wildcat Creek. The Wildcat Creek Watershed Alliance is working on a project in HUC 05120107020020, which is in the Lower Wildcat Creek watershed and includes the East and West Fork of the Little Wildcat Creek. This plan will focus on placing filter strips, improving riparian zones, bank stabilization, and habitat improvement.

The Wildcat Creek Watershed Alliance also created a watershed management plan for Kitty Run (05120107020010), which is in the Lower Wildcat Creek watershed, and Stahl Ditch (05120107010100), which is in the Upper Wildcat Creek Watershed. The goal of this watershed management plan is to reduce *E. coli* within these watersheds.

The Howard County Soil and Water Conservation District (SWCD) is working in HUC 05120107020070 which is in the Lower Wildcat Creek watershed and includes Wildcat Creek and Petes Run. HUC 05120105050040, Little Deer Creek is also included in the Howard County SWCD project, however, this HUC is not part of the Wildcat Creek watershed. The Howard County SWCD plan will focus on nutrient management and waste utilization, application, and storage.

The Clinton County SWCD is working on a watershed management plan that includes HUC 05120107040040, Wildcat Creek, and 05120107040090, Kilmore Creek and Boyle's Ditch. These watersheds are both in the South Fork Wildcat Creek watershed. This plan is focused on reducing nonpoint source pollution in these watersheds.

The Tippecanoe County Surveyor is working on a watershed management plan in Lauramie Creek (05120107040120), which is in the South Fork Wildcat Creek watershed. This plan focuses on the reduction of *E. coli* and nutrient inputs from agricultural practices and from wastewater treatment systems.

While not all of these positive efforts are within the Lower Wildcat Creek watershed, these watersheds all flow into the Lower Wildcat Creek. Improvements in these surrounding watersheds will lead to improvements within the Lower Wildcat Creek.

IDEM has recently hired a Watershed Specialist for this area of the state. The Watershed Specialist will be available to assist stakeholders with starting a watershed group, facilitating planning activities, and serving as a liaison between watershed planning and TMDL activities in the Lower Wildcat Creek watershed.

TMDLs

Currently, there are three additional TMDL projects within the Wildcat Creek Watershed, Upper Wildcat Creek, Middle Fork Wildcat Creek, and South Fork Wildcat Creek. Upper Wildcat Creek flows into Lower Wildcat Creek. Middle Fork Wildcat Creek flows into the South Fork

Wildcat Creek, which then flows into the Lower Wildcat Creek. All of these watersheds are part of the same 8-digit Hydrologic Unit Code (05120107) as the Lower Wildcat Creek. Improvements in these other watersheds will lead to improvements within the Lower Wildcat Creek.

Potential Future Activities

Nonpoint source pollution, which is the primary cause of *E. coli* impairment in this watershed, can be reduced by the implementation of "best management practices" (BMPs). BMPs are practices used in agriculture, forestry, urban land development, and industry to reduce the potential for damage to natural resources from human activities. A BMP may be structural, that is, something that is built or involves changes in landforms or equipment, or it may be managerial, that is, a specific way of using or handling infrastructure or resources. BMPs should be selected based on the goals of a watershed management plan. Livestock owners, farmers, and urban planners can implement BMPs outside of a watershed management plan, but the success of BMPs would be enhanced if coordinated as part of a watershed management plan. Following are examples of BMPs that may be used to reduce *E. coli* runoff:

Riparian Area Management - Management of riparian areas protects streambanks and river banks with a buffer zone of vegetation, either grasses, legumes, or trees.

Manure Collection and Storage - Collecting, storing, and handling manure in such a way that nutrients or bacteria do not run off into surface waters or leach down into ground water.

Contour Row Crops - Farming with row patterns and field operations aligned at or nearly perpendicular to the slope of the land.

No-Till Farming - No-till is a year-round conservation farming system. In its pure form, no-till does not include any tillage operations either before or after planting. The practice reduces wind and water erosion, catches snow, conserves soil and water, protects water quality, and provides wildlife habitat. No-till helps control soil erosion and improve water quality by maintaining maximum residue plant levels on the soil surface. These plant residues: 1) protect soil particles and applied nutrients and pesticides from detachment by wind and water; 2) increase infiltration; and 3) reduce the speed at which wind and water move over the soil surface.

Manure Nutrient-Testing - If manure application is desired, sampling and chemical analysis of manure should be performed to determine nutrient content for establishing the proper manure application rate in order to avoid overapplication and run-off.

Drift Fences - Drift fences (short fences or barriers) can be installed to direct livestock movement. A drift fence parallel to a stream keeps animals out and prevents direct input of *E. coli* to the stream.

Pet Clean-up / Education - Education programs for pet owners can improve water quality of runoff from urban areas.

Septic Management/Public Education - Programs for management of septic systems can provide a systematic approach to reducing septic system pollution. Education on proper maintenance of septic systems as well as the need to remove illicit discharges could alleviate some anthropogenic sources of *E. coli*.

Conclusion

The sources of *E. coli* to the Lower Wildcat Creek watershed include both point and nonpoint sources. In order for the Lower Wildcat Creek watershed to achieve Indiana's *E. coli* WQS, the wasteload and load allocations for the Lower Wildcat Creek watershed in Indiana have been set to the *E. coli* WQS of 125 per one hundred milliliters as a geometric mean based on not less than five samples equally spaced over a thirty day from April 1 through October 31. Achieving the wasteload and load allocations for the Lower Wildcat Creek watershed depends on:

1) Permitted facilities following their permits.
2) Nonpoint sources of *E. coli* being controlled by implementing best management practices in the watershed.
3) Implementation of the *E. coli* TMDLs completed on the impaired tributaries throughout the entire 8-digit Wildcat Creek watershed (05120107).

The next phase of this TMDL is to identify and support the implementation of activities that will bring the Lower Wildcat Creek watershed in compliance with the *E. coli* WQS. IDEM will continue to work with its existing programs on implementation. In the event that designated uses and associated water quality criteria applicable to the Lower Wildcat Creek watershed are revised in accordance with applicable requirements of state and federal law, the TMDL implementation activities may be revised to be consistent with such revisions. Additionally, IDEM will work with local stakeholder groups to pursue best management practices that will result in improvement of the water quality in the Lower Wildcat Creek watershed.

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Table 2: NPDES Permits in the Lower Wildcat Creek Watershed

Facilities with *E. coli* Limits

Permit No.	*Facility Name*	*Receiving Waters*
IN0020532	Russiaville Municipal STP	West Fork Honey Creek
IN0031801	Western Elementary and High School	William Vogus Ditch
IN0032875	Kokomo Municipal STP	Wildcat Creek
IN0039497	Village Green Mobile Home Park	Wildcat Creek
IN0039799	Burlington Municipal STP	Wildcat Creek
IN0055921	Billy Bob Mobile Home Park	Little Wildcat Creek
IN0038768	Green Acres Golf Course and Subdivision	Wildcat Creek
IN0037214	Hershey Elementary School	Wildcat Creek
IN0023353	Four Mile Hill STP	Wildcat Creek
IN0041866	Prairie Utilities, INC	Kelly West Ditch
IN0044652	Devon Woods Utilities, INC	Wildcat Creek

Facilities with Total Residual Chlorine Limits

Permit No.	*Facility Name*	*Receiving Waters*
IN0051873	New London C.D.	Wildcat Creek via Honey Creek

Facilities with no Total Residual Chlorine or *E. coli* Limits

Permit No.	*Facility Name*	*Receiving Waters*
ING080163	Speedway #7675	Wildcat Creek Indirectly
ING080194	Speedway Station 5163	
ING490022	Martin Marietta, Kokomo Stone	Wildcat Creek
ING490027	Martin Marietta, Kokomo Sand	Thomas Lindley Ditch
INJ062065	Linton Oil Company	

Table 3: Permitted Confined Feeding Operations in the Lower Wildcat Creek Watershed

			Approved Animals					
Log Number	Name	NPDES Permit Number	Nursery Pigs	Finishers	Sows	Boars	Beef Cattle	Dairy Cattle
9	HUFFER ONE, INC.	CFO	0	6000	0	0	0	0
242	CALDWELL	CFO	520	1620	271	0	0	0
889	ELLER	CFO	700	1400	0	0	0	0
1226	BURKLE	CFO	1075	1375	180	0	0	0
1693	SINK	CFO	0	2000	0	0	0	0
1694	CRUMPACKER	CFO	0	800	0	0	0	0
1774	WILSON	CFO	600	1500	240	0	150	0
1906	ETHERINGTON	CAFO	500	9000	24	0	0	0
1977	BARBOUR	CFO	995	275	124	0	0	0
2061	BURKLE	CFO	250	900	132	0	0	0
2123	R & R PORK, LLC	CFO	1000	2400	0	0	0	0
2324	RUDOLF SCHOETER	CFO	250	315	0	0	0	0
2471	MORRIS	CFO	500	740	88	0	0	0
2510	CARTER	CFO	180	580	155	0	0	0
2739	WAGONER	CFO	250	250	0	0	0	0
2805	KESSLER	CFO	300	0	90	0	0	0
2824	WARD	CFO	824	1387	236	0	0	0
2919	PORTER	CFO	0	2200	0	0	0	0
2977	M.A. SCOTT FARM	CFO	225	800	54	0	0	0
3386	MILLER	CFO	1600	1000	0	0	0	0
3472	HUFFER	CFO	500	750	164	0	0	0
3576	RITCHEY	CFO	1700	2200	612	0	0	0
3621	CALDWELL	CFO	1600	3200	496	0	0	0
3673	WISE	CAFO	2000	4680	1000	0	0	0
4032	GRIMME	CFO	250	1300	156	0	0	0
4211	FREY	CFO	2470	1840	640	0	0	0
4299	SCOTT	CFO	198	162	102	0	0	0
4655	BYRUM	CFO	200	700	84	0	0	0
4732	TEMPLIN	CFO	264	450	136	0	34	0
4880	RHINE	CFO	0	880	0	0	0	0
6183	AYRES	CFO	0	0	0	0	0	600

Figure 1: Wildcat Creek Watershed

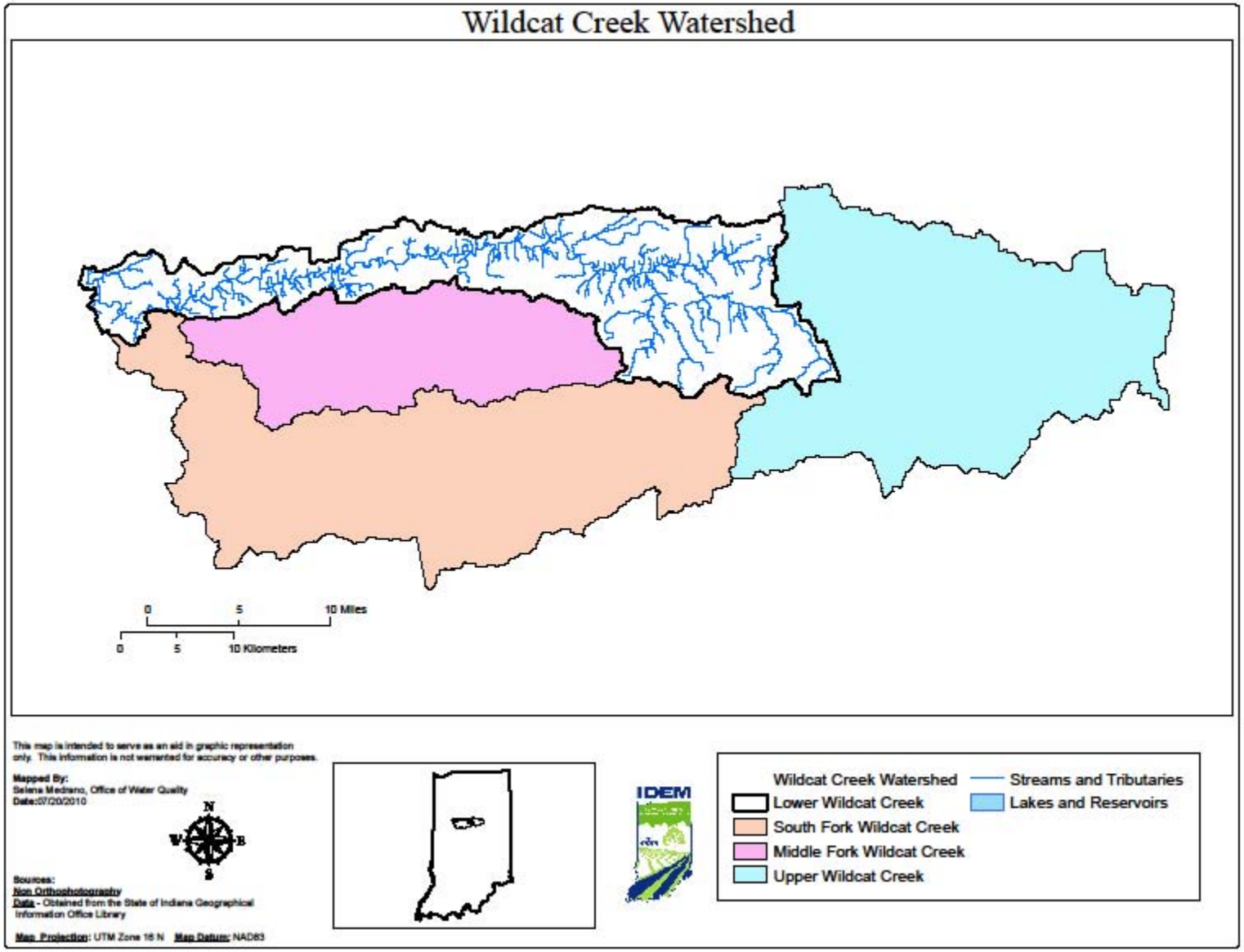


Figure 2: Lower Wildcat Creek Watershed

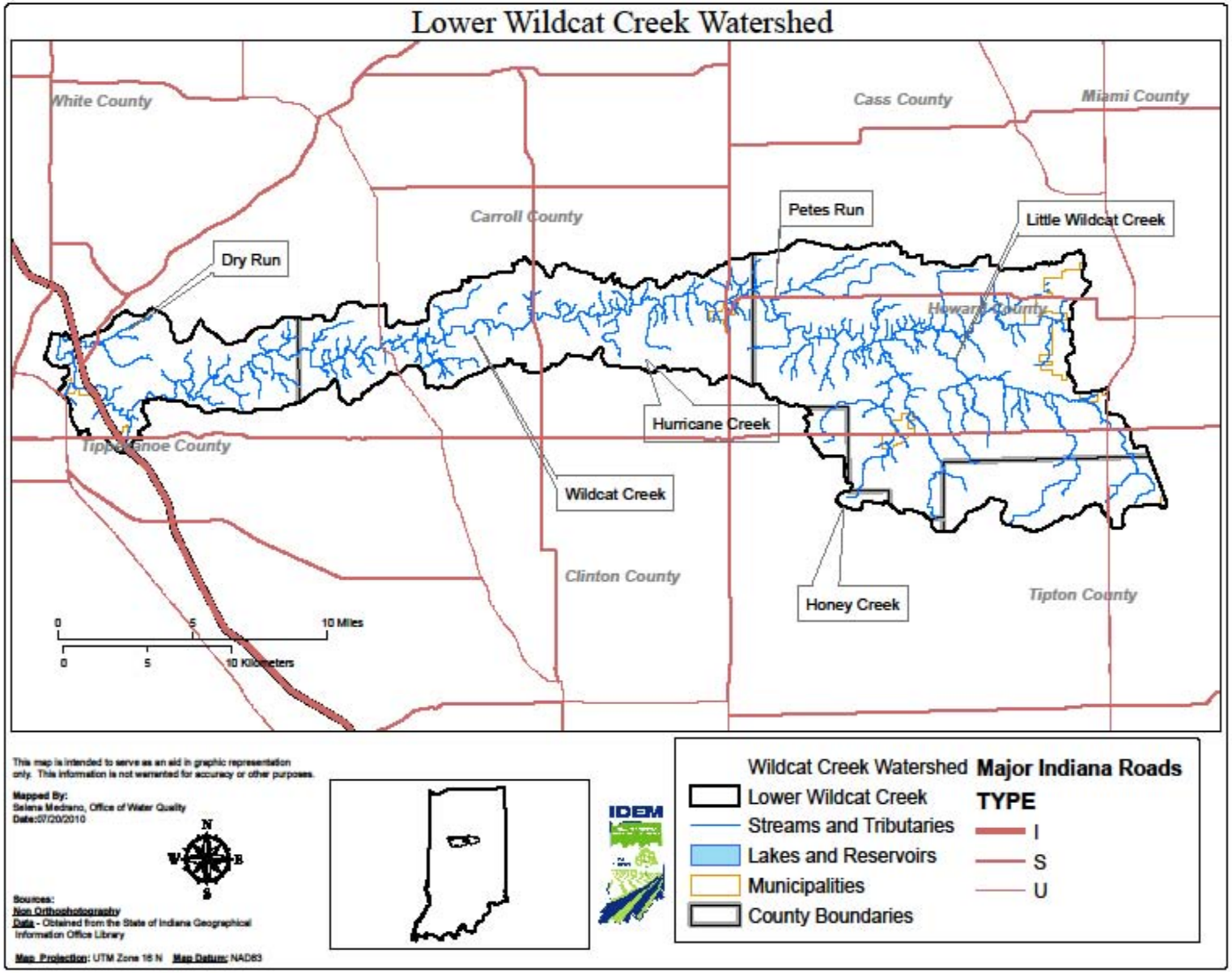


Figure 3: Streams in the Lower Wildcat Creek Watershed

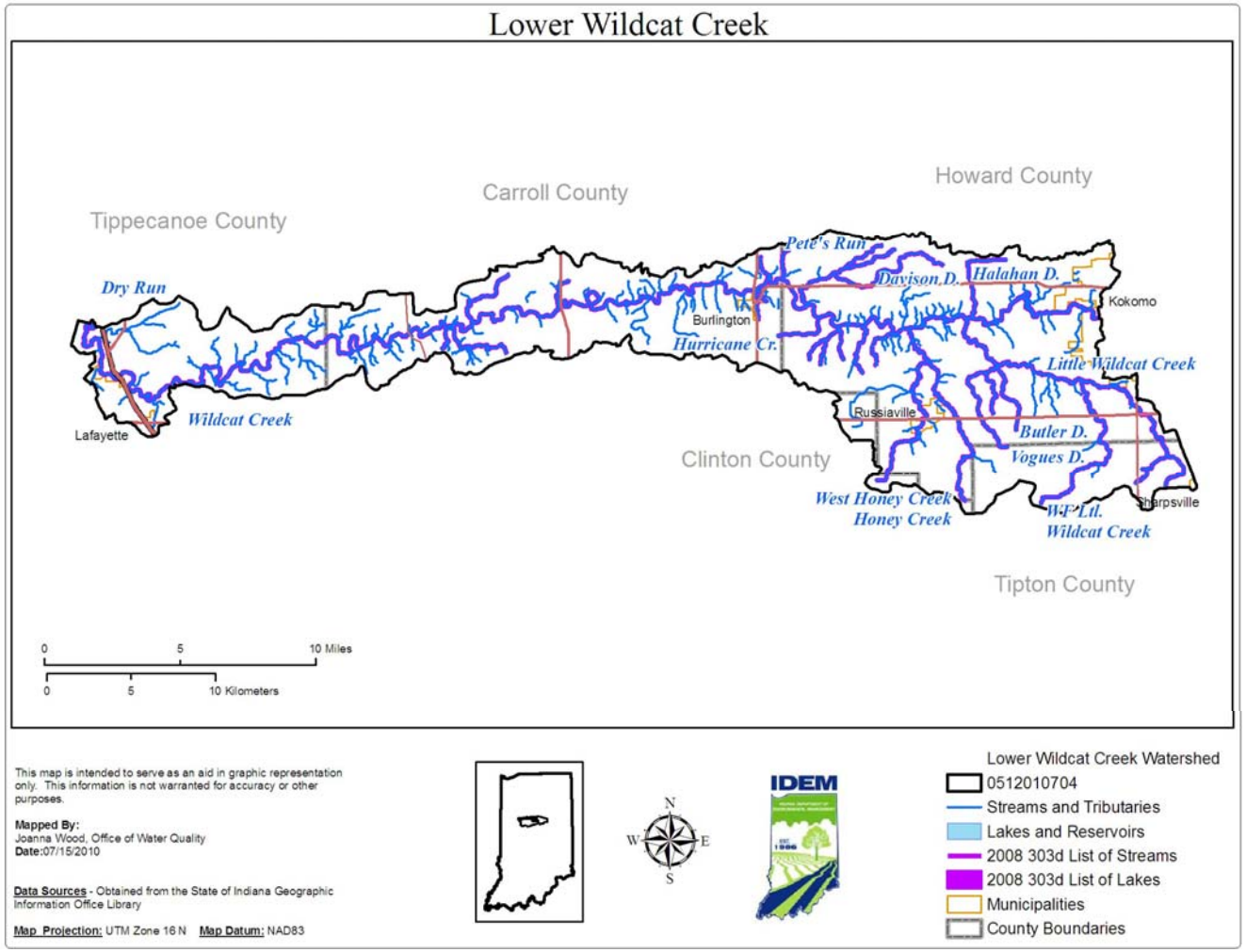


Figure 4: Sample Sites in the Lower Wildcat Creek Watershed

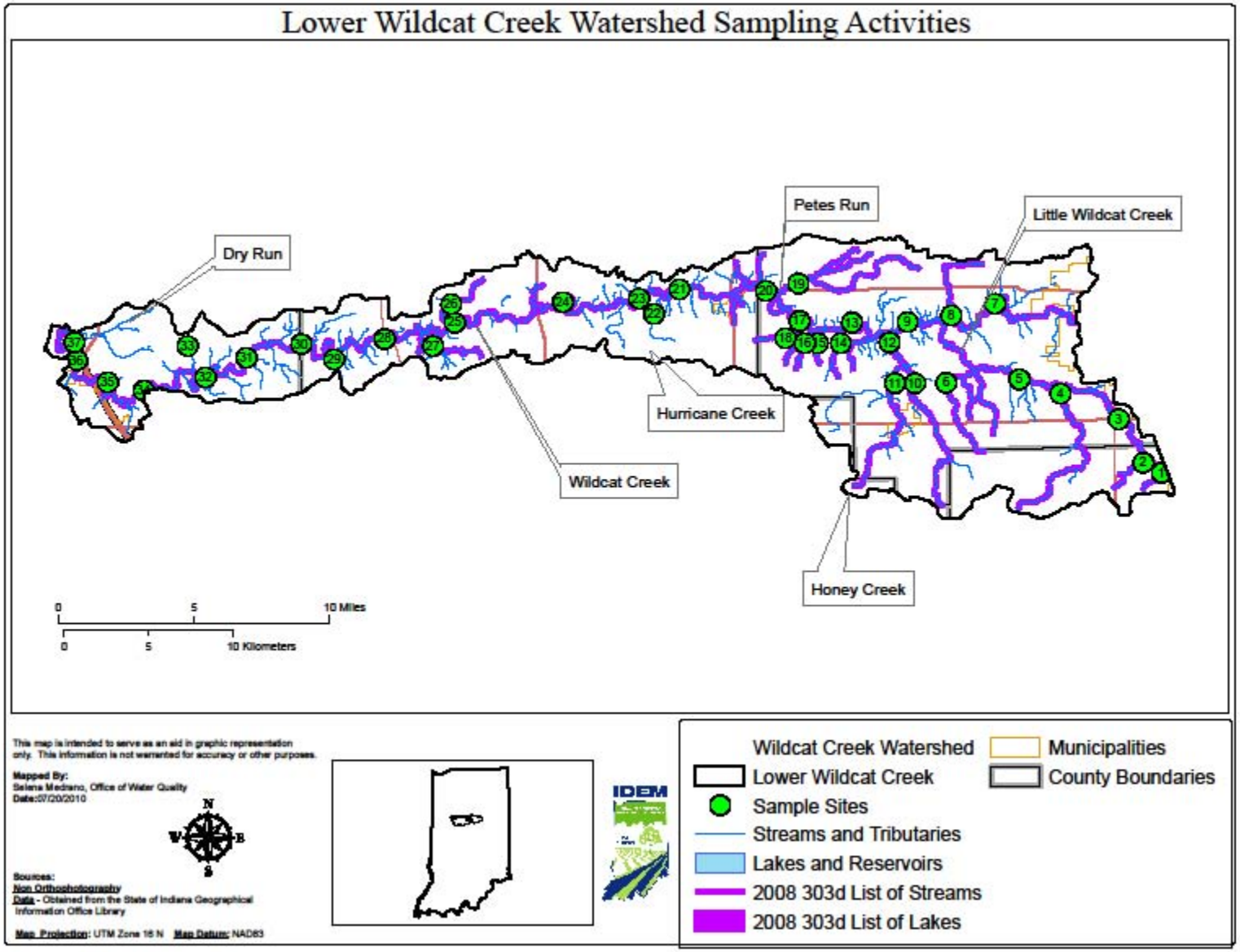


Figure 5: Landuse in the Lower Wildcat Creek Watershed

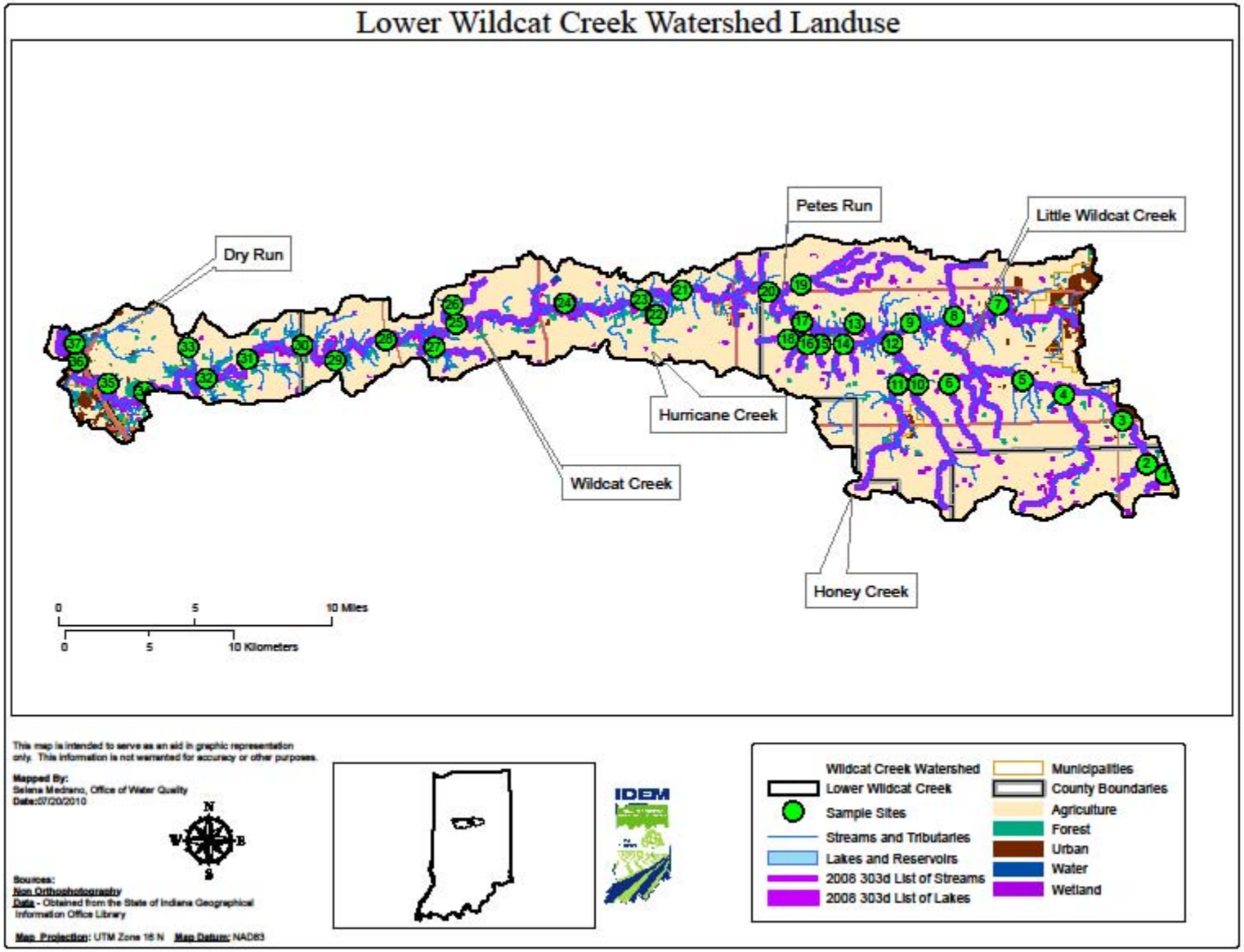


Figure 6: Unsewered Communities in the Lower Wildcat Creek Watershed

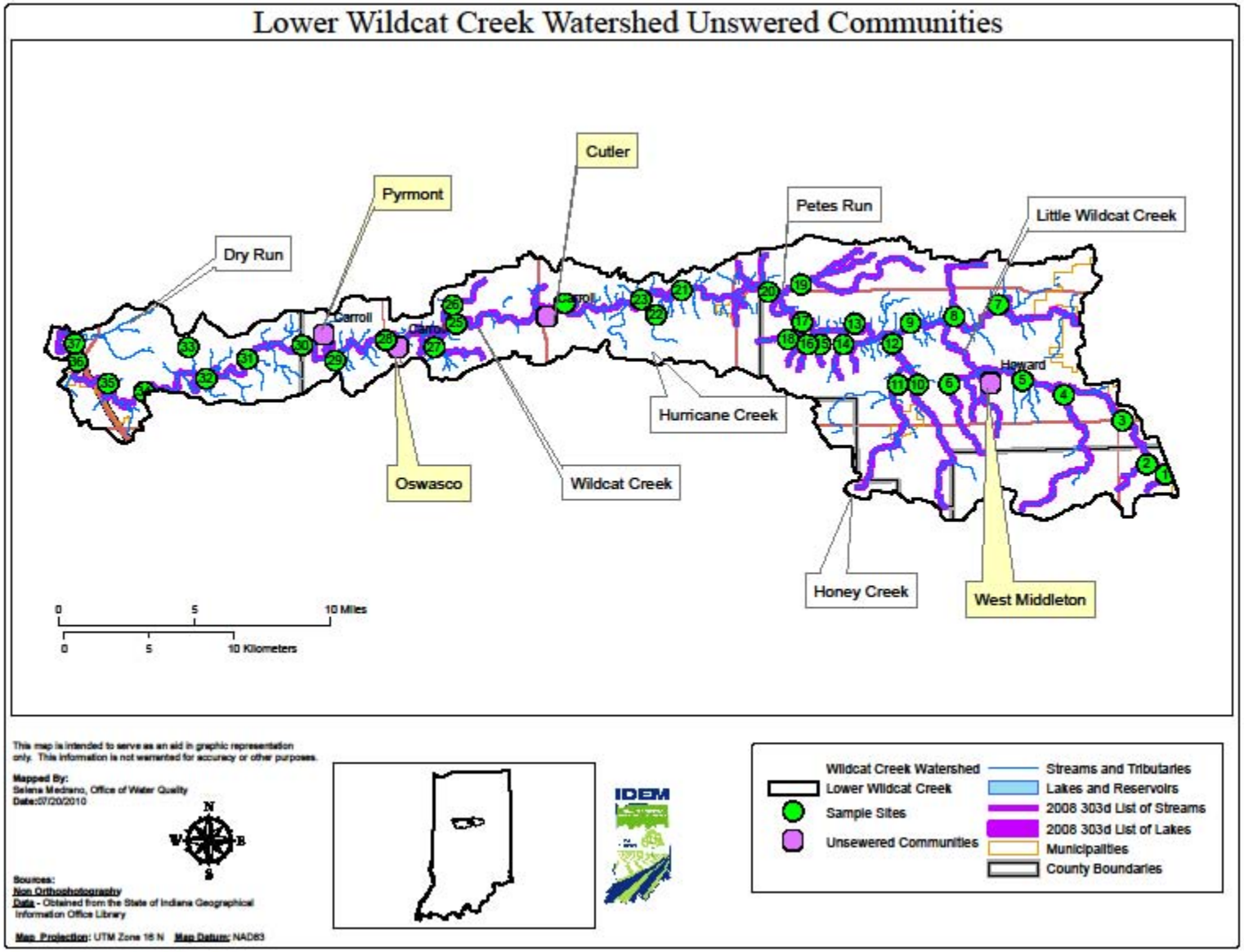


Figure 7: NPDES Permitted Facilities in the Lower Wildcat Creek Watershed

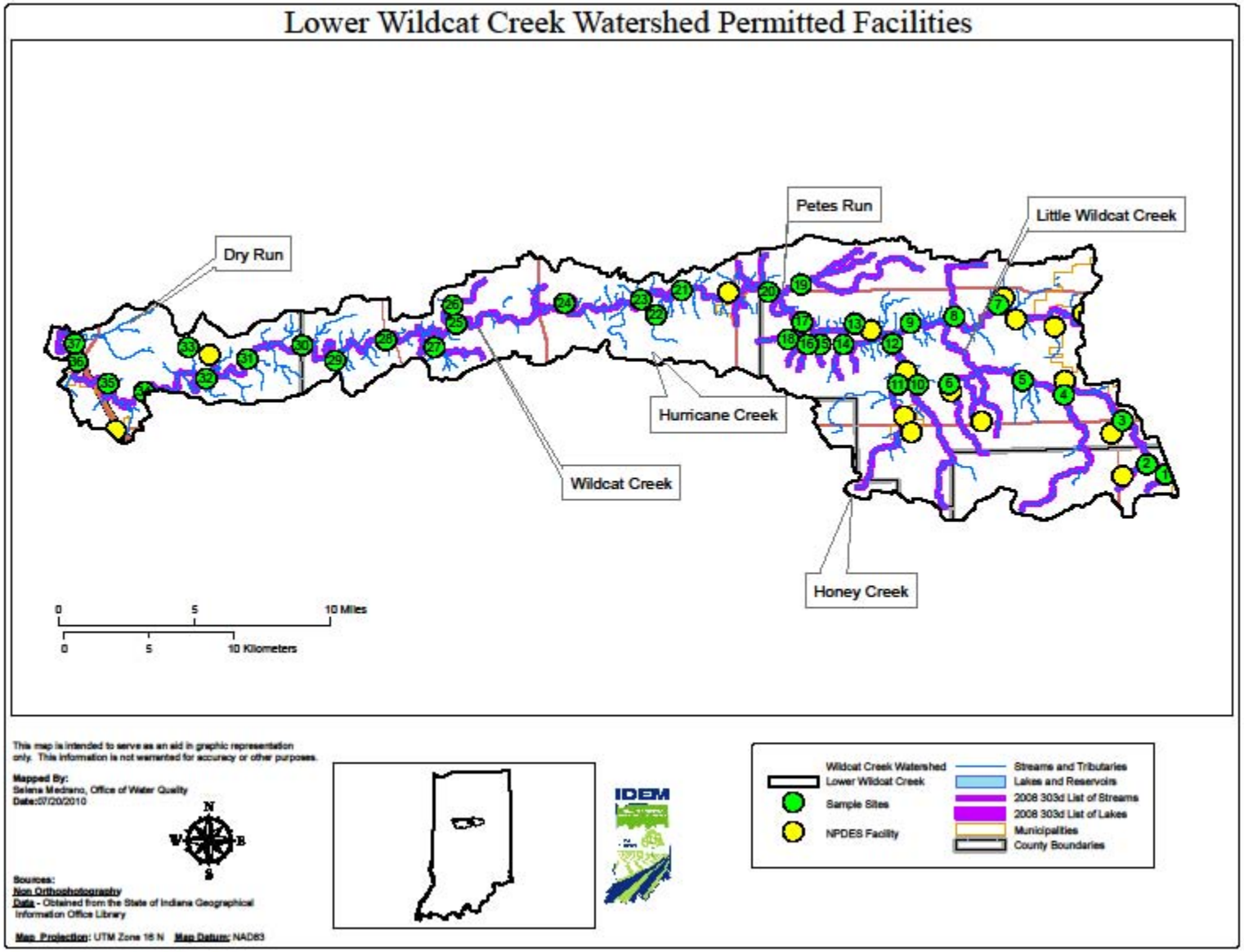


Figure 8: Combined Sewer Overflows (CSO) in the Lower Wildcat Creek Watershed

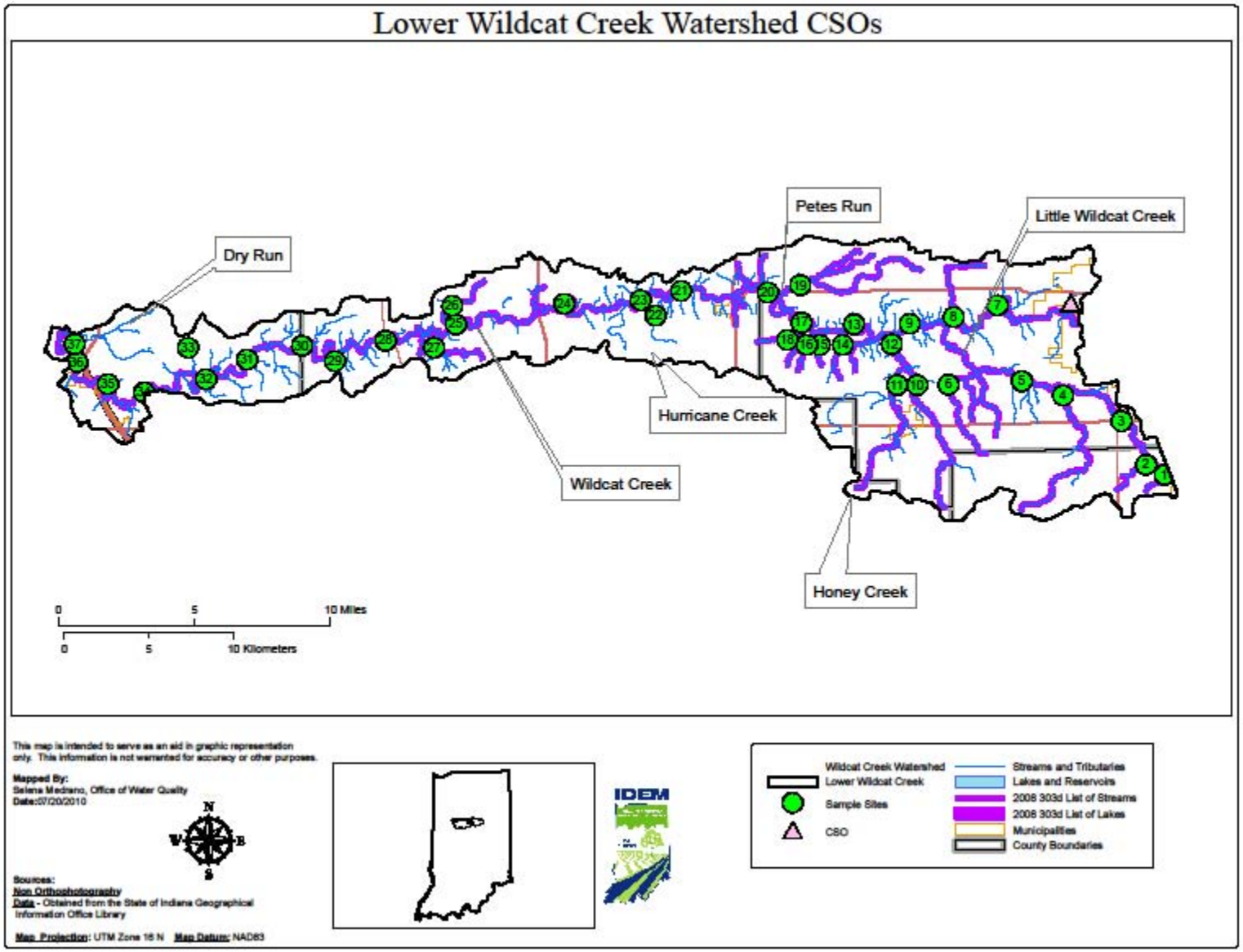
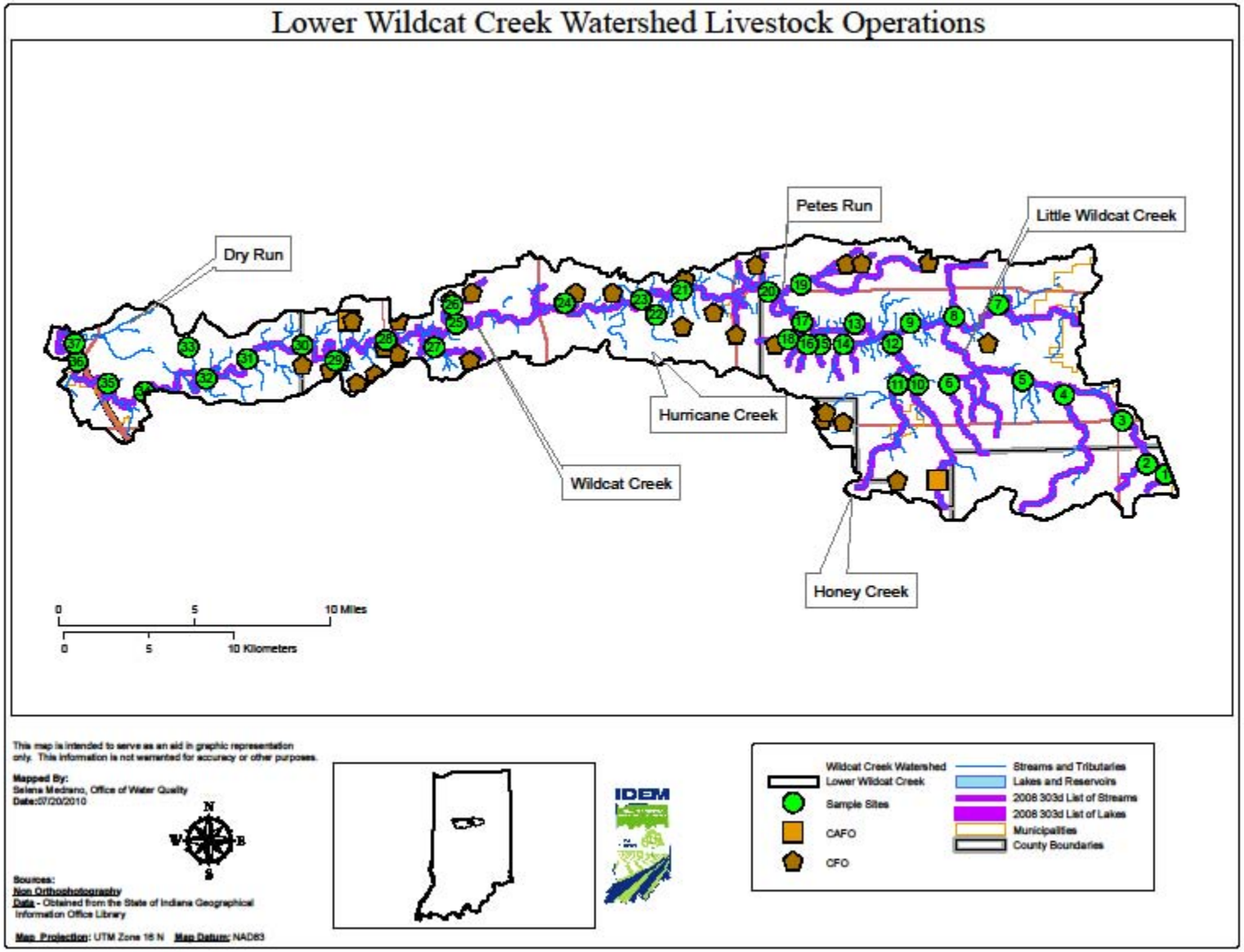


Figure 9: Confined Feeding Operations in the Lower Wildcat Creek Watershed



Attachment A

E. coli Data for the Lower Wildcat Creek Watershed TMDL

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Site Number	LSITE	Stream Name	Description	Geometric Mean	Percent Reduction Needed
1	WAW020-0089	Kelly East Ditch	CR 600 N	255.89	51.15%
2	WAW020-0088	Kelly West Ditch	CR 500 W	751.10	83.36%
3	WAW020-0009	E Fk Little Wildcat Cr	SR 26	1459.71	91.44%
4	WAW020-0013	W Fk Little Wildcat Cr	CR 200 W	1292.70	90.33%
5	WAW020-0086	Little Wildcat Cr	CR 350 W	532.59	76.53%
6	WAW020-0085	William Vogus Ditch	CR 250 S	357.16	65.00%
7	WAW020-0005	Wildcat Cr	CR 440 W	665.45	81.22%
8	WAW020-0083	Michael Hallihan Ditch	CR 00 N	1462.19	91.45%
9	WAW020-0020	Wildcat Cr	CR 750 W	521.14	76.01%
10	WAW020-0084	E Fk Honey Cr	CR 250 S	703.22	82.22%
11	WAW020-0028	W Honey Cr	CR 250 S	971.03	87.13%
12	WAW020-0030	Honey Cr	CR 100 S	853.10	85.35%
13	WAW020-0031	Wildcat Cr	CR 950 W	787.00	84.12%
14	WAW020-0090	Unnamed Trib to Wildcat Cr	CR 100 S	536.92	76.72%
15	WAW020-0091	Unnamed Trib to Wildcat Cr	CR 100 S	623.31	79.95%
16	WAW020-0092	Unnamed Trib to Wildcat Cr	CR 100 S	1226.72	89.81%
17	WAW020-0032	Wildcat Cr	CR 1150 W	744.68	83.21%
18	WAW020-0093	Unnamed Trib to Wildcat Cr	CR 1200 W	997.57	87.47%
19	WAW020-0094	Petes Run	CR 1150 W	1316.24	90.50%
20	WAW020-0034	Wildcat Cr	SR 22	756.61	83.48%
21	WAW020-0036	Wildcat Cr	CR 500 E	641.58	80.52%
22	WAW020-0095	Hurricane Cr	CR 475 S	229.22	45.47%
23	WAW020-0037	Wildcat Cr	CR 350 E	604.37	79.32%
24	WAW020-0038	Wildcat Cr	CR 50 E	530.36	76.43%
25	WAW020-0040	Wildcat Cr	Prince William Rd	396.64	68.49%
26	WAW020-0096	Unnamed Trib of Wildcat Cr	CR 350 W	203.92	38.70%
27	WAW020-0097	Unnamed Trib to Wildcat Cr	CR 600 S	228.78	45.36%
28	WAW020-0041	Wildcat Cr	US 421 and SR 39	582.76	78.55%
29	WAW020-0098	Schimmel Ditch	CR 650 S	Not Enough Data	N/A
30	WAW020-0099	Wildcat Cr	CR 900 W (County Line Rd)	389.56	67.91%
31	WAW020-0043	Wildcat Cr	Wolfe Rd CR900 E and CR250 N	448.38	72.12%
32	WAW020-0100	Wildcat Creek	Mis-So-La access site	405.13	69.15%
33	WAW020-0101	Unnamed Trib	CR 300 N	1891.11	93.39%
34	WAW050-0014	Wildcat Creek	Wildcat Creek Park	400.32	68.78%
35	WAW050-0013	Wildcat Creek	Peters Mill Landing	353.46	64.64%
36	WAW050-0005	Wildcat Cr	SR 25 Bridge NE of Lafayette	296.45	57.83%
37	WAW050-0012	Unnamed Trib	Barton Beach Road	152.59	18.08%

Attachment B

Historic *E. coli* Data for the Lower Wildcat Creek Watershed TMDL

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Site Number	LSITE	Stream Name	Description	Sample Number	Sample Date	E_ Coli (MPN/100mL)	Geometric Mean
1	WAW020-0089	Kelly East Ditch	CR 600 N	AA16256	09-Sep-03	57.3	255.89
				AA19189	24-Sep-03	1413.6	
				AA19384	30-Sep-03	228.2	
				AA19739	07-Oct-03	172.5	
				AA19953	15-Oct-03	344.1	
2	WAW020-0088	Kelly West Ditch	CR 500 W	AA16255	09-Sep-03	104.6	751.10
				AA19188	24-Sep-03	2420	
				AA19383	30-Sep-03	648.8	
				AA19738	07-Oct-03	1119.9	
				AA19952	15-Oct-03	1299.7	
3	WAW020-0009	E Fk Little Wildcat Cr	SR 26	AA16254	09-Sep-03	1299.7	1349.67
				AA19190	24-Sep-03	2420	
				AA19385	30-Sep-03	920.8	
				AA19740	07-Oct-03	770.1	
				AA19741 (D)	07-Oct-03	1119.9	
				AA19954	15-Oct-03	2420	
4	WAW020-0013	W Fk Little Wildcat Cr	CR 200 W	AA16252	09-Sep-03	727	1292.70
				AA19191	24-Sep-03	2420	
				AA19386	30-Sep-03	920.8	
				AA19742	07-Oct-03	2420	
				AA19955	15-Oct-03	920.8	
5	WAW020-0086	Little Wildcat Cr	CR 350 W	AA16250	09-Sep-03	248.1	532.59
				AA16251 (D)	09-Sep-03	307.6	
				AA19192	24-Sep-03	2420	
				AA19387	30-Sep-03	547.5	
				AA19743	07-Oct-03	93.3	
				AA19956	15-Oct-03	2419.2	
6	WAW020-0085	William Vogus Ditch	CR 250 S	AA16248	09-Sep-03	980.4	357.16
				AA19193	24-Sep-03	1986.3	
				AA19388	30-Sep-03	95.9	
				AA19744	07-Oct-03	133.4	
				AA19957	15-Oct-03	233.3	
7	WAW020-0005	Wildcat Cr	CR 440 W	AA16236	09-Sep-03	344.8	665.45
				AA19209	24-Sep-03	2420	
				AA19405	30-Sep-03	344.1	
				AA19761	07-Oct-03	166.9	
				AA19974	15-Oct-03	2723	

8	WAW020-0083	Michael Hallihan Ditch	CR 00 N	AA16239	09-Sep-03	547.5	1462.19
				AA19210	24-Sep-03	2420	
				AA19406	30-Sep-03	1203.3	
				AA19762	07-Oct-03	2419.2	
				AA19975	15-Oct-03	1732.9	
9	WAW020-0020	Wildcat Cr	CR 750 W	AA16240	09-Sep-03	214.2	521.14
				AA19211 (M)	24-Sep-03	1732.9	
				AA19407	30-Sep-03	517.2	
				AA19755 (D)	07-Oct-03	156.5	
				AA19763	07-Oct-03	275.5	
				AA19976	15-Oct-03	2420	
10	WAW020-0084	E Fk Honey Cr	CR 250 S	AA16246	09-Sep-03	579.4	703.22
				AA19214	24-Sep-03	2420	
				AA19410	30-Sep-03	307.6	
				AA19766	07-Oct-03	488.4	
				AA19979	15-Oct-03	816.4	
11	WAW020-0028	W Honey Cr	CR 250 S	AA16244	09-Sep-03	770.1	971.03
				AA19213	24-Sep-03	2420	
				AA19409	30-Sep-03	770.1	
				AA19765	07-Oct-03	387.3	
				AA19978	15-Oct-03	1553.1	
12	WAW020-0030	Honey Cr	CR 100 S	AA16242	09-Sep-03	686.7	853.10
				AA19212	24-Sep-03	2419.2	
				AA19408	30-Sep-03	365.4	
				AA19764	07-Oct-03	307.6	
				AA19977	15-Oct-03	2420	
13	WAW020-0031	Wildcat Cr	CR 950 W	AA16312	11-Sep-03	235.9	787.00
				AA19216	25-Sep-03	2420	
				AA19411	01-Oct-03	648.8	
				AA19767	09-Oct-03	547.5	
				AA19980	16-Oct-03	1119.9	
				AA19981 (D)	16-Oct-03	1046.2	
14	WAW020-0090	Unnamed Trib to Wildcat Cr	CR 100 S	AA16314	11-Sep-03	435.2	536.92
				AA19218	25-Sep-03	1553.1	
				AA19413	01-Oct-03	2419.2	
				AA19769	09-Oct-03	214.2	
				AA19983	16-Oct-03	127.4	

15	WAW020-0091	Unnamed Trib to Wildcat Cr	CR 100 S	AA16316	11-Sep-03	228.2	623.31
				AA19219	25-Sep-03	1986.3	
				AA19220 (D)	25-Sep-03	2420	
				AA19414	01-Oct-03	920.8	
				AA19770	09-Oct-03	410.6	
				AA19984	16-Oct-03	141.4	
16	WAW020-0092	Unnamed Trib to Wildcat Cr	CR 100 S	AA16317	11-Sep-03	648.8	1226.72
				AA19221	25-Sep-03	2420	
				AA19415	01-Oct-03	2420	
				AA19771	09-Oct-03	517.2	
				AA19985	16-Oct-03	1413.6	
17	WAW020-0032	Wildcat Cr	CR 1150 W	AA16319	11-Sep-03	325.5	744.68
				AA19223	25-Sep-03	2420	
				AA19417	01-Oct-03	517.2	
				AA19773	09-Oct-03	648.8	
				AA19987	16-Oct-03	866.4	
18	WAW020-0093	Unnamed Trib to Wildcat Cr	CR 1200 W	AA16318	11-Sep-03	2420	997.57
				AA19222	25-Sep-03	1986.3	
				AA19416	01-Oct-03	461.1	
				AA19772	09-Oct-03	727	
				AA19986	16-Oct-03	613.1	
19	WAW020-0094	Petes Run	CR 1150 W	AA16320	11-Sep-03	2420	1316.24
				AA19224	25-Sep-03	2420	
				AA19418	01-Oct-03	686.7	
				AA19774	09-Oct-03	1203.3	
				AA19988	16-Oct-03	816.4	
20	WAW020-0034	Wildcat Cr	SR 22	AA16321	11-Sep-03	235.9	756.61
				AA19225	25-Sep-03	2420	
				AA19419	01-Oct-03	727	
				AA19775	09-Oct-03	648.8	
				AA19989	16-Oct-03	920.8	
21	WAW020-0036	Wildcat Cr	CR 500 E	AA16322	11-Sep-03	325.5	641.58
				AA19226	25-Sep-03	2420	
				AA19420	01-Oct-03	517.2	
				AA19776	09-Oct-03	435.2	
				AA19990	16-Oct-03	613.1	
22	WAW020-0095	Hurricane Cr	CR 475 S	AA16323	11-Sep-03	178.9	229.22
				AA19227	25-Sep-03	866.4	
				AA19421	01-Oct-03	228.2	
				AA19777	09-Oct-03	461.1	
				AA19991	16-Oct-03	38.8	
23	WAW020-0037	Wildcat Cr	CR 350 E	AA16324	11-Sep-03	201.4	604.37
				AA19228	25-Sep-03	2420	
				AA19422	01-Oct-03	410.6	
				AA19423 (D)	01-Oct-03	410.6	
				AA19778	09-Oct-03	770.1	
				AA19992	16-Oct-03	770.1	
				AA16325	11-Sep-03	114.5	

24	WAW020-0038	Wildcat Cr	CR 50 E	AA19229	25-Sep-03	2420	530.36
				AA19424	01-Oct-03	613.1	
				AA19779	09-Oct-03	285.1	
				AA19993	16-Oct-03	866.4	
25	WAW020-0040	Wildcat Cr	Prince William Rd	AA16326	11-Sep-03	90.7	396.64
				AA19231 (M)	25-Sep-03	2420	
				AA19426	01-Oct-03	272.3	
				AA19781	09-Oct-03	191.8	
				AA19782 (D)	09-Oct-03	218.7	
				AA19995	16-Oct-03	1553.1	
26	WAW020-0096	Unnamed Trib of Wildcat Cr	CR 350 W	AA16327	11-Sep-03	209.8	203.92
				AA19230	25-Sep-03	866.4	
				AA19425	01-Oct-03	110	
				AA19780	09-Oct-03	178.5	
				AA19994	16-Oct-03	98.8	
27	WAW020-0097	Unnamed Trib to Wildcat Cr	CR 600 S	AA16328 (M)	11-Sep-03	185	228.78
				AA19232	25-Sep-03	1203.3	
				AA19427	01-Oct-03	142.1	
				AA19783	09-Oct-03	90.6	
				AA19996	16-Oct-03	218.7	
28	WAW020-0041	Wildcat Cr	US 421 and SR 39	AA16329	11-Sep-03	152.9	582.76
				AA19233	25-Sep-03	3873	
				AA19428	01-Oct-03	272.3	
				AA19784	09-Oct-03	172.3	
				AA19997	16-Oct-03	2419.2	
29	WAW020-0098	Schimmel Ditch	CR 650 S	AA19234	25-Sep-03	1553.1	
				AA19429	01-Oct-03	686.7	
				AA19998	16-Oct-03	1553.1	

30	WAW020-0099	Wildcat Cr	CR 900 W (County Line Rd)	AA16332 (D)	11-Sep-03	118.7	389.56
				AA16333	11-Sep-03	135.4	
				AA19235	25-Sep-03	2420	
				AA19430	01-Oct-03	261.3	
				AA19786	09-Oct-03	142.1	
				AA19999	16-Oct-03	2420	
31	WAW020-0043	Wildcat Cr	Wolfe Rd CR900 E and CR250 N	AA16344	11-Sep-03	143.9	448.38
				AA19236 (M)	25-Sep-03	2420	
				AA19431	01-Oct-03	139.6	
				AA19787	09-Oct-03	154.1	
				AA20000	16-Oct-03	2419.2	
32	WAW020-0100	Wildcat Creek	Mis-So-La access site	AA16341	11-Sep-03	95.9	405.13
				AA19237	25-Sep-03	2420	
				AA19432	01-Oct-03	275.5	
				AA19788	09-Oct-03	98.5	
				AA20001	16-Oct-03	1732.9	
33	WAW020-0101	Unnamed Trib	CR 300 N	AA16346	11-Sep-03	770.1	1891.11
				AA19238	25-Sep-03	2420	
				AA19433	01-Oct-03	1732.9	
				AA19789	09-Oct-03	2420	
				AA20002	16-Oct-03	2419.2	
				AA20003 (D)	16-Oct-03	2419.2	
34	WAW050-0014	Wildcat Creek	Wildcat Creek Park	AA16347	11-Sep-03	86	400.32
				AA19240	25-Sep-03	1413.6	
				AA19241 (D)	25-Sep-03	1413.6	
				AA19435	01-Oct-03	307.6	
				AA19791	09-Oct-03	107.1	
				AA20005	16-Oct-03	727	
35	WAW050-0013	Wildcat Creek	Peters Mill Landing	AA16339	11-Sep-03	107.1	353.46
				AA19242	25-Sep-03	3076	
				AA19436	01-Oct-03	547.5	
				AA19440 (D)	01-Oct-03	260.2	
				AA19792	09-Oct-03	101.2	
				AA20006	16-Oct-03	410.6	
36	WAW050-0005	Wildcat Cr	SR 25 Bridge NE of Lafayette	AA16337	11-Sep-03	123.6	296.45
				AA19243	25-Sep-03	2420	
				AA19437	01-Oct-03	259.5	
				AA19793	09-Oct-03	95.9	
				AA20007	16-Oct-03	307.6	
37	WAW050-0012	Unnamed Trib	Barton Beach Road	AA16335	11-Sep-03	57.8	152.59
				AA19244	25-Sep-03	1732.9	
				AA19438	01-Oct-03	261.3	
				AA19794	09-Oct-03	77.1	
				AA20008	16-Oct-03	41	

LSITE		Stream Name	Description	Site Number	Sample Number	Sample Date	E_ Coli (CFU/100mL)	E_ Coli (MPN/100mL)	Geometric Mean
WAW020-0002		Wildcat Cr	Norfolk and Western RR		AA42752	09-Sep-93	720		
					AA42879	15-Jun-94	440		
WAW020-0003		Wildcat Cr	CR 200 W		AA42753	09-Sep-93	680		
					AA42933	15-Jun-94	1100		
WAW020-0004		Wildcat Cr	CR 300 W, 1 Mile W of Kokomo		AA42754	09-Sep-93	970		
					AA42884	15-Jun-94	940		
					AA10319	15-May-02		2400	
					AA14482	03-Dec-02		1100	
WAW020-0005	7	Wildcat Cr	CR 440 W	7	AA42761	09-Sep-93	510		
					AA42888	15-Jun-94	600		
WAW020-0007		E Fk Little Wildcat Cr	CR 500 W		AA42856	21-Jun-94	420		
WAW020-0008		E Fk Little Wildcat Cr	CR 500 S		AA42857	21-Jun-94	1200		
WAW020-0009	3	E Fk Little Wildcat Cr	SR 26	3	AA42936	21-Jun-94	1900		
WAW020-0010		E Fk Little Wildcat Cr	CR 300 S		AA42938	21-Jun-94	1100		
WAW020-0011		E Fk Little Wildcat Cr	CR 200 W		AA42875	21-Jun-94	620		
WAW020-0012		W Fk Little Wildcat Cr	SR 26		AA42939	21-Jun-94	1400		
WAW020-0013	4	W Fk Little Wildcat Cr	CR 200 W	4	AA42940	21-Jun-94	300		
WAW020-0014		Little Wildcat Cr	CR 250 S		AA42941	21-Jun-94	1000		
WAW020-0015		Little Wildcat Cr	CR 200 S		AA42889	21-Jun-94	1300		
WAW020-0016		Wildcat Cr	Owasco, 200 Feet D/S of SR 39 Bridge, 0.5 Miles NW of Owasco		AA07570	03-Aug-98	330		255.47
					AA07597	10-Aug-98	600		
					AA07624	17-Aug-98	520		
					AA07651	24-Aug-98	150		
					AA09465 (D)	24-Aug-98	150		
					AA07678	31-Aug-98	120		
WAW020-0017		William Vogus Ditch	CR 600 W		AA42946	21-Jun-94	760		
WAW020-0018		Little Wildcat Cr	CR 560 W		AA42947	21-Jun-94	560		
WAW020-0019		Little Wildcat Cr	CR 80 S		AA42899	21-Jun-94	450		
					AA42898 (D)	22-Jun-94	470		
WAW020-0020	9	Wildcat Cr	CR 750 W	9	AA42763	22-Sep-93	450		
					AA42949	21-Jun-94	520		
WAW020-0021		Honey Cr	CR 500 S		AA42951	21-Jun-94	110		
WAW020-0022		Honey Cr	CR 680 W		AA42952	21-Jun-94	890		
WAW020-0023		Honey Cr	CR 220 S		AA42904	21-Jun-94	860		
WAW020-0024		Honey Cr	CR 750 W		AA42760	22-Sep-93	750		
					AA42905	21-Jun-94	400		
WAW020-0025		W Honey Cr	SR 26		AA42953	21-Jun-94	1200		
WAW020-0026		W Honey Cr	CR 775 W		AA42756	22-Sep-93	1300		
					AA42954	21-Jun-94	1900		
WAW020-0027		W Honey Cr	Near Bend on CR 785 W		AA42960	21-Jun-94	6400		
WAW020-0028	11	W Honey Cr	CR 250 S	11	AA42758	22-Sep-93	790		
					AA42911	21-Jun-94	1300		
WAW020-0029		W Honey Cr	CR 180 S		AA42759	22-Sep-93	770		
					AA42912	21-Jun-94	2500		
WAW020-0030	12	Honey Cr	CR 100 S	12	AA42918	22-Sep-93	890		
					AA42913	21-Jun-94	250		

					AA42914 (D)	22-Jun-94	510		
WAW020-0031	13	Wildcat Cr	CR 950 W	13	AA42764	21-Sep-93	430		
					AA42916	21-Jun-94	350		
WAW020-0032	17	Wildcat Cr	CR 1150 W	17	AA42891	24-Jun-94	360		
WAW020-0033		Petes Run	SR 22		AA42895	23-Jun-94	10000		
LSITE		Stream Name	Description	Site Number	Sample Number	Sample Date	E_ Coli (CFU/100mL)	E_ Coli (MPN/100mL)	Geometric Mean
WAW020-0034	20	Wildcat Cr	SR 22	20	AA42896	24-Jun-94	260		
					AA07567	03-Aug-98	210		
					AA07594	10-Aug-98	600		
					AA09458 (D)	10-Aug-98	1300		
					AA07621	17-Aug-98	21000		
					AA07648	24-Aug-98	500		
					AA07675	31-Aug-98	390		
WAW020-0035		Wildcat Cr	SR 29		AA42897	24-Jun-94	200		
WAW020-0036	21	Wildcat Cr	CR 500 E	21	AA42945	24-Jun-94	200		
WAW020-0037	23	Wildcat Cr	CR 350 E	23	AA42900	24-Jun-94	180		
WAW020-0038	24	Wildcat Cr	CR 50 E	24	AA42901	24-Jun-94	140		
WAW020-0039		Wildcat Cr	SR 75 Near Cutler		AA42902	24-Jun-94	90		
					AA28949	23-Sep-05		770	
WAW020-0040	25	Wildcat Cr	Prince William Rd	25	AA42903	24-Jun-94	250		
WAW020-0041		Wildcat Cr	US 421 and SR 39	28	AA42948	24-Jun-94	90		
WAW020-0042		Wildcat Cr			AA42950	24-Jun-94	80		
WAW020-0043	31	Wildcat Cr	Wolfe Rd CR900 E and CR250 N	31	AA42906	24-Jun-94	190		
WAW020-0044		Wildcat Cr	CR 200 N		AA42907	24-Jun-94	60		
WAW020-0045		Shambaugh Run	Markland Ave		AA42880	15-Jun-94	6600		
					AA14102	18-Oct-02		60	
WAW020-0046		Wildcat Cr	1202 Arundel Dr		AA42755	09-Sep-93	570		
WAW020-0048		Kelley W Ditch	CR 600 N		AA42853	21-Jun-94	340		
WAW020-0050		Unnamed Trib	Yale Blvd		AA42937	22-Jun-94	86000		
WAW020-0055		Devon Woods Sub	001 Final Effluent		AA42885	14-Jun-94	90		
WAW020-0057		Four Mile Sub	001 Final Effluent		AA42886	14-Jun-94	7600		
WAW020-0058		Prairie Utilities	001 Final Effluent		AA42934	22-Jun-94	180000		
WAW020-0063		Russiaville POTW	001 Final Effluent		AA42909	21-Jun-94	130000		
WAW020-0064		Green Acres Sub	001 Final Effluent		AA42915	22-Jun-94	190000		
WAW020-0066		Burlington POTW	001 Final Effluent		AA42798	06-May-94	< 10		
WAW020-0085	6	William Vogus Ditch	CR 250 S	6	AA42894	21-Jun-94	2600		
WAW020-0106		William Vogus Ditch	CR 600 W		AA42890	21-Jun-94	9700		
WAW050-0001		Wildcat Cr	Before S Fk Wildcat Cr Conf		AA42908	24-Jun-94	80		
WAW050-0005	36	Wildcat Cr	SR 25 Bridge NE of Lafayette	36	AA28216	12-Jul-05		440	
					AA28952	23-Sep-05		440	
					AA14097	18-Oct-02		56	
WAW050-0006		Wildcat Cr	CR 2A E, NE Side of Lafayette		AA07562	04-Aug-98	620		203.98
					AA09451 (D)	04-Aug-98	280		
					AA07589	10-Aug-98	1900		
					AA07616	17-Aug-98	80		
					AA07643	24-Aug-98	39		
					AA07670	31-Aug-98	70		

Attachment C

Hoosier Riverwatch data for the Lower Wildcat Creek Watershed TMDL

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Site ID	River Name	Description	Date	Weather	Past Weather	E-coli (colonies 100 mL)	General Coliforms (colonies 100 mL)	Comments
353	Wildcat Creek	Wildcat Creek Park in Tippecanoe County....public access off of Creasy Lane	12/4/2001	Clear/Sunny	Showers	36630		
486	Wildcat Creek	Bridge on SR 25	10/18/2002	Overcast	Showers	56		
486	Wildcat Creek	Bridge on SR 25	10/17/2003	Clear/Sunny	Clear/Sunny	266.4		
486	Wildcat Creek	Bridge on SR 25	1/7/2004	Clear/Sunny	Rain	200		snow
489	Wildcat Creek	Bridge on CR 900 E, just north of CR 250 N	10/18/2002	Overcast	Showers	60		
489	Wildcat Creek	Bridge on CR 900 E, just north of CR 250 N	10/18/2003	Clear/Sunny	Showers	0		
489	Wildcat Creek	Bridge on CR 900 E, just north of CR 250 N	12/29/2003	Showers	Clear/Sunny	300		
838	Wildcat Creek, north fork	North fork - 200 yards upstream from confluence at Wildcat Park	9/4/2004	Overcast	Stormy	700		The water level was very high due to recent heavy rains.
838	Wildcat Creek, north fork	North fork - 200 yards upstream from confluence at Wildcat Park	10/9/2004	Clear/Sunny	Showers	0	0	
838	Wildcat Creek, north fork	North fork - 200 yards upstream from confluence at Wildcat Park	5/6/2006	Clear/Sunny	Overcast	40	450	
838	Wildcat Creek, north fork	North fork - 200 yards upstream from confluence at Wildcat Park	5/22/2005	Clear/Sunny	Showers	500	240	
838	Wildcat Creek, north fork	North fork - 200 yards upstream from confluence at Wildcat Park	8/11/2005	Overcast	Stormy	100	200	
838	Wildcat Creek, north fork	North fork - 200 yards upstream from confluence at Wildcat Park	7/27/2006	Showers	Overcast	100	600	
838	Wildcat Creek, north fork	North fork - 200 yards upstream from confluence at Wildcat Park	10/2/2005	Clear/Sunny	Stormy	100	400	

838	Wildcat Creek, north fork	North fork - 200 yards upstream from confluence at Wildcat Park	2/11/2006	Clear/Sunny	Overcast	20	600	

Attachment D

Load Duration Curves and Precipitation Graphs for the Lower Wildcat Creek Watershed TMDL

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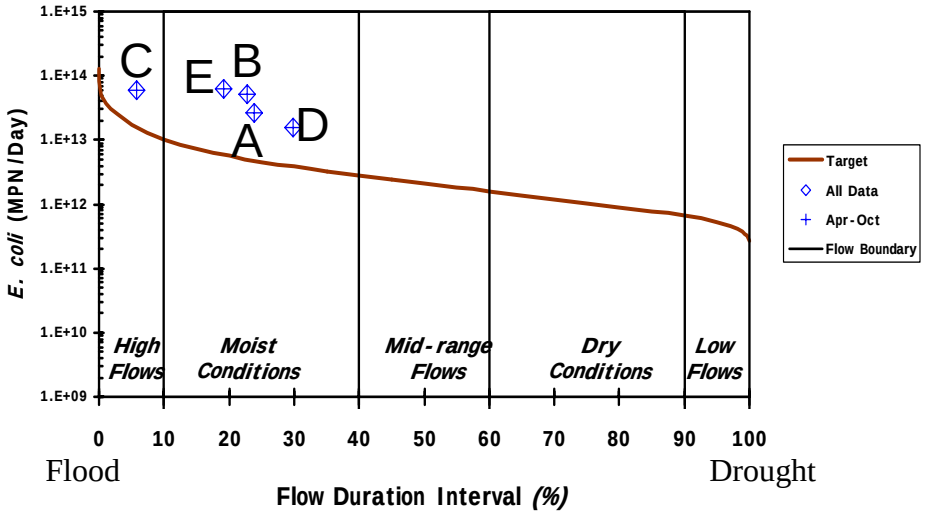
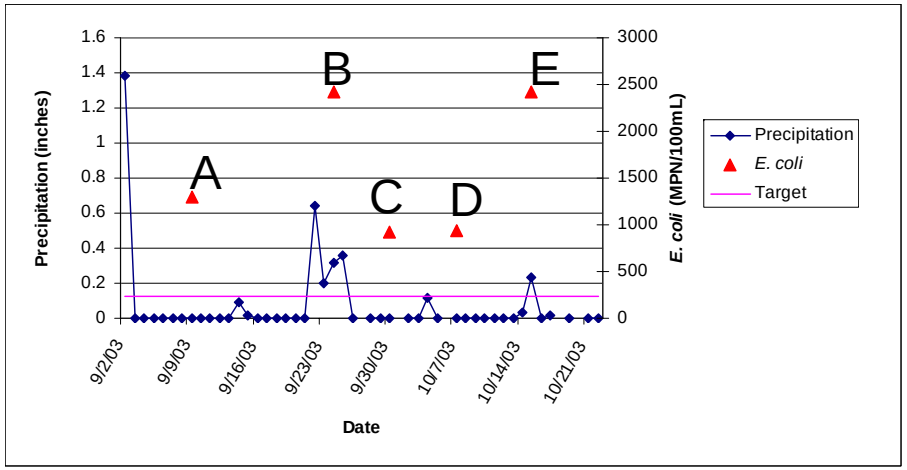
East Fork Little Wildcat Creek SR 26
Site 3: WAW020-0009

Load Duration Curve



Precipitation



UPSTREAM

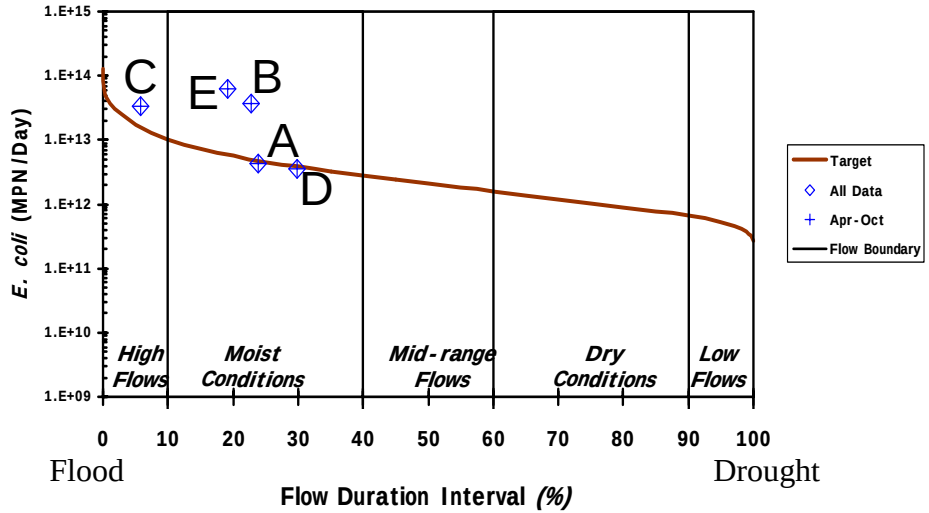
DOWNSTREAM

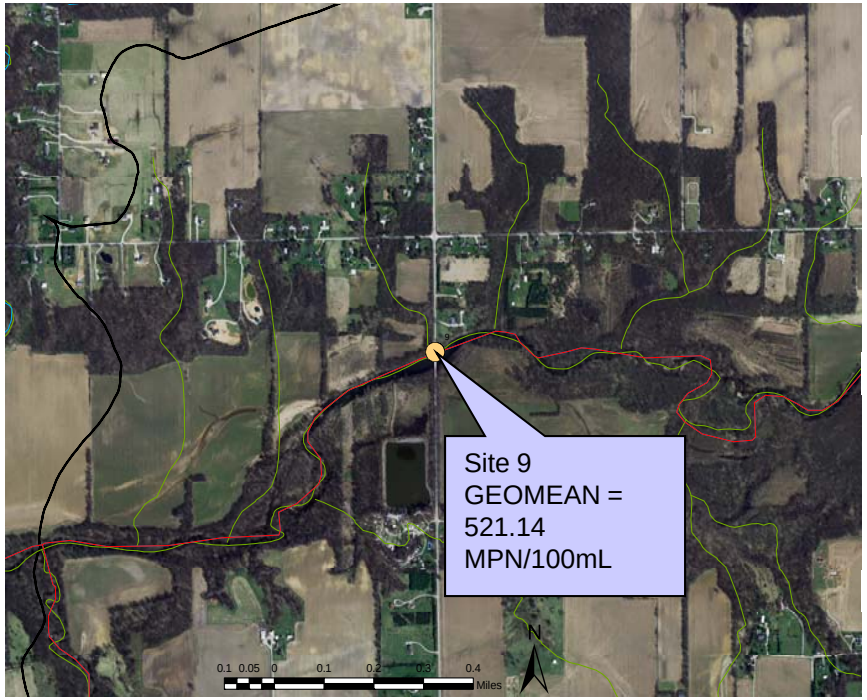
USGS Wildcat Creek Near Lafayette Flow Gage.
Carroll County Precipitation Station - State Climate Office

Drainage Area:
191.7 Square Miles

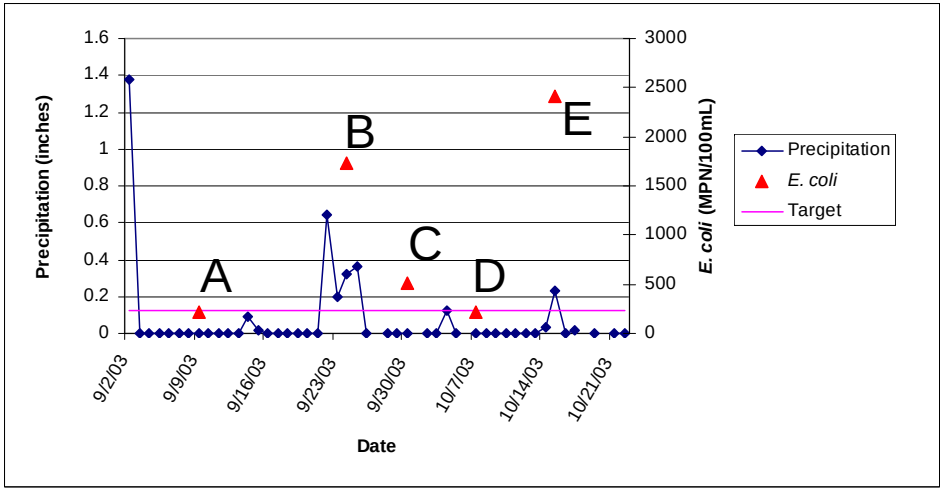
Wildcat Creek CR 750 W
Site 9: WAW020-0020

Load Duration Curve





Precipitation



UPSTREAM

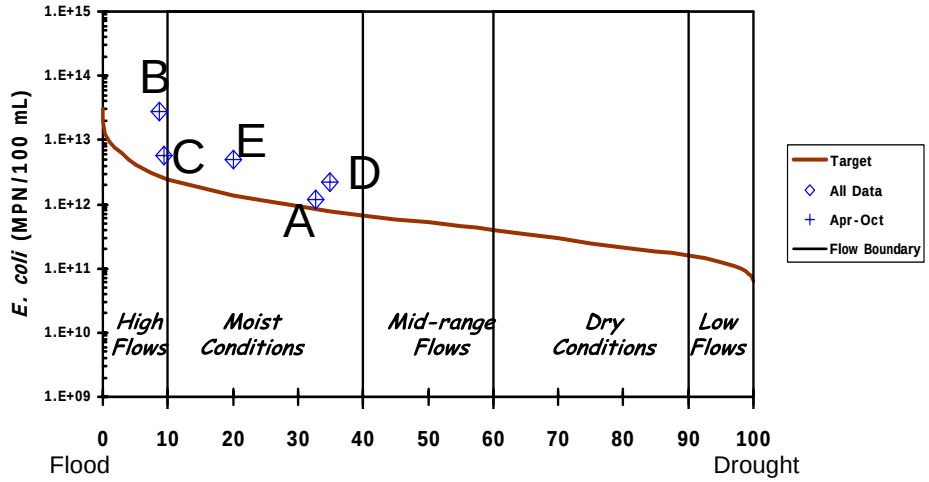
DOWNSTREAM

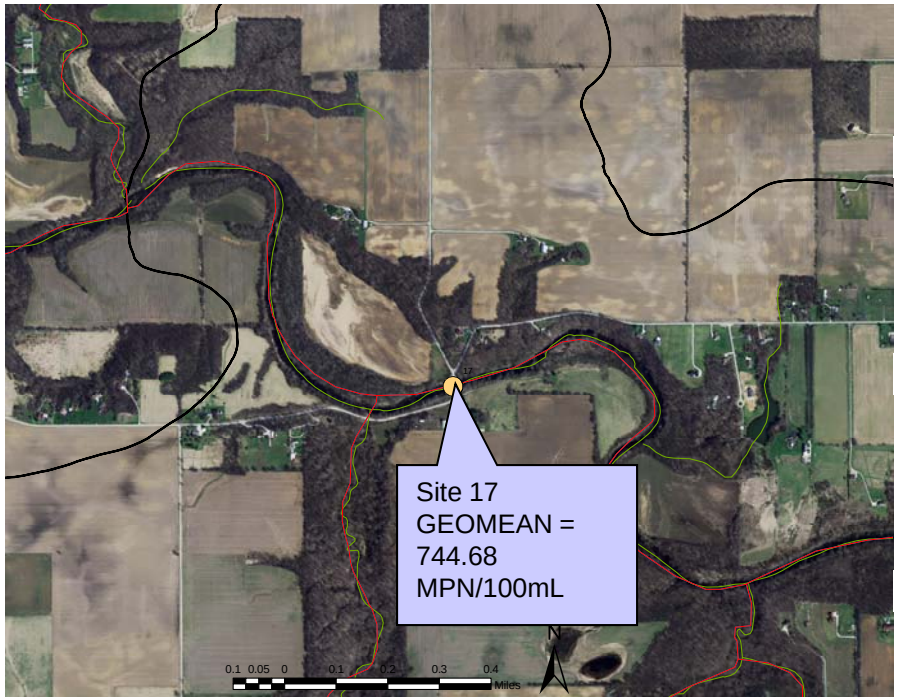
USGS Wildcat Creek Near Lafayette Flow Gage.
Carroll County Precipitation Station - State Climate Office

Drainage Area:
191.7 Square Miles

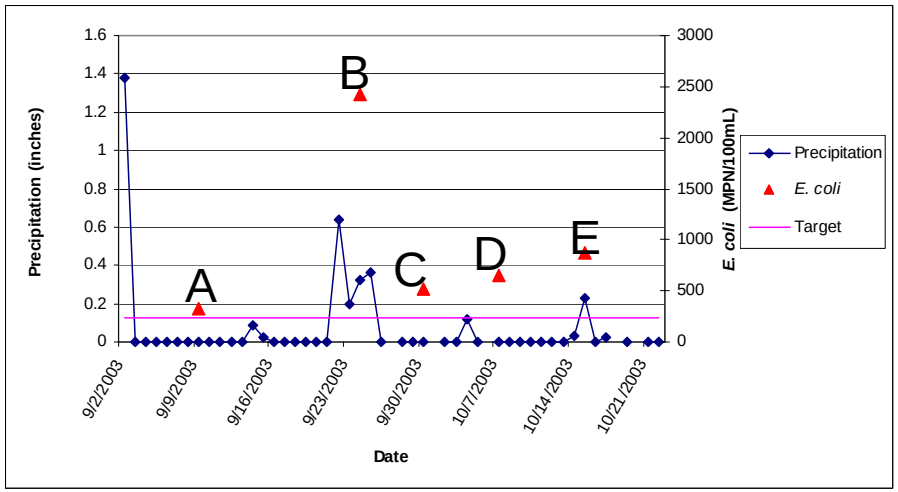
Wildcat Creek CR 1150 W
Site 17: WAW020-0032

Load Duration Curve





Precipitation



UPSTREAM

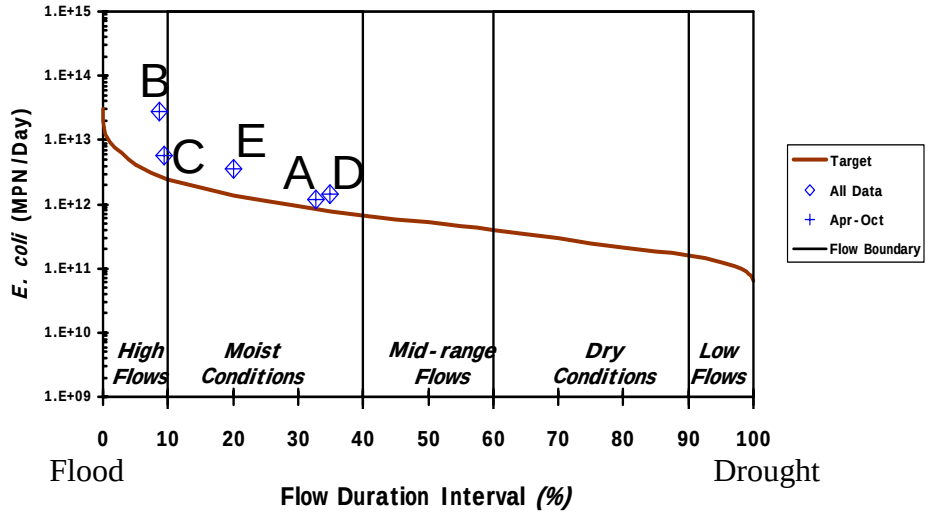
DOWNSTREAM

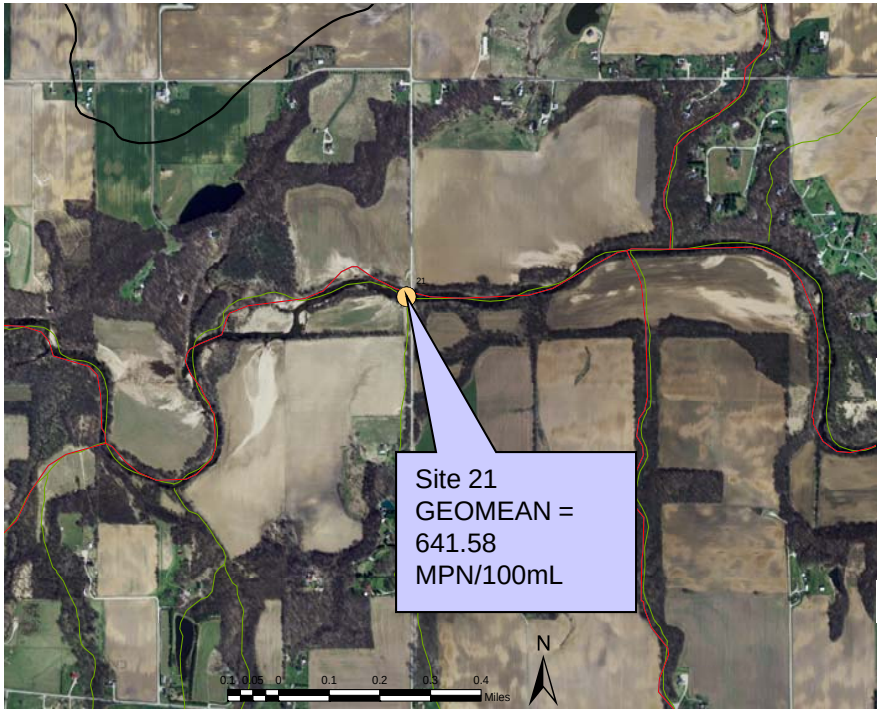
USGS Wildcat Creek Near Lafayette Flow Gage.
Carroll County Precipitation Station - State Climate Office

Drainage Area:
191.7 Square Miles

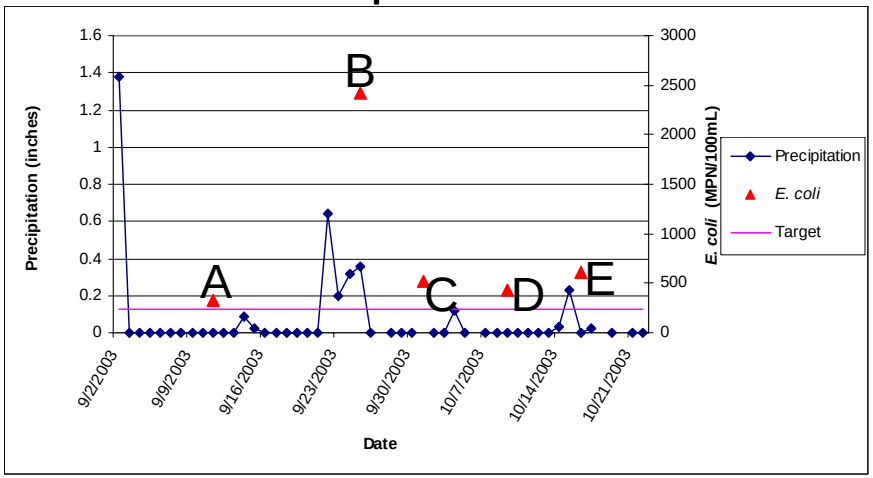
Wildcat Creek CR 500 E
Site 21: WAW020-0036

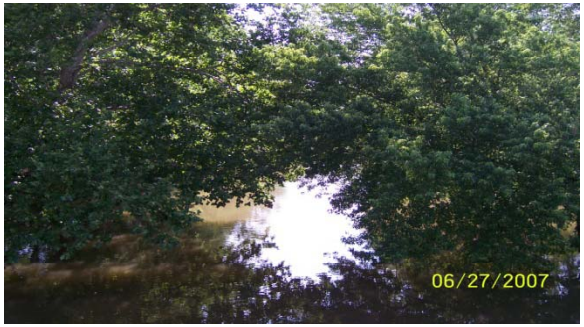
Load Duration Curve





Precipitation





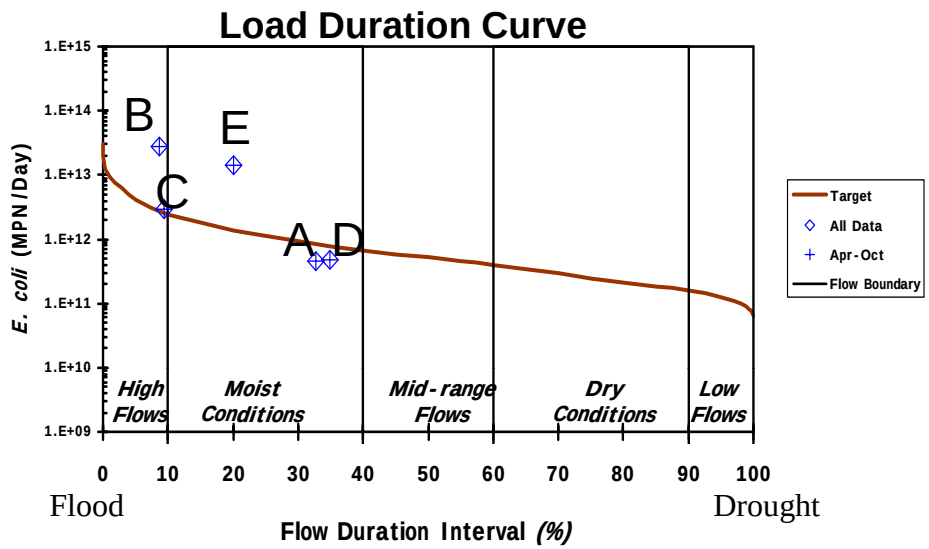
UPSTREAM

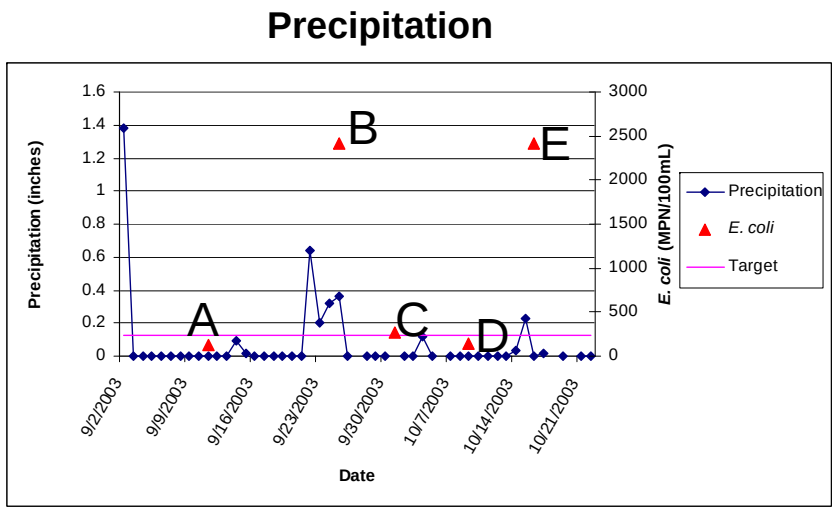
DOWNSTREAM

USGS Wildcat Creek Near Lafayette Flow Gage.
Carroll County Precipitation Station - State Climate Office

Drainage Area:
191.7 Square Miles

Wildcat Creek CR 900 W (County Line Road)
Site 30: WAW020-0099





UPSTREAM

DOWNSTREAM

USGS Wildcat Creek Near Lafayette Flow Gage.
Carroll County Precipitation Station - State Climate Office

Drainage Area:
191.7 Square Miles

Attachment E

Load Reductions for the Lower Wildcat Creek Watershed TMDL

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Site Number	LSITE	Stream Name	Description	Geometric Mean	Percent Reduction Needed
1	WAW020-0089	Kelly East Ditch	CR 600 N	255.89	51.15%
2	WAW020-0088	Kelly West Ditch	CR 500 W	751.10	83.36%
3	WAW020-0009	E Fk Little Wildcat Cr	SR 26	1459.71	91.44%
4	WAW020-0013	W Fk Little Wildcat Cr	CR 200 W	1292.70	90.33%
5	WAW020-0086	Little Wildcat Cr	CR 350 W	532.59	76.53%
6	WAW020-0085	William Vogus Ditch	CR 250 S	357.16	65.00%
7	WAW020-0005	Wildcat Cr	CR 440 W	665.45	81.22%
8	WAW020-0083	Michael Hallihan Ditch	CR 00 N	1462.19	91.45%
9	WAW020-0020	Wildcat Cr	CR 750 W	521.14	76.01%
10	WAW020-0084	E Fk Honey Cr	CR 250 S	703.22	82.22%
11	WAW020-0028	W Honey Cr	CR 250 S	971.03	87.13%
12	WAW020-0030	Honey Cr	CR 100 S	853.10	85.35%
13	WAW020-0031	Wildcat Cr	CR 950 W	787.00	84.12%
14	WAW020-0090	Unnamed Trib to Wildcat Cr	CR 100 S	536.92	76.72%
15	WAW020-0091	Unnamed Trib to Wildcat Cr	CR 100 S	623.31	79.95%
16	WAW020-0092	Unnamed Trib to Wildcat Cr	CR 100 S	1226.72	89.81%
17	WAW020-0032	Wildcat Cr	CR 1150 W	744.68	83.21%
18	WAW020-0093	Unnamed Trib to Wildcat Cr	CR 1200 W	997.57	87.47%
19	WAW020-0094	Petes Run	CR 1150 W	1316.24	90.50%
20	WAW020-0034	Wildcat Cr	SR 22	756.61	83.48%
21	WAW020-0036	Wildcat Cr	CR 500 E	641.58	80.52%
22	WAW020-0095	Hurricane Cr	CR 475 S	229.22	45.47%
23	WAW020-0037	Wildcat Cr	CR 350 E	604.37	79.32%
24	WAW020-0038	Wildcat Cr	CR 50 E	530.36	76.43%
25	WAW020-0040	Wildcat Cr	Prince William Rd	396.64	68.49%
26	WAW020-0096	Unnamed Trib of Wildcat Cr	CR 350 W	203.92	38.70%
27	WAW020-0097	Unnamed Trib to Wildcat Cr	CR 600 S	228.78	45.36%
28	WAW020-0041	Wildcat Cr	US 421 and SR 39	582.76	78.55%
29	WAW020-0098	Schimmel Ditch	CR 650 S	Not Enough Data	N/A
30	WAW020-0099	Wildcat Cr	CR 900 W (County Line Rd)	389.56	67.91%
31	WAW020-0043	Wildcat Cr	Wolfe Rd CR900 E and CR250 N	448.38	72.12%
32	WAW020-0100	Wildcat Creek	Mis-So-La access site	405.13	69.15%
33	WAW020-0101	Unnamed Trib	CR 300 N	1891.11	93.39%
34	WAW050-0014	Wildcat Creek	Wildcat Creek Park	400.32	68.78%
35	WAW050-0013	Wildcat Creek	Peters Mill Landing	353.46	64.64%
36	WAW050-0005	Wildcat Cr	SR 25 Bridge NE of Lafayette	296.45	57.83%
37	WAW050-0012	Unnamed Trib	Barton Beach Road	152.59	18.08%

Attachment F

Segment Load Reductions for the Lower Wildcat Creek Watershed TMDL

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Segment ID	Miles	Sample Maximum	Target	Total Needed Reduction	Segment Percentage of Watershed	Segment Load Reduction
INB0741_03	8.43	2420	235	2185	3.51%	76.66
INB0741_04	9.37	2420	235	2185	3.90%	85.24
INB0741_T1006	2.04	2420	235	2185	0.85%	18.51
INB0742_04	8.86	2420	235	2185	3.69%	80.62
INB0742_T1004	2.49	2420	235	2185	1.04%	22.67
INB0742_T1005	1.84	2420	235	2185	0.77%	16.78
INB0742_T1006	9.99	2420	235	2185	4.16%	90.87
INB0743_04	13.32	2420	235	2185	5.55%	121.19
INB0743_T1006	1.00	2420	235	2185	0.41%	9.05
INB0743_T1007	2.20	2420	235	2185	0.92%	20.04
INB0743_T1008	3.16	2420	235	2185	1.31%	28.70
INB0743_T1010	3.94	2420	235	2185	1.64%	35.79
INB0745_04	19.20	2420	235	2185	7.99%	174.63
INB0745_T1008	1.46	2420	235	2185	0.61%	13.25
INB0745_T1009	1.10	2420	235	2185	0.46%	9.99
INB0745_T1012	3.07	2420	235	2185	1.28%	27.95
INB0745_T1013	4.72	2420	235	2185	1.97%	42.95
INB0745_T1014	2.26	2420	235	2185	0.94%	20.55
INB0746_03	3.31	2420	235	2185	1.38%	30.13
INB0746_03A	0.36	2420	235	2185	0.15%	3.26
INB0746_03B	0.79	2420	235	2185	0.33%	7.16
INB0746_03C	0.48	2420	235	2185	0.20%	4.40
INB0746_03D	0.83	2420	235	2185	0.35%	7.56
INB0746_T1005	13.08	2420	235	2185	5.45%	118.99
INB0746_T1006	1.99	2420	235	2185	0.83%	18.06
INB0746_T1007	1.51	2420	235	2185	0.63%	13.77
INB0746_T1008	2.03	2420	235	2185	0.85%	18.51
INB0747_01	24.61	2420	235	2185	10.24%	223.83
INB0747_T1004	3.44	2420	235	2185	1.43%	31.31
INB0747_T1005	3.42	2420	235	2185	1.43%	31.15
INB0748_01	13.89	2420	235	2185	5.78%	126.36
INB0748_01A	0.61	2420	235	2185	0.25%	5.52
INB0748_T1001	1.99	2420	235	2185	0.83%	18.13
INB0748_T1002	3.76	2420	235	2185	1.57%	34.20
INB0748_T1003	6.86	2420	235	2185	2.85%	62.37
INB0748_T1004	1.38	2420	235	2185	0.57%	12.53
INB0749_01	36.01	2420	235	2185	14.99%	327.56
INB0749_02	5.26	2420	235	2185	2.19%	47.80
INB0749_03	7.85	2420	235	2185	3.27%	71.41
INB0749_T1006	8.30	2420	235	2185	3.46%	75.54
	240.23				100.00%	2185.00