Final
Total Maximum Daily Load for Escherichia coli
40 Stream Segments within the Clarks River Watershed
Calloway, Graves, Marshall, and McCracken Counties, Kentucky
September, 2011

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This report is approved for release

Sandra L. Gruzesky, P.E., Director
Division of Water

9/26/11
Date

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Glossary of Acronyms

ADD	Area Development District
AFO	Animal Feeding Operation
AWQA	Agriculture Water Quality Act
BMP	Best Management Practices
CAFO	Concentrated Animal Feeding Operation
CFR	Code of Federal Regulations
CPP	Continuing Planning Process
CSO	Combined Sewer Overflow
DMR	Discharge Monitoring Report
GNIS	Geographic Names Information System
HUC	Hydrologic Unit Code
KAR	Kentucky Administrative Regulations
KDOW	Kentucky Division of Water
KGS	Kentucky Geological Survey
KRS	Kentucky Revised Statutes
KIA	Kentucky Infrastructure Authority
KNDOP	Kentucky No Discharge Operating Permit
KPDES	Kentucky Pollution Discharge Elimination System
LA	Load Allocations
MAF	Mean Annual Flow
MGD	Million Gallons per Day
MOS	Margin of Safety
MS4	Municipal Separate Storm Sewer Systems
NASS	National Agricultural Statistics Service
NLCD	National Land Cover Database
NRCS	Natural Resources Conservation Service
OSTDS	On Site Sewage Treatment and Disposal System
PCR	Primary Contact Recreation
POTW	Publicly Owned Treatment Works
RM	River Mile
SCR	Secondary Contact Recreation
SOP	Standard Operating Procedures
STP	Sewage Treatment Plant
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WBID	Waterbody Identification Number
WLA	Waste Load Allocation
WQC	Water Quality Criteria
WQS	Water Quality Standard
WWTP	Wastewater Treatment Plant

Total Maximum Daily Load Synopsis

State: Kentucky
Major River Basin: Tennessee
USGS HUC8#: 06040006
Counties: Calloway, Graves, Marshall, and McCracken
Pollutants of Concern: *E. coli*

The Clarks River, United States Geological Survey 8 digit HUC (Hydrologic Unit Code) 06040006, is located in the Jackson Purchase area of western Kentucky (Figure S1). It encompasses parts of four counties (McCracken, Graves, Marshall and Calloway) and covers 546 square miles of land. The southern (upper) most reaches of the basin extend into northern Henry County, Tennessee.

The Kentucky Division of Water (KDOW) contracted with Murray State University's Hancock Biological Station and Center for Reservoir Research (MSU) to monitor for Escherichia coli (*E. coli*, a pathogen indicator) in the Clarks River Watershed. The Clarks River was intensively sampled in the 2005 primary contact recreation season (May−October) for *E. coli*. Additional sampling in 2006 by MSU at Clayton Creek and also by a 319(h) grant to the Jackson Purchase RC&D enhanced efforts in the upper Clarks River watershed. This additional funding made available several more data points for use in the TMDL. This document contains the monitoring results and describes TMDL development for pathogen indicators in the Clarks River watershed as required under Section 303(d) of the Clean Water Act. Table S.1 lists the pathogen indicator impaired segments for which TMDLs are developed in this document.

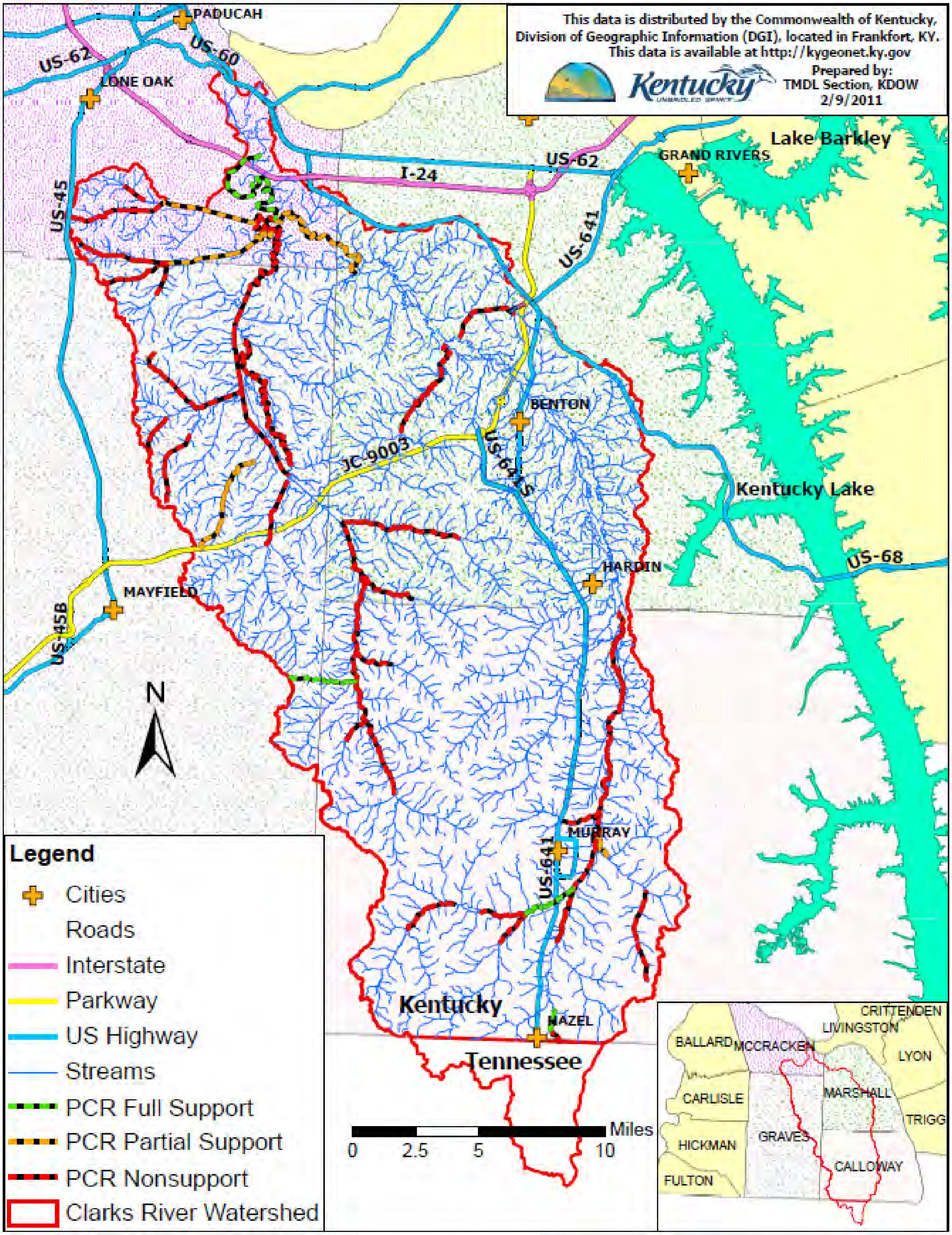

Figure S1. Location of the Clarks River watershed (USGS HUC 06040006)

Table S.1 Impaired Waterbodies Addressed in this TMDL Document

Waterbody Name	Pollutant[3]	County	GNIS Number	Suspected Sources	Impaired[3] Use (Support Status)
Bee Creek 0.0 to 0.7	*E. coli*	Calloway	KY486666_01	Source Unknown	PCR (NS)
Bee Creek 0.7 to 2.0	*E. coli*	Calloway	KY486666_02	Source Unknown	PCR (NS)
[1]Blizzard Pond 4.8 to 5.8	*E. coli*	McCracken	KY487484_02	Package Plant or Other Permitted Small Flows Discharges	PCR (NS)
Blizzard Pond Drainage Canal 0.0 to 3.7	*E. coli*	McCracken	KY487484_01	Source Unknown	PCR (PS)
Camp Creek 0.0 to 5.4	*E. coli*	McCracken	KY488685_00	Source Unknown	PCR (PS)
[1]Camp Creek 5.4 to 9.5	*E. coli*	Graves	KY488685_02	Source Unknown	PCR (NS)
Chestnut Creek 0.0 to 3.0	*E. coli*	Marshall	KY489424_00	Source Unknown	PCR (NS)
Clarks River 13.2 to 20.6	*E. coli*	McCracken	KY489552_02	Source Unknown	PCR (PS)
[2]Clarks River 50.9 to 55.6	Fecal Coliform	Calloway	KY489552_07	Package Plant or Other Permitted Small Flows Discharges	PCR (NS)
Clarks River 55.6 to 64.7	*E. coli*	Calloway	KY489552_08	Agriculture	PCR (NS)
Clarks River 64.7 to 66.8	*E. coli*	Calloway	KY489552_09	Source Unknown	PCR (NS)
Clayton Creek 3.3 to 7.7	*E. coli*	Calloway	KY489601_02	Source Unknown	PCR (NS)
[1]Clayton Creek Relict Channel 0.0 to 1.2	*E. coli*	Calloway	KY489552-63.7_01	Source Unknown	PCR (PS)
Damon Creek 0.0 to 1.8	*E. coli*	Calloway	KY490545_01	Animal Feeding Operations (NPS)	PCR (NS)
Duncan Creek 0.0 to 2.5	*E. coli*	Marshall	KY491300_00	Source Unknown	PCR (NS)
[1]East Fork Clarks River 0.0 to 2.7	*E. coli*	Calloway	KY491450_01	Source Unknown	PCR (NS)
[1]East Fork Clarks River 7.1 to 8.0	*E. coli*	Calloway	KY491450_03	Source Unknown	PCR (NS)
[1]Farley Branch of Middle Fork Clarks River 0.0 to 2.2	*E. coli*	Calloway	KY491983_01	Source Unknown	PCR (NS)

Waterbody Name	Pollutant[3]	County	GNIS Number	Suspected Sources	Impaired[3] Use (Support Status)
[1]Haskell Branch 1.2 to 4.5	*E. coli*	Graves	KY493854_01	Source Unknown	PCR (NS)
Middle Fork Creek of Clarks River 0.2 to 6.0	*E. coli*	Marshall	KY498118_00	Agriculture	PCR (NS)
[1]Middle Fork of Clarks River 2.7 to 4.8	*E. coli*	Calloway	KY498115_02	Source Unknown	PCR (NS)
[1]Middle Fork of Clarks River 6.15 to 9.1	*E. coli*	Calloway	KY498115_03	Source Unknown	PCR (NS)
Panther Creek 0.0 to 3.0	*E. coli*	Graves	KY500155_01	Source Unknown	PCR (NS)
[1]Sand Lick Branch 0.0 to 1.2	*E. coli*	Calloway	KY502926_01	Source Unknown	PCR (NS)
[1]Soldier Creek 0.0 to 5.7	*E. coli*	Marshall	KY503868_01	Source Unknown	PCR (NS)
[1]South Fork Camp Creek 0.0 to 1.3	*E. coli*	Graves	KY503908_01	Source Unknown	PCR (NS)
[1]Spring Creek 0.0 to 2.0	*E. coli*	Calloway	KY504124_01	Source Unknown	PCR (NS)
[1]Spring Creek 3.6 to 5.4	*E. coli*	Calloway	KY504124_02	Source Unknown	PCR (NS)
[1]Trace Creek 0.95 to 5.9	*E. coli*	Graves	KY505419_01	Source Unknown	PCR (PS)
[1]Turkey Creek 0.0 to 3.4	*E. coli*	Graves	KY505595_01	Source Unknown	PCR (NS)
[1]UT South Fork Camp Creek 0.0 to 3.0	*E. coli*	Graves	KY503908-0.05_01	Source Unknown	PCR (NS)
[1]UT Chestnut Creek 0.0 to 0.7	*E. coli*	Marshall	KY489424-2.8_00	Source Unknown	PCR (NS)
[1]UT Blizzard Pond Drainage Canal 0.0 to 4.2	*E. coli*	McCracken	KY487484-1.3_01	Source Unknown	PCR (NS)
[1]West Fork Clarks River Relict Channel 0.0 to 13.8	*E. coli*	Graves	KY506427_01	Source Unknown	PCR (NS)
West Fork of Clarks River 0.0 to 10.4	*E. coli*	McCracken	KY506426_01	Agriculture, Urban Runoff/Storm Sewers	PCR (NS)
[1]West Fork of Clarks River 10.4 to 13.1	*E. coli*	Graves	KY506426_02	Source Unknown	PCR (NS)
West Fork of Clarks River 13.1 to 17.2	*E. coli*	Graves	KY506426_03	Source Unknown	PCR (NS)

Waterbody Name	Pollutant[3]	County	GNIS Number	Suspected Sources	Impaired[3] Use (Support Status)
West Fork of Clarks River 20.1 to 28.4	*E. coli*	Marshall	KY506426_04	Source Unknown	PCR (NS)
[1]West Fork of Clarks River 28.4 to 29.15	*E. coli*	Calloway	KY506426_05	Source Unknown	PCR (NS)
[1]West Fork of Clarks River 29.15 to 31.35	*E. coli*	Calloway	KY506426_06	Source Unknown	PCR (NS)
[1]West Fork of Clarks River 31.35 to 34.2	*E. coli*	Calloway	KY506426_07	Source Unknown	PCR (NS)

Note: [1]Indicates a new listing not on the draft 2010-303(d) list.
[2]Re-assessment of this segment is recommended prior to either delisting or TMDL development for it.
[3]Pollutants and Support Status reflect the most recent assessments, which have not made it into the 303(d) listing process yet. In most cases, a previous impairment for fecal coliform has been updated to *E. coli* and support status reflects the level of *E. coli* impairment.

Kentucky Water Quality Criteria (WQC):

The WQC in 401 KAR 10:031 (Kentucky's Surface Water Standards) for the PCR use are based on both fecal coliform and *E. coli*. Per 401 KAR 10:031:

"The following criteria shall apply to waters designated as primary contact recreation use during the primary contact recreation season of May 1 through October 31: Fecal coliform content or Escherichia coli content shall not exceed 200 colonies per 100 ml or 130 colonies per 100 ml respectively as a geometric mean based on not less than five (5) samples taken during a thirty (30) day period. Content also shall not exceed 400 colonies per 100 ml in twenty (20) percent or more of all samples taken during a thirty (30) day period for fecal coliform or 240 colonies per 100 ml for Escherichia coli."

Both the geomean and instantaneous criteria of 130 and 240 *E. coli* colonies/100 ml, respectively, were applied to calculate allowable loadings to bring the watershed into compliance with the PCR designated use. The loading requiring the greatest percent reduction was set as the TMDL for a segment.

TMDL Components and Target:
A TMDL calculation is performed as follows:

$$\text{TMDL} = \text{WLA} + \text{LA} + \text{MOS}$$
(Equation 1)

The WLA has three components:

$$\text{WLA} = \text{SWS-WLA} + \text{MS4-WLA} + \text{Future Growth-WLA}$$
(Equation 2)

Definitions:
TMDL: the WQC, expressed as a load. This is defined as a geomean concentration of 130 and instantaneous concentration of 240 *E. coli* colonies/100 ml.
MOS: the Margin of Safety, which can be an implicit or explicit additional reduction applied to sources of pollutants that accounts for uncertainties in the relationship between effluent limits and water quality.
TMDL Target: the TMDL minus the MOS.
WLA: the Wasteload Allocation, which is the allowable loading of pollutants into the stream from KPDES-permitted sources such as SWSs and MS4s.
SWS-WLA: the WLA for KPDES-permitted sources, which have discharge limits for bacteria (including wastewater treatment plants, package plants and home units).
Future Growth-WLA: the allowable loading for future KPDES-permitted sources, including new SWSs, expansion of existing SWSs, new storm water sources, and growth of existing storm water sources (such as MS4s).
MS4-WLA: the WLA for KPDES-permitted municipal separate storm water sewer systems (including, but not limited to cities, counties, KYTC, universities and military bases).
Remainder: the TMDL minus the MOS and minus the SWS-WLA (also equal to Future Growth-WLA plus the MS4-WLA and the LA).
LA: the Load Allocation, which is the allowable loading of pollutants into the stream from sources not permitted by KPDES and from natural background.
Seasonality: Yearly factors that affect the relationship between pollutant inputs and the ability of the stream to meet its designated uses.
Critical Condition: The period when the pollutant conditions are expected to be at their worst.
MAF: the Mean Annual Flow as defined by USGS.
Adjusted MAF: the MAF plus SWS-WLA design flows.
Critical Flow: the flow used to calculate the TMDL as a load (is equivalent to the Adjusted MAF for MAF TMDLS)
Existing Conditions: the load that exists in the watershed at the time of TMDL development (i.e., sampling) and is causing the impairment.
Percent Reduction: the reduction needed to bring the existing conditions in line with the TMDL Target.
Load: Concentration * Flow * Conversion Factor in colonies per day (colonies/day)
Concentration: colonies per 100 milliliters (colonies/100ml)
Flow (i.e. stream discharge): cubic feet per second (cfs)
Conversion Factor: the value which converts the product of Concentration and Flow to Load (in units of colonies per day); it is derived from the calculation of the following components: (28.31685) L/cf * 86400sec/day * 1000ml/L)/ (100 ml) and is equal to 24465758.4.

<u>Calculation Procedure</u>:

1) The MOS, if an explicit value, is calculated and subtracted from the TMDL first, giving the TMDL Target;
2) Percent reductions are calculated to show the difference between Existing Conditions and the TMDL Target;
3) The SWS-WLA is calculated and subtracted from the TMDL Target, leaving the Remainder;

4) The Future Growth-WLA is calculated and subtracted from the Remainder;
5) If there is a MS4 present upstream of the impaired segment, the MS4-WLA is subtracted from the Remainder based on percent landcover, leaving the LA.

Margin of Safety:
There are two methods for incorporating a MOS in the TMDL analysis: implicitly include the MOS using conservative assumptions, or explicitly set aside a (numerical) portion of the TMDL as the MOS and divide the remainder of the allowable load (i.e., the TMDL Target load) between the LA and WLA. For this TMDL, a 10% explicit MOS (i.e., 10% of the WQC— 13 or 24 *E. coli* colonies/100 ml for geomean and instantaneous WQC, respectively-- but expressed as a load where possible) was reserved to address uncertainties involving loading from non-SWS sources. SWS sources have an implicit MOS based on the fact that they seldom operate at their design flow. The explicit MOS load was calculated using the following equation:

13 geomean or 24 instantaneous (colonies/100ml)	×	Critical Flow (cfs)	×	Conversion Factor 24465758.4	=	MOS (colonies/day)

WLA:
The WLA is the portion of the TMDL allocated to KPDES-permitted sources within the watershed(s).

The SWS-load was calculated using the following equation:

130 geomean or 240 instantaneous (colonies/100ml)	×	Design Flow (cfs)	×	Conversion Factor 24465758.4	=	SWS-WLA (colonies/day)

The individual SWS-WLAs for each facility that discharges to an impaired segment are summed to create a final SWS-WLA for that segment.

Future Growth WLA:
The amount set aside for future growth is determined using Table S.2:

Table S.2 Future Growth

Percent Developed Area in the Subwatershed	Future Growth WLA Percentage
≥25%	5%
≥20% – <25%	4%
≥15% – <20%	3%
≥10% – <15%	2%
≥5% – <10%	1%
<5%	0.5%

The Future Growth WLA is calculated using the following formula:

Remainder	×	Future Growth-WLA percentage	=	Future Growth-WLA

MS4-WLA:
The MS4-WLA is calculated using the following equation:

(TMDL - MOS - SWS-WLA)	×	% of (developed acres in MS4 boundary)/(total acres in subwatershed)	=	MS4-WLA

LA:
The LA is calculated using the following equation:

Remainder	-	Future Growth WLA	-	MS4-WLA	=	LA

The available sampling data were insufficient to apportion the existing loading among the various LA sources; therefore, it is attributed to all LA sources.

Seasonality:
Seasonality considers yearly factors such as temporal variations on source behavior and stream loading than can affect the relationship between pollutant inputs and the ability of the stream to meet its designated uses. This TMDL addresses seasonality by only using samples collected within the PCR season (May - October).

Critical Condition:
The critical condition for nonpoint source pathogen loadings is typically an extended dry period followed by a rainfall runoff event. During the dry weather period, pathogens and bacteria build up on the land surface, and are washed off by subsequent rainfall. Conversely, the critical condition for point source loading typically occurs during periods of low stream flow when dilution is minimized. The Clarks River watershed contains both types of sources; therefore the critical condition for each PCR-impaired segment is defined by the geomean or sample showing the highest exceedance.

Existing Condition:
The maximum exceedance or greatest geomean of all samples collected along a segment was selected to represent existing conditions. This concentration was converted to a load using the following equation:

$$\frac{\text{Maximum Exceedance or Greatest Geomean}}{(\text{colonies/100ml})} \times \frac{\text{Critical Flow}}{(\text{cfs})} \times \text{Conversion Factor } 24465758.4 = \frac{\text{Existing Load}}{(\text{colonies/day})}$$

Percent Reduction:
A 'percent reduction' was calculated for informational purposes only to illustrate the difference between existing conditions and the TMDL Target at the time the streams were sampled.

TMDLs Calculated as a Daily Load:
Federal guidelines of the Clean Water Act require a TMDL to be expressed in terms of a daily load. Due to the limited amount of data available, particularly the absence of stream gages or in-stream flow data, a method was developed utilizing the WQC and Mean Annual Flow (MAF) as outlined in the *Pathogen TMDL [Standard Operating Procedure] SOP* (KDOW, 2009) to convert bacteria concentrations to loads. The USGS has generated a MAF value for streams across Kentucky. The MAF values were calculated using the equation found in the USGS Water-Resources Investigations Report 02-4206 "Estimating Mean Annual Stream flow of Rural Streams in Kentucky" (http://ky.water.usgs.gov/pubs/wrir_2002_4206.pdf). The MAF values can be found on the Hydrology of Kentucky webpage (http://kygeonet.ky.gov/kyhydro/main.htm). The MAF was determined at the downstream end of each impaired segment. Once obtained, SWS inputs (i.e. WWTP, home unit, etc., design capacity) were added to the MAF to generate an Adjusted MAF, which is also the critical flow. The critical flow is then multiplied by the WQC minus the MOS (10%) times the appropriate conversion factors to obtain the TMDL Target (i.e., the allowable daily load). The TMDLs for each segment are shown in Table S.3.

Table S.3 TMDLs for Impaired Segments

Waterbody Name	Existing Load (*E. coli* colonies/day)	**Total TMDL** (*E. coli* colonies/ day)	**MOS** (*E. coli* colonies / day)	TMDL Target (*E. coli* colonies/ day)	% reduction	**SWS-WLA** (*E. coli* colonies/day)	Remainder (*E. coli* colonies/ day)	**MS4 WLA** (*E. coli* colonies/ day)	**Future Growth WLA**[1] (*E. coli* colonies/ day)	**LA** (*E. coli* colonies/ day)
Bee Creek 0.0 to 0.7	1.59E+13	**1.35E+11**	**1.35E+10**	1.21E+11	99.2%	**7.95E+10** **(Bee Creek WWTP 7.95E+10)**	4.17E+10	**1.21E+10**	**2.09E+09**	**2.75E+10**
Bee Creek 0.7 to 2.0	1.02E+13	**5.05E+10**	**5.05E+09**	4.54E+10	99.6%	**0**	4.54E+10	**1.31E+10**	**2.27E+09**	**3.00E+10**
Blizzard Pond 4.8 to 5.8	2.77E+12	**2.35E+10**	**2.35E+09**	2.12E+10	99.2%	**6.36E+08** **(Great Oaks Subdivision 6.36E+08)**	2.05E+10	**N/A**[3]	**2.05E+08**	**2.03E+10**
Blizzard Pond Drainage Canal 0.0 to 3.7	1.28E+13	**1.09E+11**	**1.09E+10**	9.78E+10	99.2%	**6.63E+08** **(Freemont Baptist Mission 2.73E+07),** **(Great Oaks Subdivision 6.36E+08)**	9.72E+10	**N/A**[3]	**9.72E+08**	**9.62E+10**
Camp Creek 0.0 to 5.4	1.04E+13	**1.12E+11**	**1.12E+10**	1.00E+11	99.0%	**0**	1.00E+11	**N/A**[3]	**5.02E+08**	**9.99E+10**
Camp Creek 5.4 to 9.5	8.76E+11	**2.88E+10**	**2.88E+09**	2.59E+10	97.0%	**0**	2.59E+10	**N/A**[3]	**1.29E+08**	**2.58E+10**
Chestnut Creek 0.0 to 3.0	1.24E+13	**6.15E+10**	**6.15E+09**	5.54E+10	99.6%	**1.65E+09** **(Marshall County High School and Technical Center 2.73E+08),** **(Marshall County Sanitation District #2 1.36E+09),** **(Memory Lane Trailer Court 1.82E+07)**	5.37E+10	**N/A**[3]	**5.37E+08**	**5.32E+10**
Clarks River 13.2 to 20.6	1.45E+13	**2.46E+12**	**2.46E+11**	2.21E+12	84.7%	**9.24E+10** **(Bee Creek WWTP 7.95E+10),** **(Benton STP 9.08E+09),** **(East Calloway Elementary School 7.27E+07),** **(Golden Acres Subdivision 2.27E+08),** **(Hardin STP 1.29E+09),** **(Marshall County High School and Technical Center 2.73E+08),** **(Marshall County Sanitation District #2 1.36E+09),** **(Memory Lane Trailer Court 1.82E+07),** **(Murray Mobile Home & RV Park 6.36E+07),** **(North Calloway Elementary School 7.27E+07),** **(South 641 Water District 2.73E+08),** **(South Marshall Elementary and Middle School 5.45E+07),** **(Southwest Calloway Elementary School 7.27E+07)**	2.12E+12	**4.04E+10**	**2.12E+10**	**2.06E+12**[2]
Clarks River 55.6 to 64.7	3.59E+13	**1.18E+12**	**1.18E+11**	1.06E+12	97.0%	**8.00E+10** **(Bee Creek WWTP 7.95E+10),** **(East Calloway Elementary School 7.27E+07),** **(Murray Mobile Home and RV Park 6.36E+07),** **(North Calloway Elementary School 7.27E+07),** **(South 641 Water District 2.73E+08),** **(Southwest Calloway Elementary School 7.27E+07)**	9.18E+11	**4.03E+10**	**1.96E+10**	**9.21E+11**[2]

Waterbody Name	Existing Load (*E. coli* colonies/day)	**Total TMDL** (*E. coli* colonies/ day)	**MOS** (*E. coli* colonies / day)	TMDL Target (*E. coli* colonies/ day)	% reduction	**SWS-WLA** (*E. coli* colonies/day)	Remainder (*E. coli* colonies/ day)	**MS4 WLA** (*E. coli* colonies/ day)	**Future Growth WLA**(1) (*E. coli* colonies/ day)	**LA** (*E. coli* colonies/ day)
Clarks River 64.7 to 66.8	1.09E+14	**7.53E+11**	**7.53E+10**	6.78E+11	99.4%	**4.18E+08 (East Calloway Elementary School 7.27E+07), (South 641 Water District 2.73E+08), (Southwest Calloway Elementary School 7.27E+07)**	6.77E+11	**1.83E+10**	**6.77E+09**	**6.52E+11**(2)
Clayton Creek 3.3 to 7.7	3.82E+12	**5.28E+10**	**5.28E+09**	4.76E+10	98.8%	**0**	4.76E+10	**N/A**(3)	**4.76E+08**	**4.71E+10**
Clayton Creek Relict Channel 0.0 to 1.2	4.88E+11	**3.83E+10**	**3.83E+09**	3.45E+10	92.9%	**1.36E+08 (East Calloway Elementary School 7.27E+07), (Murray Mobile Home and RV Park 6.36E+07)**	3.43E+10	**N/A**(3)	**6.87E+08**	**3.36E+10**
Damon Creek 0.0 to 1.8	2.25E+12	**4.40E+10**	**4.40E+09**	3.96E+10	98.2%	**0**	3.96E+10	**N/A**(3)	**1.98E+08**	**3.94E+10**
Duncan Creek 0.0 to 2.5	1.45E+12	**8.93E+10**	**8.93E+09**	8.03E+10	94.5%	**0**	8.03E+10	**N/A**(3)	**4.02E+08**	**7.99E+10**
East Fork Clarks River 0.0 to 2.7	4.80E+11	**3.29E+11**	**3.29E+10**	2.96E+11	38.3%	**2.73E+08 (South 641 Water District 2.73E+08)**	2.96E+11	**N/A**(3)	**2.96E+09**	**2.93E+11**(2)
East Fork Clarks River 7.1 to 8.0	5.12E+11	**1.06E+11**	**1.06E+10**	9.51E+10	81.4%	**0**	9.51E+10	**N/A**(3)	**9.51E+08**	**9.42E+10**(2)
Farley Branch 0.0 to 2.2	3.22E+11	**1.10E+11**	**1.10E+10**	9.94E+10	69.1%	**0**	9.94E+10	**N/A**(3)	**9.94E+08**	**9.84E+10**(2)
Haskell Branch 1.2 to 4.5	3.17E+10	**2.17E+10**	**2.17E+09**	1.96E+10	38.3%	**0**	1.96E+10	**N/A**(3)	**9.78E+07**	**1.95E+10**
Middle Fork Creek of Clarks River 0.2 to 6.0	6.98E+12	**1.71E+11**	**1.71E+10**	1.54E+11	97.8%	**0**	1.54E+11	**N/A**(3)	**1.54E+09**	**1.53E+11**
Middle Fork of Clarks River 2.7 to 4.8	8.43E+11	**2.40E+11**	**2.40E+10**	2.16E+11	74.4%	**7.27E+07 (Southwest Calloway Elementary School 7.27E+07)**	2.16E+11	**N/A**(3)	**2.16E+09**	**2.13E+11**
Middle Fork of Clarks River 6.15 to 9.1	1.91E+12	**1.41E+11**	**1.41E+10**	1.27E+11	93.3%	**0**	1.27E+11	**N/A**(3)	**1.27E+09**	**1.26E+11**
Panther Creek 0.0 to 3.0	7.85E+11	**1.64E+11**	**1.64E+10**	1.48E+11	81.2%	**0**	1.48E+11	**N/A**(3)	**7.40E+08**	**1.47E+11**
Sand Lick Branch 0.0 to 1.2	2.11E+11	**2.41E+10**	**2.41E+09**	2.17E+10	89.7%	**0**	2.17E+10	**N/A**(3)	**2.17E+08**	**2.15E+10**
Soldier Creek 0.0 to 5.7	8.40E+11	**1.52E+11**	**1.52E+10**	1.37E+11	83.7%	**0**	1.37E+11	**N/A**(3)	**6.84E+08**	**1.36E+11**
South Fork Camp Creek 0.0 to 1.3	1.24E+12	**4.58E+10**	**4.58E+09**	4.12E+10	96.7%	**0**	4.12E+10	**N/A**(3)	**2.06E+08**	**4.10E+10**
Spring Creek 0.0 to 2.0	2.54E+13	**1.24E+11**	**1.24E+10**	1.12E+11	99.6%	**0**	1.12E+11	**N/A**(3)	**5.60E+08**	**1.11E+11**
Spring Creek 3.6 to 5.4	1.59E+10	**8.81E+09**	**8.81E+08**	7.93E+09	50.0%	**0**	7.93E+09	**N/A**(3)	**3.96E+07**	7.89E+09
Trace Creek 0.95 to 5.9	2.01E+11	**4.93E+10**	**4.93E+09**	4.44E+10	77.9%	**0**	4.44E+10	**N/A**(3)	**2.22E+08**	**4.42E+10**

Waterbody Name	Existing Load (*E. coli* colonies/day)	**Total TMDL** (*E. coli* colonies/ day)	**MOS** (*E. coli* colonies / day)	TMDL Target (*E. coli* colonies/ day)	% reduction	**SWS-WLA** (*E. coli* colonies/day)	Remainder (*E. coli* colonies/ day)	**MS4 WLA** (*E. coli* colonies/ day)	**Future Growth WLA**[1] (*E. coli* colonies/ day)	**LA** (*E. coli* colonies/ day)
Turkey Creek 0.0 to 3.4	7.03E+10	**2.35E+10**	**2.35E+09**	2.11E+10	69.9%	**0**	2.11E+10	**N/A**[3]	**1.06E+08**	**2.10E+10**
UT South Fork Camp Creek 0.0 to 3.0	1.55E+12	**3.82E+10**	**3.82E+09**	3.43E+10	97.8%	**0**	3.43E+10	**N/A**[3]	**3.43E+08**	**3.40E+10**
UT Chestnut Creek 0.0 to 0.7	2.01E+11	**3.12E+09**	**3.12E+08**	2.81E+09	98.6%	**1.36E+09 (Marshall County Sanitation District #2 1.36E+09)**	1.45E+09	**N/A**[3]	**5.80E+07**	**1.39E+09**
UT Blizzard Pond Drainage Canal 0.0 to 4.2	5.64E+11	**1.47E+10**	**1.47E+09**	1.32E+10	97.7%	**0**	1.32E+10	**N/A**[3]	**6.61E+07**	**1.31E+10**
West Fork of Clarks River 0.0 to 10.4	1.67E+13	**1.66E+12**	**1.66E+11**	1.49E+12	91.1%	**1.57E+09 (Freemont Baptist Mission 2.73E+07), (Great Oaks Subdivision 6.36E+08), (Symsonia Water and Sewer 9.08E+08)**	1.49E+12	**N/A**[3]	**7.47E+09**	**1.49E+12**
West Fork of Clarks River 10.4 to 13.1	3.71E+13	**1.18E+12**	**1.18E+11**	1.06E+12	97.1%	**0**	1.06E+12	**N/A**[3]	**5.30E+09**	**1.05E+12**
West Fork of Clarks River 13.1 to 17.2	8.08E+12	**1.01E+12**	**1.01E+11**	9.09E+11	88.7%	**0**	9.09E+11	**N/A**[3]	**4.55E+09**	**9.05E+11**
West Fork of Clarks River 20.1 to 28.4	1.35E+13	**5.44E+11**	**5.44E+10**	4.89E+11	96.4%	**0**	4.89E+11	**N/A**[3]	**2.45E+09**	**4.87E+11**
West Fork of Clarks River 28.4 to 29.15	3.11E+12	**2.47E+11**	**2.47E+10**	2.22E+11	92.9%	**0**	2.22E+11	**N/A**[3]	**2.22E+09**	**2.20E+11**
West Fork of Clarks River 29.15 to 31.35	1.16E+12	**2.31E+11**	**2.31E+10**	2.08E+11	82.1%	**0**	2.08E+11	**N/A**[3]	**2.08E+09**	**2.06E+11**
West Fork of Clarks River 31.35 to 34.2	2.47E+12	**1.51E+11**	**1.51E+10**	1.36E+11	94.5%	**0**	1.36E+11	**N/A**[3]	**1.36E+09**	**1.34E+11**
West Fork Clarks River Relict Channel 0.0 to 13.8	4.33E+11	**7.99E+10**	**7.99E+09**	7.19E+10	83.4%	**0**	7.19E+10	**N/A**[3]	**3.59E+08**	**7.15E+10**

(1)Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
(2)The LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).
(3)N/A indicates that there is no MS4 area in the subwatershed.

Translation of WLAs into Permit Limits:

All KPDES-permitted point sources must meet permit limits based on the Water Quality Standards in 401 KAR 10:031. SWS-WLAs will be translated into KPDES permit limits as an *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average.

MS4-WLAs will be addressed through the KDOW storm water permitting program.

1.0 Introduction

Section 303(d) of the Clean Water Act (1972) requires states to identify waterbodies within their boundaries that have been assessed and are not currently meeting their designated uses (401 KAR 10:026 and 10:031) and that require the development of a Total Maximum Daily Load (TMDL). States must establish a priority ranking for such waters, taking into account their intended uses and the severity of the pollutant. Section 303(d) also requires that states provide a list of this information called the 303(d) list. This list is submitted to the Environmental Protection Agency (EPA) during even-numbered years and each submittal replaces the previous list. The draft 2010-303(d) information for Kentucky can be found in the *Draft 2010 Integrated Report to Congress on the Condition of Water Resources in Kentucky Volume II. 303(d) List of Surface Waters* (Kentucky Division of Water [KDOW], 2010) and can be obtained at: http://water.ky.gov.

States are also required to develop TMDLs for the pollutants that cause each waterbody to fail to meet its designated uses. The TMDL process establishes the allowable amount (i.e. "load") of pollutant a waterbody can naturally assimilate while continuing to meet the water quality criteria (WQC) for each designated use. The pollutant load must be established at a level necessary to implement the applicable WQC with seasonal variations and a Margin of Safety (MOS) that takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. This load is then divided among different sources of the pollutant in a watershed. Information from EPA on TMDLs can be found at: http://www.epa.gov/owow/tmdl.

This document contains the monitoring results and describes TMDL development for pathogen indicators in the Clarks River watershed as required under Section 303(d) of the Clean Water Act. By providing bacteria allocations and reductions, this TMDL can provide an analytical foundation for identifying, planning, and implementing water quality-based controls to reduce bacteria pollution from identified sources. The ultimate goal is the restoration and maintenance of water quality in the waterbody so that designated uses are met.

2.0 Problem Definition

The Clean Water Act requires states to designate uses for surface waters within their jurisdiction. The designated uses assigned to waterbodies in Kentucky can be found in 401 KAR 10:026 and includes primary contact recreation (PCR). 401 KAR 10:001 defines PCR waters as those "waters suitable for full body contact recreation during the recreation season of May 1 through October 31." 401 KAR 10:031 establishes standards that are "minimum requirements that apply to all surface waters in the Commonwealth of Kentucky in order to maintain and protect them for designated uses." The pathogen-related WQC in 401 KAR 10:031 are based upon those proposed by EPA (EPA, 1986).

The term pathogen refers to bacteria, viruses, or other biological agents (such as parasites) that can cause disease. Because it is currently resource intensive, difficult, and a potential health hazard to detect most pathogens in water, other organisms are used to indicate whether the presence of pathogens is likely in waters. Like EPA's proposed criteria, Kentucky uses Escherichia coli (*E. coli*) and fecal coliform bacteria as indicator organisms of pathogens. *E. coli* and fecal coliform are found in the fecal waste of humans and warm-blooded animals (birds and mammals). The presence of these bacteria in a waterbody indicates that contamination from human or animal wastes has likely occurred and that pathogens may be present.

2.1 Watershed Description

The Clarks River watershed is located in the Jackson Purchase area of western Kentucky (Figure 2.1) in the Tennessee River Basin and encompasses parts of four counties (McCracken, Graves, Marshall and Calloway). The southern (upper) most reaches of the watershed extend into northern Henry County, Tennessee. Because of its size, the Clarks River watershed was divided into five smaller subwatersheds to display information. These five subwatersheds are Upper Clarks, Middle Clarks, Lower Clarks, Upper West Fork, and Lower West Fork (Figure 2.2).

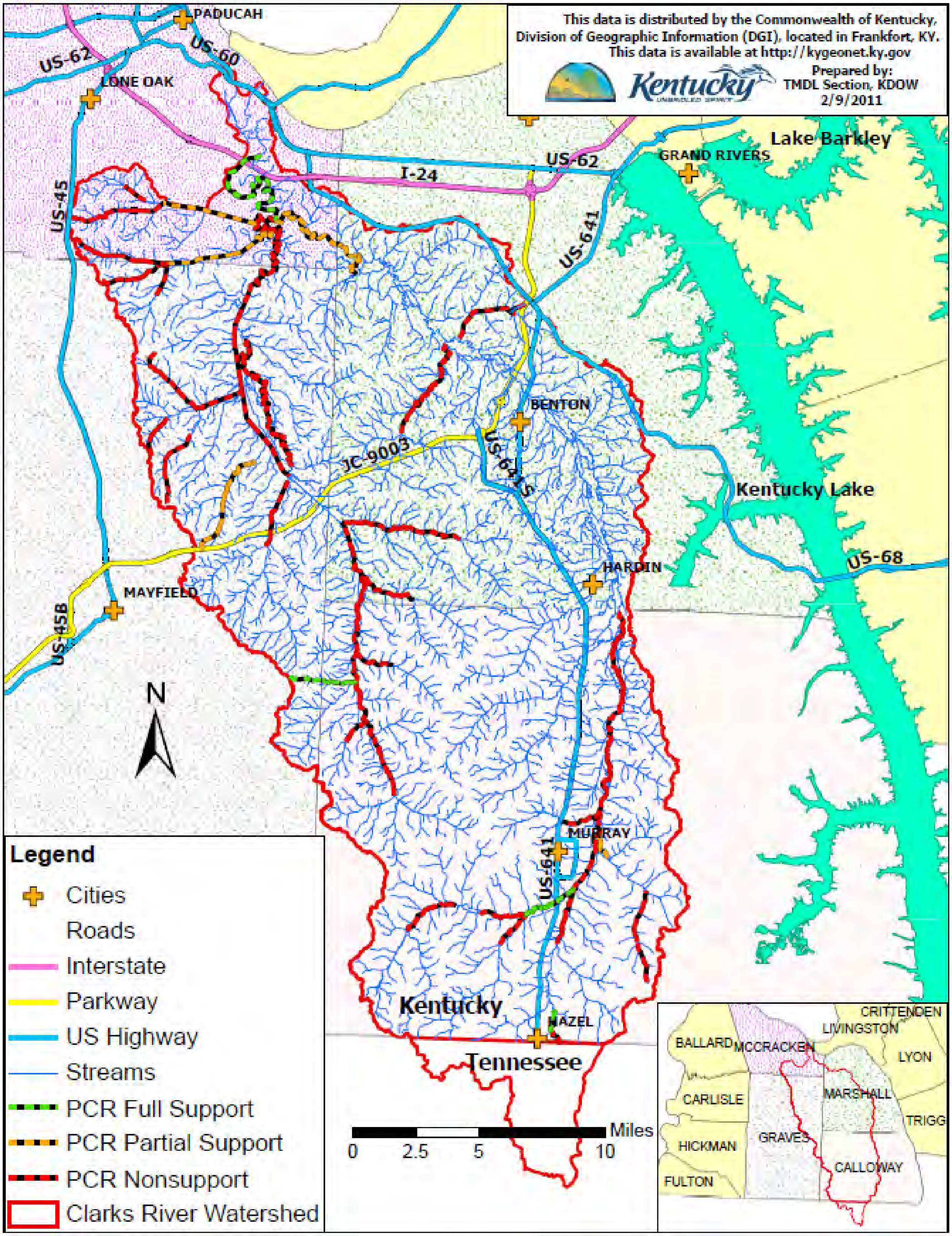

Figure 2.1 Location of Clarks River Watershed

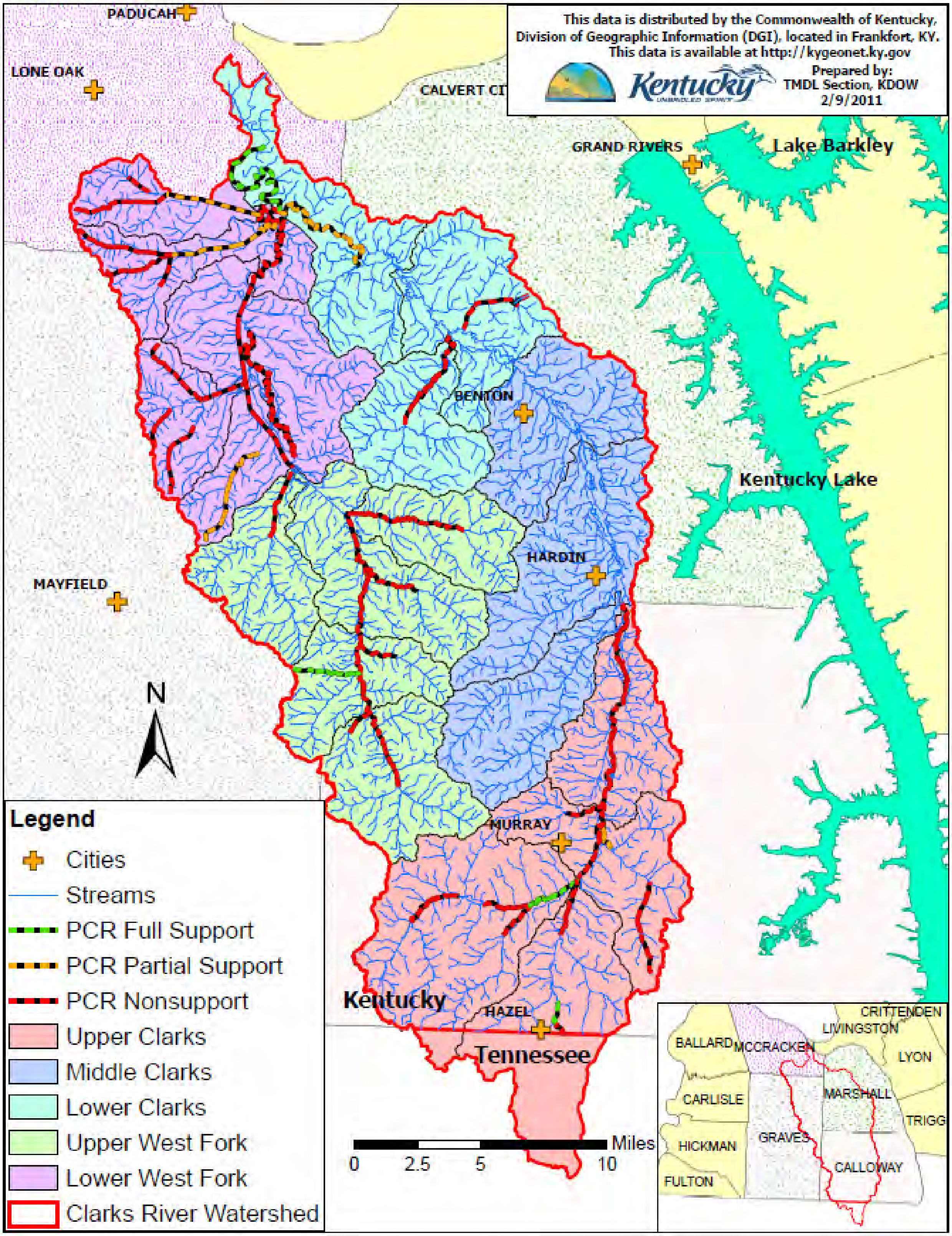

Figure 2.2 Subwatersheds in Clarks River Watershed

2.2 303(d) Listing History

The information presented below relays the history of 303(d) listings for bacteria impaired segments in the Clarks River watershed. There are no bacteria impaired segments in the Tennessee portion of the watershed (Vicki Steed, 2011personal communication); therefore only KDOW's 303(d) listing history is presented.

Bee Creek of Clarks River 0.0 to 0.7 and Bee Creek of Clarks River 0.7 to 2.0
Bee Creek of Clarks River 0.0 to 1.8 was first 303(d) listed for nonsupport of the Swimming Use due to pathogens on the 2002 report (KDOW, 2003). Fecal coliform data for this listing were collected by Murray State University's Hancock Biological Station and Center for Reservoir Research (MSU) as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). This segment was split into two and River Miles (RM) were corrected to the National Hydrography Dataset (NHD) during the 2008 listing cycle yielding segments from RM 0.0 to 0.7 and 0.7 to 2.0, and the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform (KDOW, 2008). These fecal coliform listings were carried forward on the draft 2010-303(d) Report (KDOW, 2010).

Blizzard Pond Drainage Canal of West Fork Clarks River 0.0 to 3.7
Blizzard Pond of West Fork Clarks River 0.0 to 3.7 was first 303(d) listed for nonsupport of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform, and the segment name was corrected to Blizzard Pond Drainage Canal (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Camp Creek of West Fork Clarks River 0.0 to 5.4
Camp Creek of West Fork Clarks River 0.0 to 5.4 was first 303(d) listed for partial support of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Chestnut Creek of Clarks River 0.0 to 3.0
Chestnut Creek of Clarks River 0.0 to 3.0 was first 303(d) listed for partial support of the Swimming Use due to pathogens on the 2004 report (KDOW, 2005) and was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Clarks River of Tennessee River 13.2 to 20.6
Clarks River of Tennessee River 13.2 to 20.6 was first 303(d) listed for partial support of the PCR use due to Escherichia coli on the 2008-303(d) report (KDOW, 2008). *E. coli* data for this listing were collected by KDOW's bacterial monitoring program. This *E. coli* listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Clarks River of Tennessee River 50.9 to 55.6
Clarks River of Tennessee River 48.4 to 59.2 was first 303(d) listed for nonsupport of the Swimming Use due to pathogens on the 1998 report (KDOW 1998). Fecal coliform data for this listing were collected by the Tennessee Valley Authority (TVA). Data collected by the KDOW bacteria monitoring program during 2000 resulted in partial delisting of this segment on the 2002 report (KDOW, 2003); RMs 48.4 to 50.9 were found to be fully supporting the Swimming Use while RMs 50.9 to 59.2 remained nonsupporting. The nonsupport listing for RMs 50.9 to 59.2 was corrected to RM 50.9 to 59.9 on the 2004-303(d) list (KDOW, 2005) and the designated use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform, and the river miles were reconciled to the NHD to yield RMs 50.9 to 55.6 (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010). The most recent data for this segment (from 2000 and 2001) indicate that this segment is fully supporting; however, KDOW has not pursued a delisting on it. It is recommended that this segment be re-assessed prior to either delisting or TMDL development for it.

Clarks River of Tennessee River 55.6 to 64.7
Clarks River 59.2 to 61.9 was first 303(d) listed for partial support of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list but the river miles were corrected to 59.9 to 61.9 (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform, the support status was determined to be nonsupport, and the river miles were reconciled to the NHD to yield RMs 55.6 to 64.7 (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Clarks River of Tennessee River 64.7 to 66.8
Clarks River of Tennessee River 64.7 to 66.8 was first 303(d) listed for partial support of the PCR use due to fecal coliform on the 2008-303(d) Report (KDOW 2008). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Clayton Creek of Clarks River 3.3 to 7.7
Clayton Creek of Clarks River 3.3 to 7.1 was first 303(d) listed for nonsupport of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the swimming use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). During the 2008 listing cycle, the

pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform, and the river miles were reconciled to the NHD to yield RMs 3.3 to 7.7 (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Damon Creek of West Fork Clarks River 0.0 to 1.8
Damon Creek of West Fork Clarks River 0.0 to 1.8 was first 303(d) listed for nonsupport of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform (KDOW, 2008).

Duncan Creek of West Fork Clarks River 0.0 to 2.5
Duncan Creek of West Fork Clarks River 0.0 to 2.5 received an inconclusive assessment for the Swimming Use on the 2002-303(d) report (KDOW, 2003), indicating that it required additional information to be collected during 2005-2006. During the 2008 listing cycle, Duncan Creek 0.0 to 2.5 was listed as partial support of the PCR use due to fecal coliform (KDOW, 2008). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Middle Fork Clarks River of Clarks River 0.0 to 2.7
Middle Fork Clarks River of Clarks River 0.0 to 2.7 was first 303(d) listed for nonsupport of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010). Following TMDL data collection (see below), this segment was found to be fully supporting of the PCR use.

Middle Fork Creek of Clarks River 0.2 to 6.0
Middle Fork Creek of Clarks River 0.2 to 6.6 was first 303(d) listed for nonsupport of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform, and the river miles were reconciled to the NHD to yield RMs 0.2 to 6.0 (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

Panther Creek of West Fork Clarks River 0.0 to 3.0
Panther Creek of West Fork Clarks River 0.0 to 3.0 was first 303(d) listed for nonsupport of the PCR use due to Escherichia coli on the 2008-303(d) Report (KDOW, 2008). *E. coli* data for this listing were collected by KDOW. This *E. coli* listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

West Fork of Clarks River 0.0 to 10.4
West Fork of Clarks River 2.6 to 10.1 was first 303(d) listed for partial support of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project and by KDOW's bacterial monitoring program. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). Additionally, during the 2006 listing cycle, this was identified as a segment on the canalized portion of the river as opposed to the Relict Channel (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, Escherichia coli, the support status was determined to be nonsupport, and the river miles were reconciled to the NHD to yield RMs 0.0 to 10.4 (KDOW, 2008). This *E. coli* listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

West Fork of Clarks River 13.1 to 17.2
West Fork of Clarks River 12.8 to 16.8 was first 303(d) listed for nonsupport of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). Additionally, during the 2006 listing cycle, this was identified as a segment on the canalized portion of the river as opposed to the Relict Channel (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform, and the river miles were reconciled to the NHD to yield RMs 13.1 to 17.2 (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

West Fork of Clarks River 20.1 to 28.4
West Fork of Clarks River 22.7 to 27.3 was first 303(d) listed for partial support of the Swimming Use due to pathogens on the 2002 report (KDOW 2003). Fecal coliform data for this listing were collected by MSU as part of a 319(h) project. This listing was carried forward on the 2004-303(d) list (KDOW, 2005) and the Swimming Use was redefined as the Primary Contact Recreation use on the 2006-303(d) list (KDOW, 2007). Additionally, during the 2006 listing cycle, this was identified as a segment on the canalized portion of the river as opposed to the Relict Channel (KDOW, 2007). During the 2008 listing cycle, the pathogen impairment was more correctly identified as the bacterial indicator assayed, fecal coliform, and the river miles were expanded and reconciled to the NHD to yield RMs 20.1 to 28.4 (KDOW, 2008). This fecal coliform listing was carried forward on the draft 2010-303(d) report (KDOW, 2010).

To facilitate TMDL development, KDOW contracted with MSU to monitor for Escherichia coli (*E. coli*, a pathogen indicator) at fifty-one sites in the Clarks River watershed. The watershed was intensively sampled during the 2005 PCR season (May–October) for *E. coli*. Additional sampling in 2006 by MSU at Clayton Creek and also by a 319(h) grant to the JP RC&D enhanced efforts in the upper Clarks River watershed. This monitoring resulted in the identification of twenty-four additional segments as impaired and changed the pathogen-indicator from fecal coliform to *E. coli*; however these changes in assessments have not yet been incorporated in the 303(d) listing process. Additionally, four segments were identified as fully supporting the PCR use for pathogen indicators (Table 2.1). The forty pathogen indicator impaired segments for which TMDLs are developed in this document are listed in Table 2.2. The pathogen indicator assessed segments in each subwatershed are identified in Figures 2.3-2.6. There are no pathogen indicator assessed segments in the Middle Clarks Subwatershed; therefore it is not shown in detail in this section.

Table 2.1 Pathogen Indicator Fully Support Segments

Waterbody Name	County	Waterbody ID	Use (Support Status)
Clarks River 5.0 to 13.2	Marshall	KY489552_01	PCR (FS)
East Fork Clarks River 6.1 to 7.1	Calloway	KY491450_02	PCR (FS)
Guier Branch of West Fork Clarks River 0.0 to 2.9	Calloway	KY493462_01	PCR (FS)
Middle Fork of Clarks River 0.0 to 2.7	Calloway	KY498115_01	PCR (FS)

Table 2.2 Pathogen Indicator Impaired Segments for TMDL Development

Waterbody Name	Pollutant(3)	County	GNIS Number	Suspected Sources	Impaired(3) Use (Support Status)
Bee Creek 0.0 to 0.7	*E. coli*	Calloway	KY486666_01	Source Unknown	PCR (NS)
Bee Creek 0.7 to 2.0	*E. coli*	Calloway	KY486666_02	Source Unknown	PCR (NS)
(1)Blizzard Pond 4.8 to 5.8	*E. coli*	McCracken	KY487484_02	Package Plant or Other Permitted Small Flows Discharges	PCR (NS)
Blizzard Pond Drainage Canal 0.0 to 3.7	*E. coli*	McCracken	KY487484_01	Source Unknown	PCR (PS)
Camp Creek 0.0 to 5.4	*E. coli*	McCracken	KY488685_00	Source Unknown	PCR (PS)
(1)Camp Creek 5.4 to 9.5	*E. coli*	Graves	KY488685_02	Source Unknown	PCR (NS)
Chestnut Creek 0.0 to 3.0	*E. coli*	Marshall	KY489424_00	Source Unknown	PCR (NS)
Clarks River 13.2 to 20.6	*E. coli*	McCracken	KY489552_02	Source Unknown	PCR (PS)
(2)Clarks River 50.9 to 55.6	Fecal Coliform	Calloway	KY489552_07	Package Plant or Other Permitted Small Flows Discharges	PCR (NS)

Waterbody Name	Pollutant(3)	County	GNIS Number	Suspected Sources	Impaired(3) Use (Support Status)
Clarks River 55.6 to 64.7	*E. coli*	Calloway	KY489552_08	Agriculture	PCR (NS)
Clarks River 64.7 to 66.8	*E. coli*	Calloway	KY489552_09	Source Unknown	PCR (NS)
Clayton Creek 3.3 to 7.7	*E. coli*	Calloway	KY489601_02	Source Unknown	PCR (NS)
(1)Clayton Creek Relict Channel 0.0 to 1.2	*E. coli*	Calloway	KY489552-63.7_01	Source Unknown	PCR (PS)
Damon Creek 0.0 to 1.8	*E. coli*	Calloway	KY490545_01	Animal Feeding Operations (NPS)	PCR (NS)
Duncan Creek 0.0 to 2.5	*E. coli*	Marshall	KY491300_00	Source Unknown	PCR (NS)
(1)East Fork Clarks River 0.0 to 2.7	*E. coli*	Calloway	KY491450_01	Source Unknown	PCR (NS)
(1)East Fork Clarks River 7.1 to 8.0	*E. coli*	Calloway	KY491450_03	Source Unknown	PCR (NS)
(1)Farley Branch of Middle Fork Clarks River 0.0 to 2.2	*E. coli*	Calloway	KY491983_01	Source Unknown	PCR (NS)
(1)Haskell Branch 1.2 to 4.5	*E. coli*	Graves	KY493854_01	Source Unknown	PCR (NS)
Middle Fork Creek of Clarks River 0.2 to 6.0	*E. coli*	Marshall	KY498118_00	Agriculture	PCR (NS)
(1)Middle Fork of Clarks River 2.7 to 4.8	*E. coli*	Calloway	KY498115_02	Source Unknown	PCR (NS)
(1)Middle Fork of Clarks River 6.15 to 9.1	*E. coli*	Calloway	KY498115_03	Source Unknown	PCR (NS)
Panther Creek 0.0 to 3.0	*E. coli*	Graves	KY500155_01	Source Unknown	PCR (NS)
(1)Sand Lick Branch 0.0 to 1.2	*E. coli*	Calloway	KY502926_01	Source Unknown	PCR (NS)
(1)Soldier Creek 0.0 to 5.7	*E. coli*	Marshall	KY503868_01	Source Unknown	PCR (NS)
(1)South Fork Camp Creek 0.0 to 1.3	*E. coli*	Graves	KY503908_01	Source Unknown	PCR (NS)
(1)Spring Creek 0.0 to 2.0	*E. coli*	Calloway	KY504124_01	Source Unknown	PCR (NS)
(1)Spring Creek 3.6 to 5.4	*E. coli*	Calloway	KY504124_02	Source Unknown	PCR (NS)

Waterbody Name	Pollutant[3]	County	GNIS Number	Suspected Sources	Impaired[3] Use (Support Status)
[1]Trace Creek 0.95 to 5.9	*E. coli*	Graves	KY505419_01	Source Unknown	PCR (PS)
[1]Turkey Creek 0.0 to 3.4	*E. coli*	Graves	KY505595_01	Source Unknown	PCR (NS)
[1]UT South Fork Camp Creek 0.0 to 3.0	*E. coli*	Graves	KY503908-0.05_01	Source Unknown	PCR (NS)
[1]UT Chestnut Creek 0.0 to 0.7	*E. coli*	Marshall	KY489424-2.8_00	Source Unknown	PCR (NS)
[1]UT Blizzard Pond Drainage Canal 0.0 to 4.2	*E. coli*	McCracken	KY487484-1.3_01	Source Unknown	PCR (NS)
[1]West Fork Clarks River Relict Channel 0.0 to 13.8	*E. coli*	Graves	KY506427_01	Source Unknown	PCR (NS)
West Fork of Clarks River 0.0 to 10.4	*E. coli*	McCracken	KY506426_01	Agriculture, Urban Runoff/Storm Sewers	PCR (NS)
[1]West Fork of Clarks River 10.4 to 13.1	*E. coli*	Graves	KY506426_02	Source Unknown	PCR (NS)
West Fork of Clarks River 13.1 to 17.2	*E. coli*	Graves	KY506426_03	Source Unknown	PCR (NS)
West Fork of Clarks River 20.1 to 28.4	*E. coli*	Marshall	KY506426_04	Source Unknown	PCR (NS)
[1]West Fork of Clarks River 28.4 to 29.15	*E. coli*	Calloway	KY506426_05	Source Unknown	PCR (NS)
[1]West Fork of Clarks River 29.15 to 31.35	*E. coli*	Calloway	KY506426_06	Source Unknown	PCR (NS)
[1]West Fork of Clarks River 31.35 to 34.2	*E. coli*	Calloway	KY506426_07	Source Unknown	PCR (NS)

Note: [1]Indicates a new listing not on the draft 2010-303(d) list.
[2]There was no current sampling conducted on this segment. Re-assessment is recommended prior to either delisting or TMDL development for it.
[3]Pollutants and Support Status reflect the most recent assessments, which have not made it into the 303(d) listing process yet. In most cases, a previous impairment for fecal coliform has been updated to *E. coli* and support status reflects the level of *E. coli* impairment.

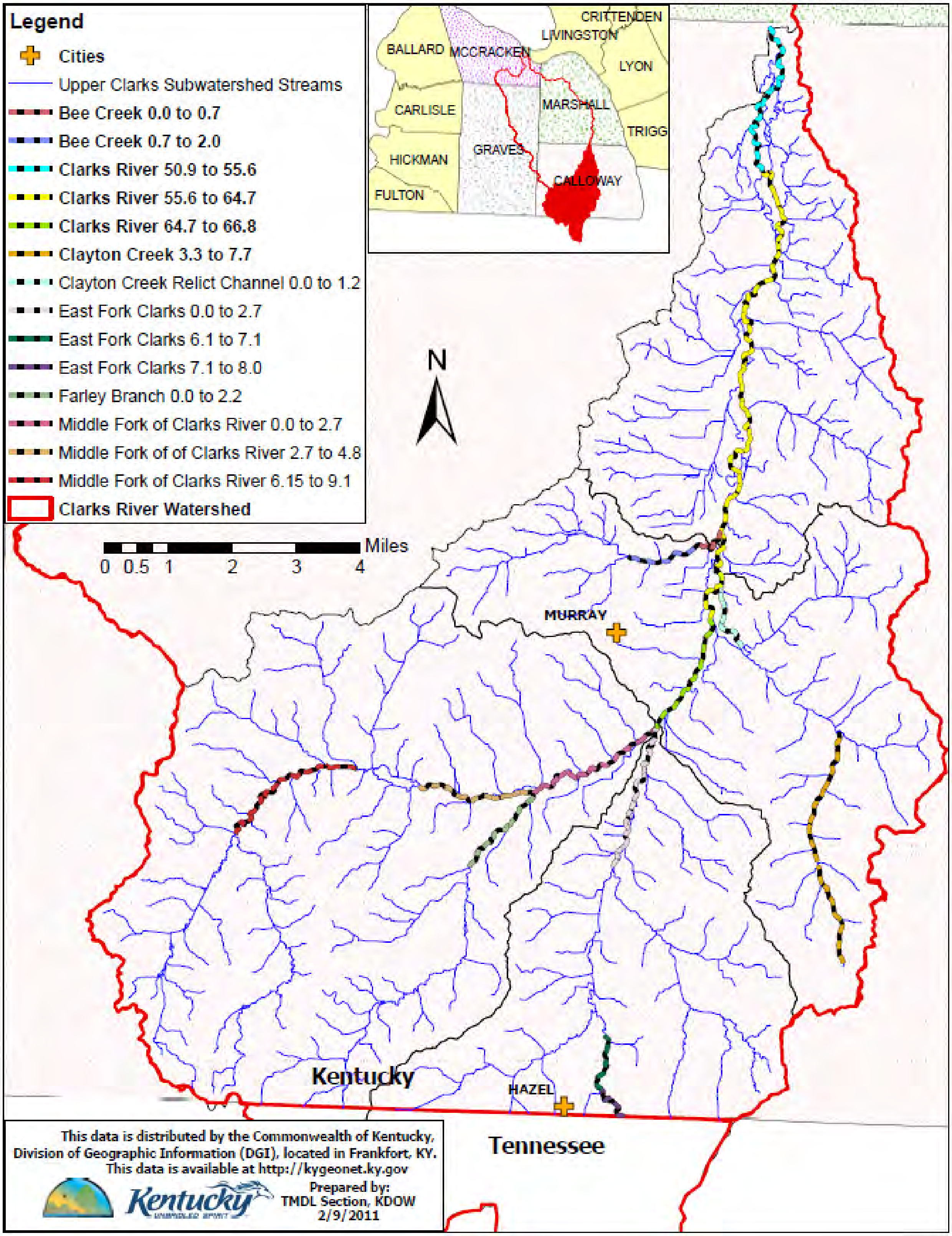

Figure 2.3 Pathogen Indicator Assessed Segments in Upper Clarks Subwatershed

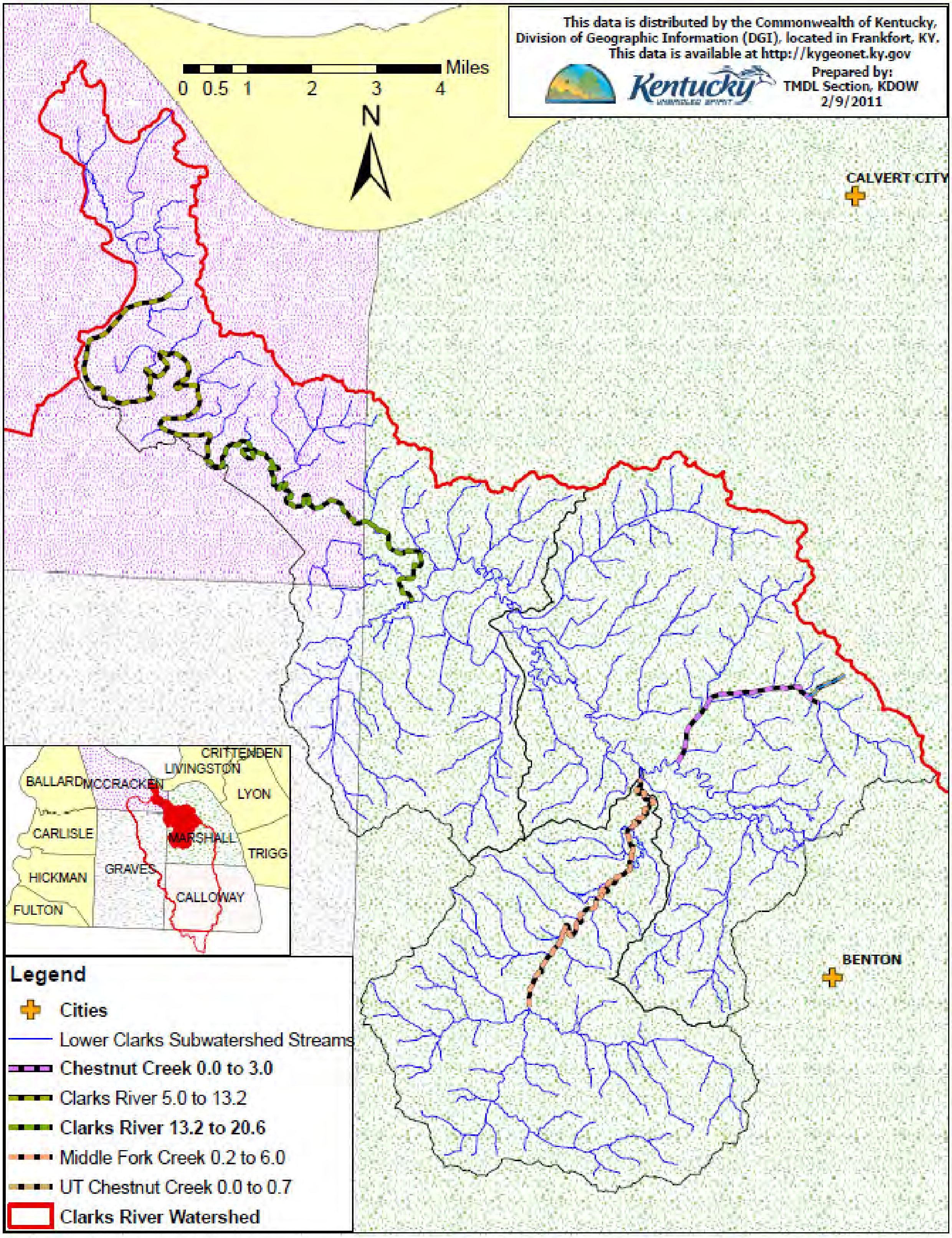

Figure 2.4 Pathogen Indicator Assessed Segments in Lower Clarks Subwatershed

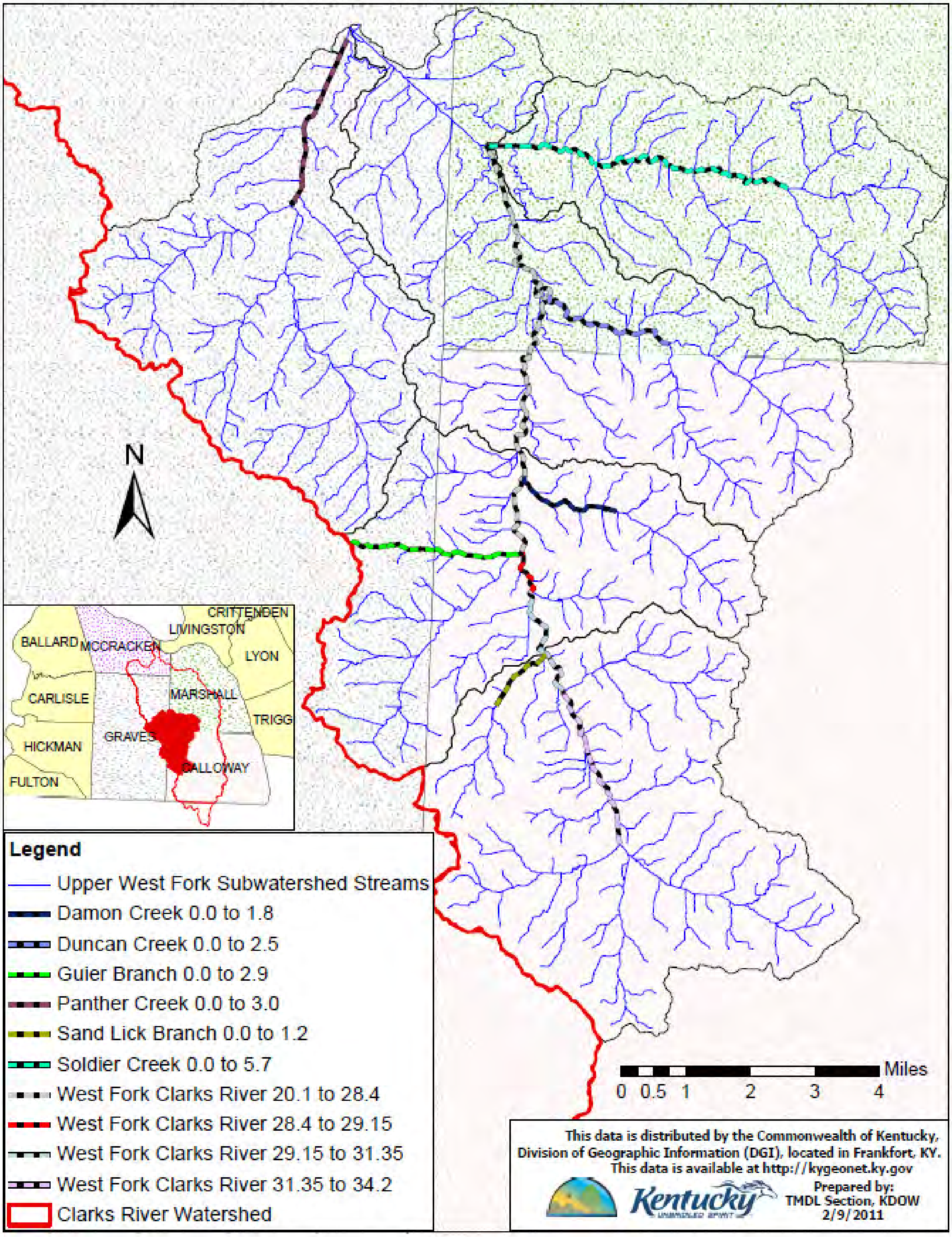

Figure 2.5 Pathogen Indicator Assessed Segments in Upper West Fork Subwatershed

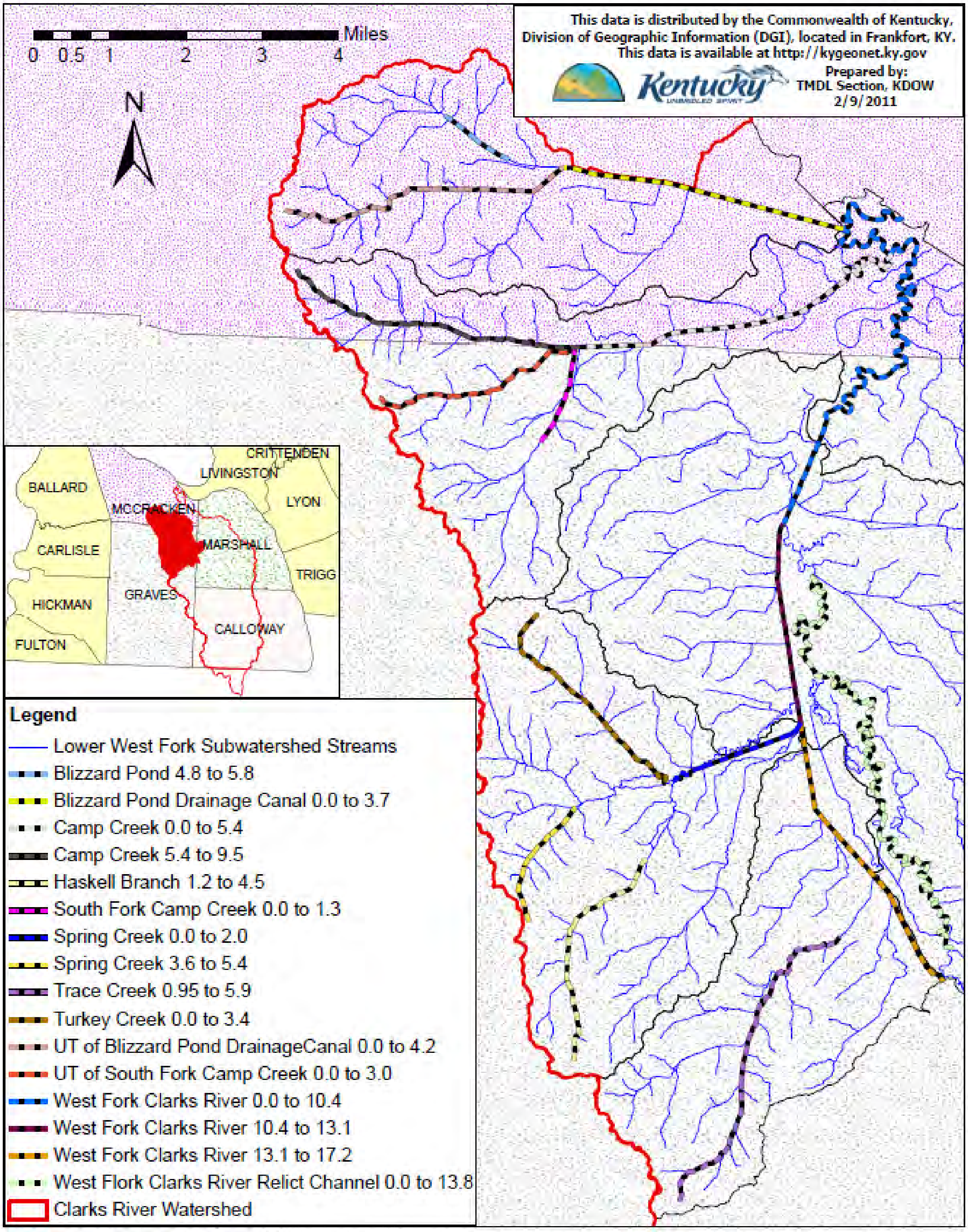

Figure 2.6 Pathogen Indicator Assessed Segments in Lower West Fork Subwatershed
Note: The extreme right portion of this subwatershed is off the map in order to more clearly present the assessed segments, which are on the left side of the subwatershed.

3.0 Physical Setting

The Clarks River is a 546 square mile watershed located in McCracken, Graves, Marshall and Calloway counties and contains the cities of Hazel, Murray, Hardin, and Benton. The Clarks River watershed is in the Tennessee River Basin, United States Geological Survey (USGS) 6-digit hydrologic unit code (HUC) # 060400, of the Four Rivers Basin Management Unit. The system of HUCs was developed by the USGS to identify specific watersheds and includes all the land area that drains to a particular stream (USGS, 2004). The larger the HUC number, the smaller the watershed and the more specific the identification of a watershed to one particular stream. The HUC 12s that are in Clarks River are identified in Table 3.1 and are shown in Figure 3.1.

Table 3.1 HUC 12s in Clarks River Watershed

HUC 12	HUC 12 NAME	ACRES
060400060-101	East Fork Clarks River	25509
060400060-102	Middle Fork Clarks River	31164
060400060-103	Clayton Creek-Clarks River	18414
060400060-104	Rockhouse Creek	17456
060400060-105	Almo-Clarks River	15859
060400060-201	Clear Creek-West Fork Clarks River	17295
060400060-202	Damon Creek-West Fork Clarks River	13244
060400060-203	Soldier Creek	12556
060400060-204	Panther Creek	14160
060400060-205	Duncan Creek-West Fork Clarks River	19144
060400060-301	Trace Creek-West Fork Clarks River	8207
060400060-302	Spring Creek	10585
060400060-303	Sugar Creek-West Fork Clarks River	23585
060400060-304	Blizzard Ponds	9422
060400060-305	Camp Creek-West Fork Clarks River	14165
060400060-401	Wades Creek-Clarks River	23819
060400060-402	Watch Creek-Clarks River	19102
060400060-403	Middle Fork Creek	14568
060400060-404	Chestnut Creek-Clarks River	19902
060400060-405	Dunn Slough Creek-Clarks River	21678

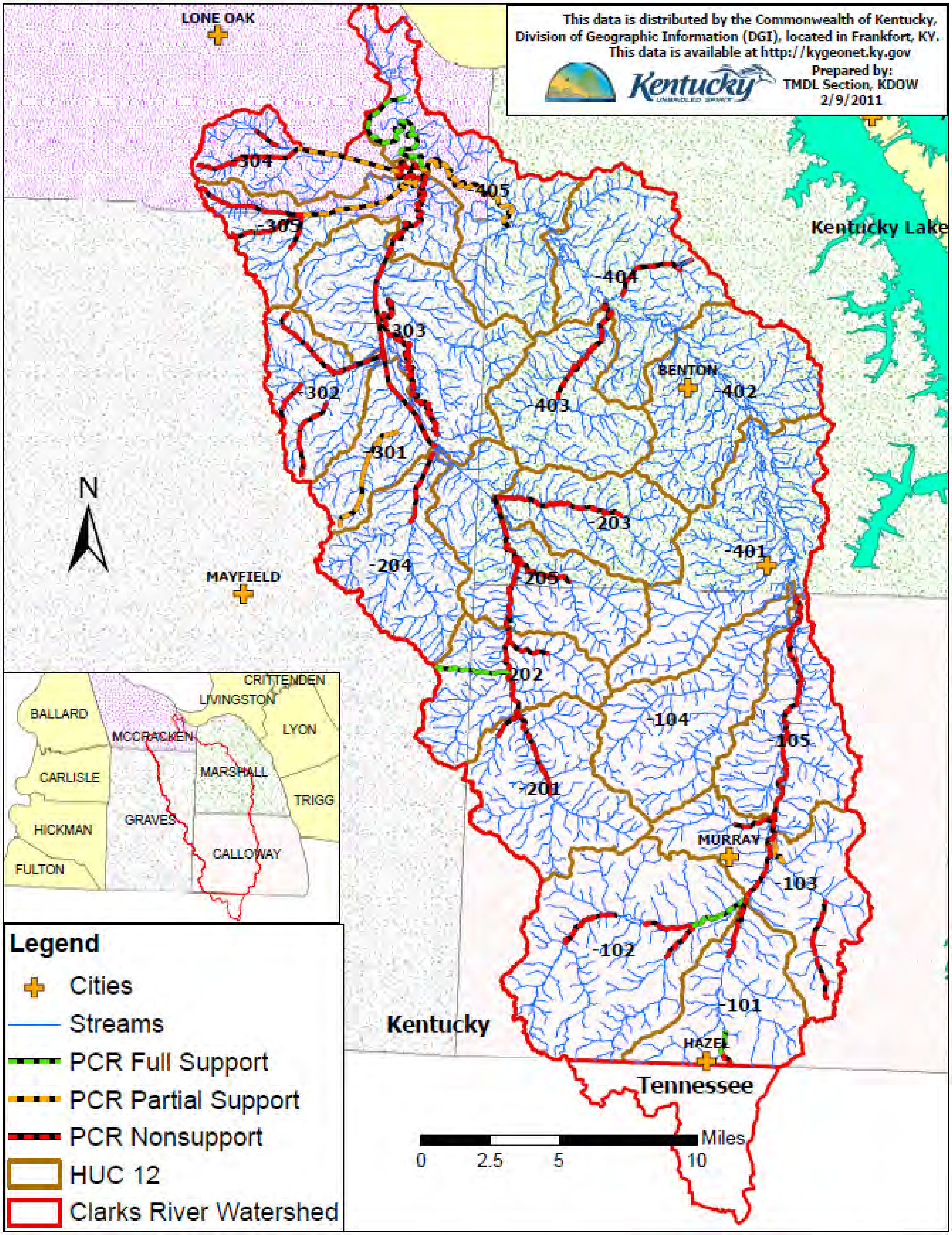

Figure 3.1 Location of HUC 12s in Clarks River Watershed
Note: Only the last 3 digits of the HUC 12 are labeled on the map

Clarks River begins in Calloway County just south of Murray, Kentucky at the confluence of two headwater tributaries, the Middle Fork Clarks River and the East Fork Clarks River (which begins in Henry County, Tennessee). From these headwater streams, Clarks River flows northward to its confluence at river mile (RM) 4.2 of the Tennessee River. The headwaters of West Fork Clarks River are west of Murray in Calloway County and it flows northward to its confluence at RM 13.1 of Clarks River in McCracken County.

3.1 Geology

The Clarks River watershed is in the Purchase physiographic region. The majority of the watershed is in the Level IV Ecoregion of the Loess Plains with a small area of the downstream watershed (northern portion) in the Wabash-Ohio Bottomlands (Figure 3.2). Information from Woods, et. al. (2002) indicates that the Loess Plains are dominated by gently rolling uplands, broad bottomlands and terraces. Woods, et. al. (2002) further indicates that the Wabash-Ohio Bottomlands are dominated by nearly level, poorly drained floodplains and undulating terraces.

The Clarks River watershed is underlain by Cretaceous and Tertiary deposits that “consist mainly of unconsolidated marine and continental gravels, sands, silts, and clays which are generally concealed beneath alluvium, loess, and continental deposits of latest Tertiary and Pleistocene age” (McDowell, 1986). The major members of the Cretaceous and Tertiary deposits in Clarks River watershed are the Clayton and McNairy Formations, Jackson and Claiborne Formations, Porters Creek Clay, Wilcox Formation, alluvium, and continental deposits and loess (Figure 3.3). Information about the Cretaceous and Tertiary deposits can be found at: http://pubs.usgs.gov/pp/p1151h/cret.html (McDowell, 1986).

The rock formations in the watershed are not prone to karst; however a few faults are present in the watershed (Figure 3.3). KDOW is not aware of any studies that specifically address bacteria movement along fault zones and site-specific investigation into the groundwater flow in faults was beyond the scope of this document.

Silty loams are the predominant soil type in the Clarks River watershed (Figure 3.4). Once deposited on or in soils, fecal bacteria can die-off or re-grow. A review of factors important in the survival of fecal bacteria in soils showed, in general, longer bacteria survival time with greater soil moisture content (survival of days in dry soils versus longer than 1.5 months in wet soils), lower temperatures (with a doubling of the die-off rate for each 10° Celsius increase in temperature), alkaline soils (survival of days in acidic soils versus weeks in alkaline soils, with neutral soils optimal), decreased sunlight (ultraviolet light is bactericidal), and increased organic material (a nutrient source for the bacteria) (reviewed in Gerba et. al., 1975). In soils, bacteria can adhere to soil particles, particularly clay particles, and either be retained in the soil or move with water flow via erosion processes (reviewed in Reddy, et. al., 1981). Bacteria that do not adsorb to a soil particle can remain bound to fecal waste particles and move with those particles in runoff or, rarely, be unbound in the soil pore water and move in an unbound state (reviewed in Reddy, et. al., 1981). Soil erosion and water runoff can both move bacteria to a stream or to groundwater. Determining the fate and transport of bacteria in the soils of Clarks River watershed was beyond the scope of this document; however information on soils can obtained from the U.S. Department of Agriculture (USDA) Web Soil Survey at URL http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. It is known that, due to poor soil drainage, suitability for septic tanks is very limited for the majority of soils in the watershed (Figure 3.5).

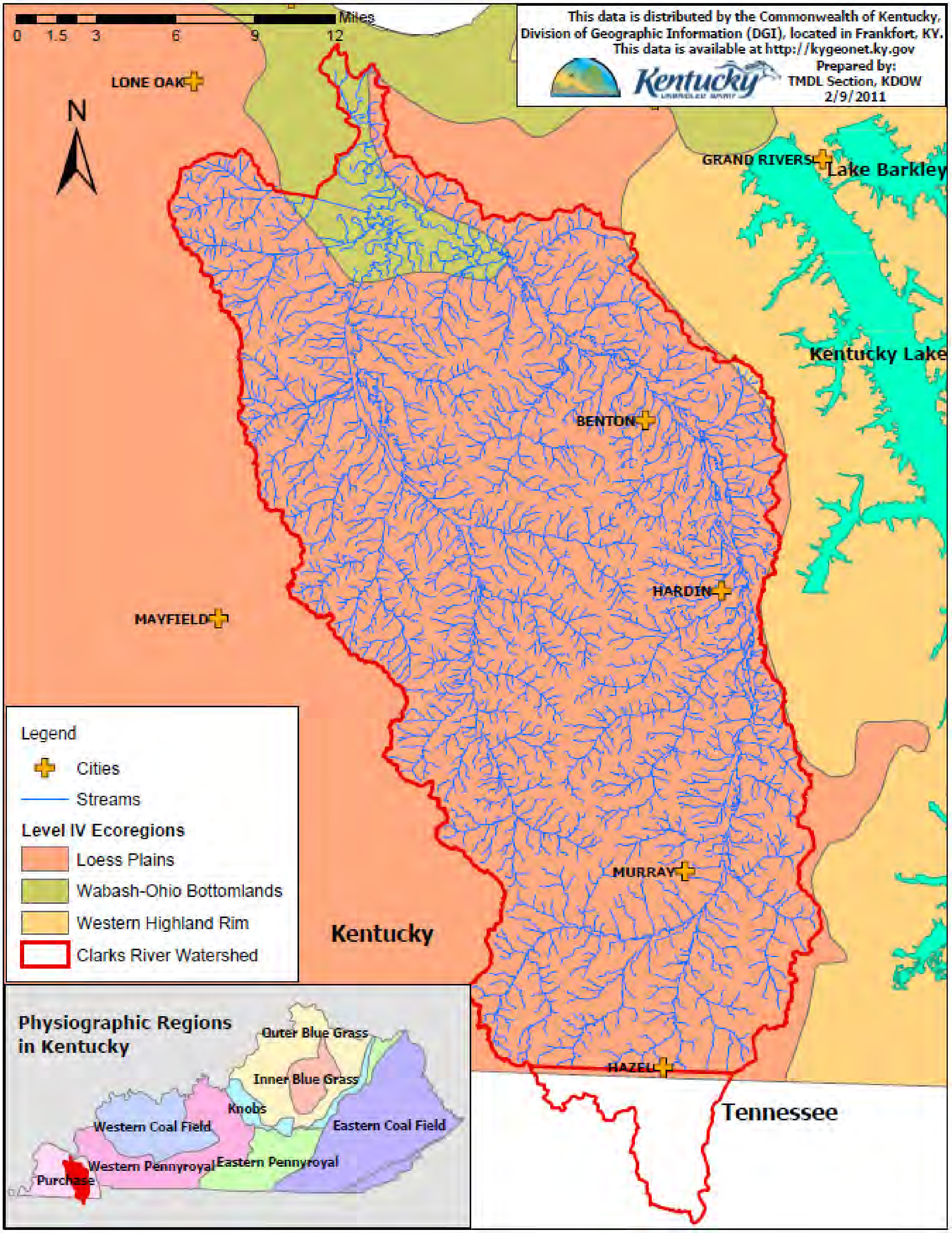

Figure 3.2 Level IV Ecoregions of Clarks River Watershed

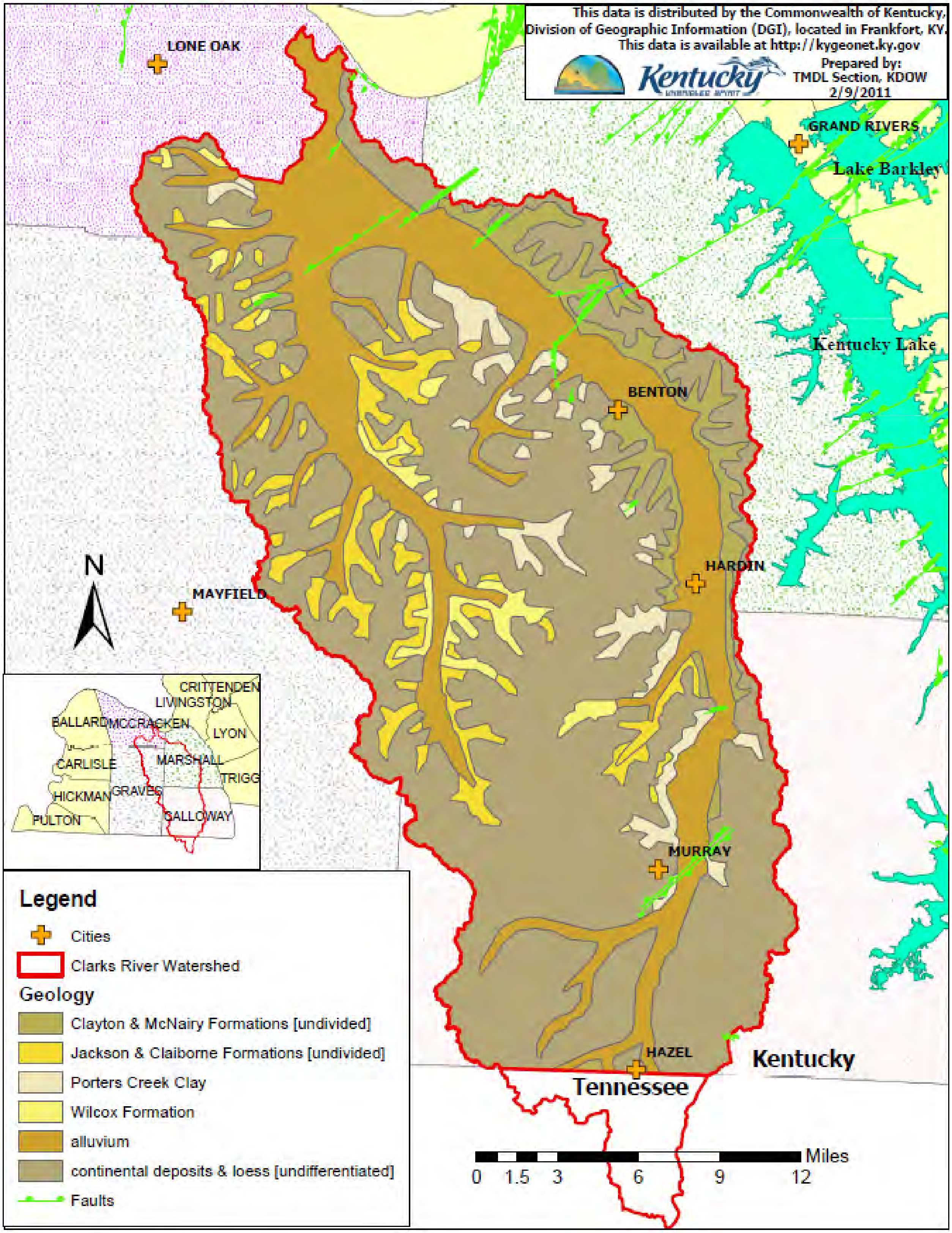

Figure 3.3 Geology in Clarks River Watershed

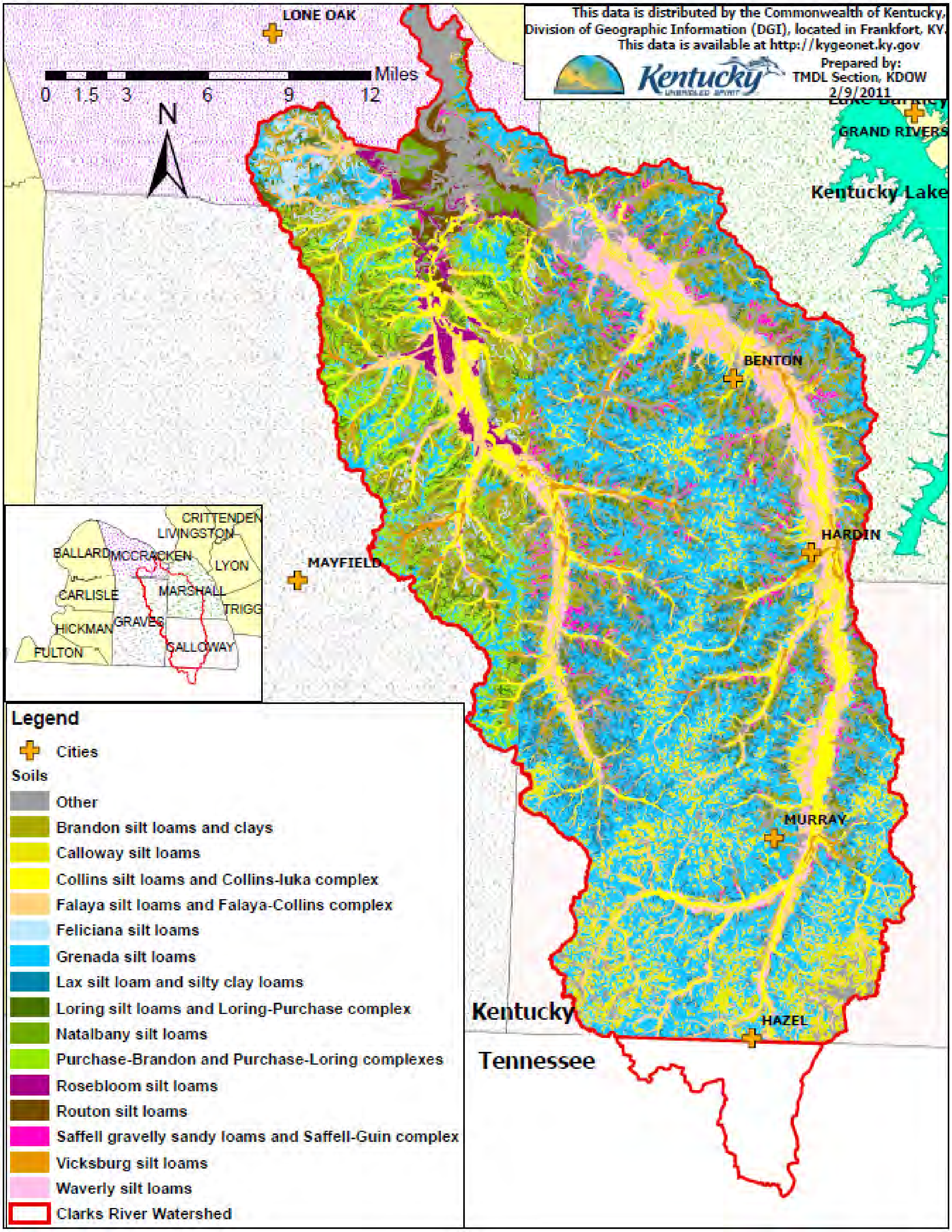

Figure 3.4 Soil Types in the Clarks River Watershed

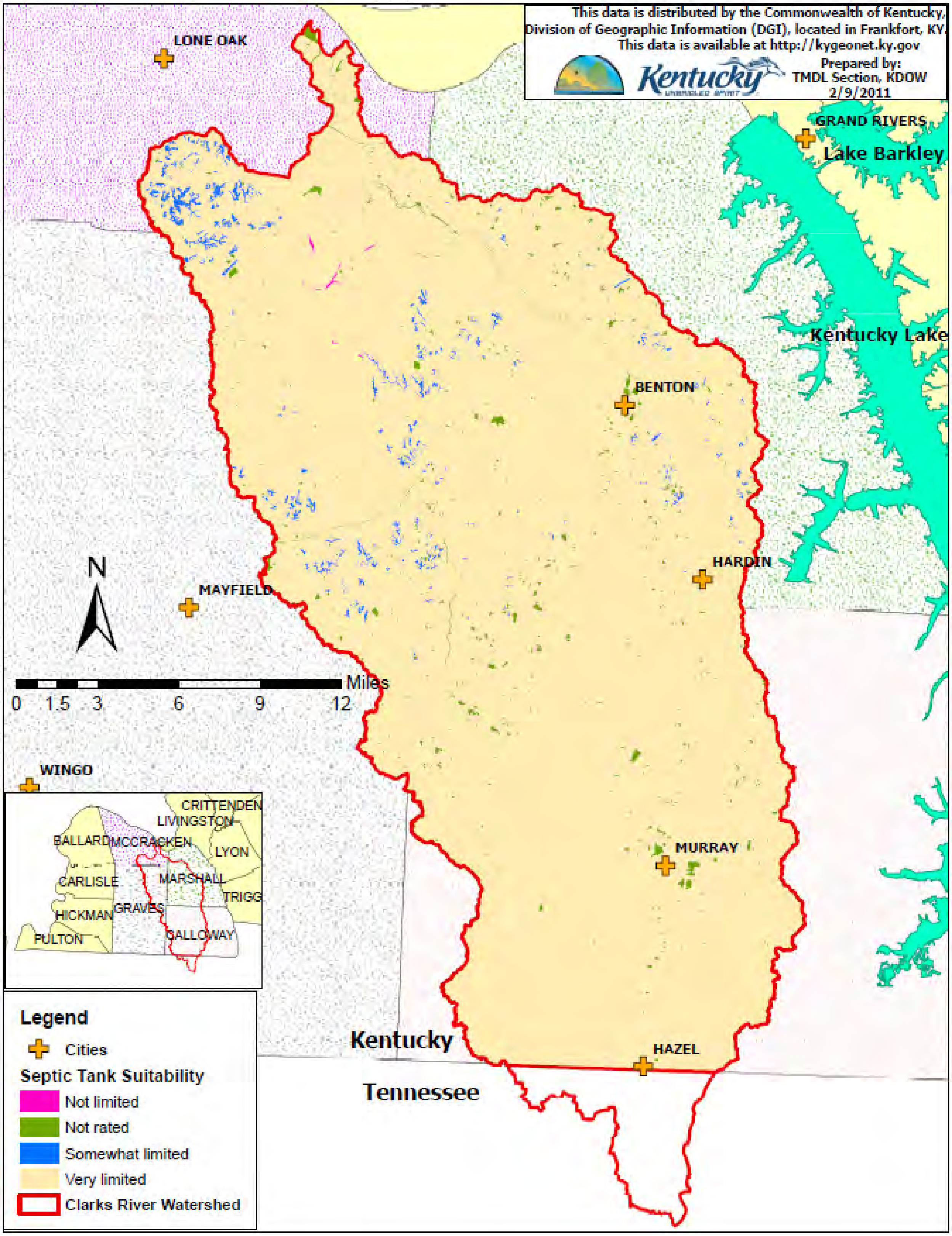

Figure 3.5 Soil Suitability for Septic Tanks

3.2 Hydrology

KDOW follows the Strahler (1952) method for stream order determination where small upstream segments with no tributaries are first order. When two first order streams merge, they form a second order stream segment; two second order segments merge to form a third order segment; and so on. In this method, a first order segment merging with a second order segment results in a continuation of the second order segment; order only increases when segments with the same order merge or if a tributary to a main segment has a larger order. First order streams tend to be small and carry little flow except during wet weather events while larger stream orders indicate larger systems with greater flow. At a 1:100 scale, both the Middle Fork Clarks River and the East Fork Clarks River are third order streams at their confluence, thus Clarks River mainstem begins as a fourth order stream. At it's confluence with Clarks River, the West Fork Clarks River is a fifth order stream. From this confluence to the Tennessee River, Clarks River is a fifth order stream (Figure 3.6).

There are four permitted water withdrawals in the Clarks River watershed. All of them are groundwater withdrawals from wells. Table 3.2 displays KDOW water withdrawal permit information while Figure 3.6 shows the location of the withdrawals.

Table 3.2 Water Withdrawal Permit Information

AI #	Name	Latitude	Longitude	Withdrawal (MGD)	Withdrawal (cfs)
2922	Benton Water System	36.863333	-88.349167	≤0.900 Jan, Feb, Nov, & Dec; ≤0.925 Mar; ≤0.950 Apr, May, Sept, & Oct; ≤1.0 Jun; ≤1.20 Jul & Aug	≤1.393 Jan, Feb, Nov, & Dec; ≤1.431 Mar; ≤1.470 Apr, May, Sept, & Oct; ≤1.5 Jun; ≤ 1.86 Jul & Aug
44216	Symsonia Water District	36.91944	-88.51583	≤0.08 Year Round	≤0.12 Year Round
516	Murray Water System	36.6075	-88.2975	≤3.600 Jan, Apr, & Nov; ≤3.700 Feb & May; ≤3.500 Mar; ≤3.800 Jun; ≤4.100 Jul & Sept; ≤4.200 Aug; ≤3.900 Oct; ≤3.300 Dec	≤5.570 Jan, Apr, & Nov; ≤5.725 Feb & May; ≤5.415 Mar; ≤5.879 Jun; ≤6.344 Jul & Sept; ≤6.498 Aug; ≤6.034 Oct; ≤5.106 Dec
520	R. T. Vanderbilt Co Inc	36.647333	-88.300444	≤1.8 Year Round	≤2.8 Year Round

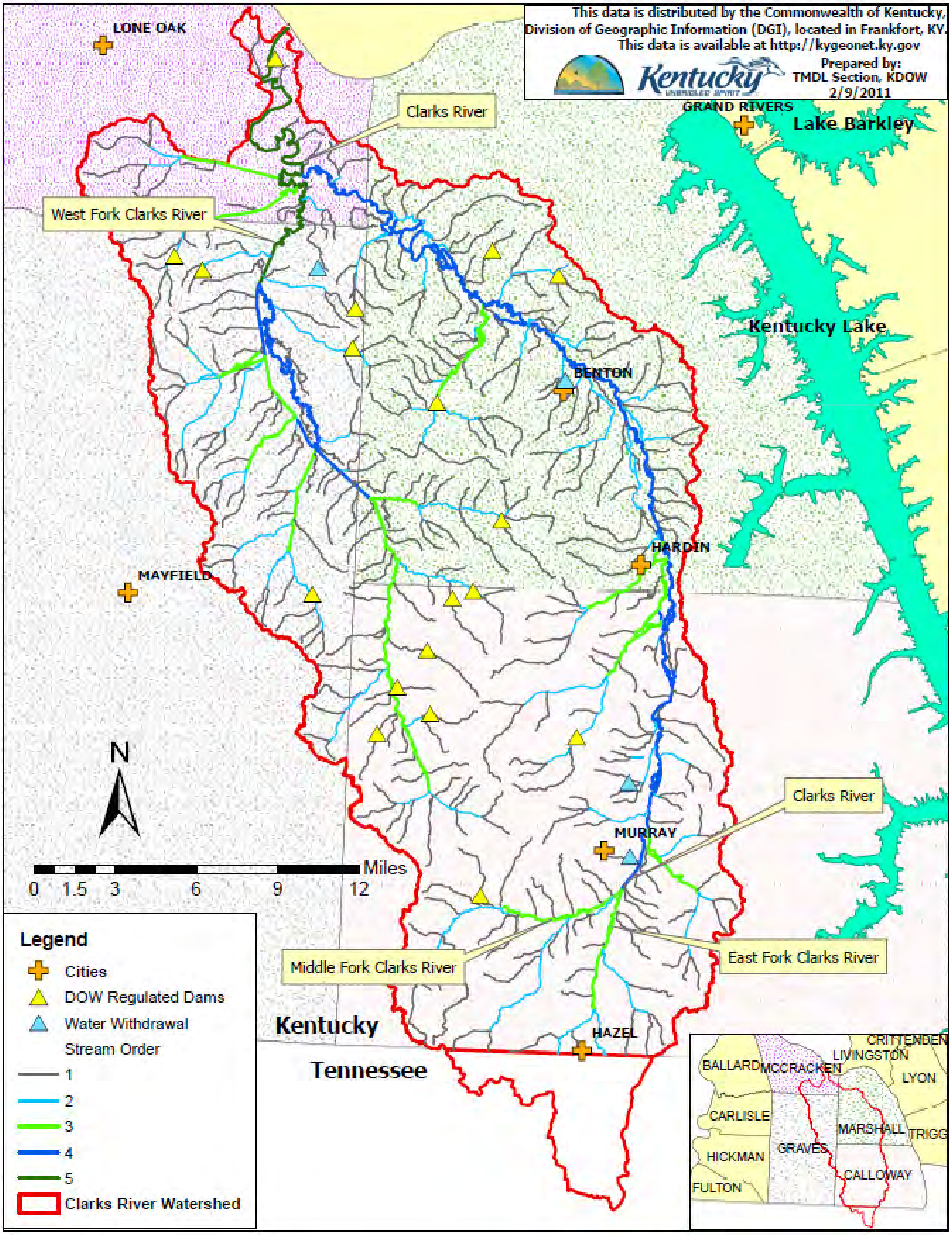

Figure 3.6 Stream Order and Dam and Water Withdrawal Locations

There are eighteen KDOW regulated dams in the watershed. All of them are on smaller order tributaries (first or second order) and form ponds or small lakes. Table 3.3 shows the information for these dams while Figure 3.6 shows their location.

Table 3.3 Dams in the Clarks River Watershed

Dam ID #	Name	Latitude	Longitude	County
201	EAST FORK CLARKS RIVER FRS NO 10	36.5844	88.39616	Calloway
213	EAST FORK CLARKS RIVER FRS NO 15	36.671107	88.335082	Calloway
222	WEST FORK CLARKS RIVER FRS NO 4	36.67	88.468055	Calloway
221	WEST FORK CLARKS RIVER FRS NO 6	36.681299	88.433052	Calloway
218	WEST FORK CLARKS RIVER FRS NO 25A	36.695277	88.455555	Calloway
47	WEST FORK CLARKS RIVER FRS NO 7	36.715548	88.436218	Calloway
219	WEST FORK CLARKS RIVER FRS NO 9	36.743877	88.420371	Calloway
216	WEST FORK CLARKS RIVER FRS NO 10	36.743888	88.513888	Graves
67	WEST FORK CLARKS RIVER FRS NO 8A	36.748142	88.406615	Calloway
217	WEST FORK CLARKS RIVER FRS NO 13A	36.786666	88.389166	Marshall
199	EAST FORK CLARKS RIVER FRS NO 28A	36.84896	88.43455	Marshall
68	WEST FORK CLARKS RIVER FRS NO 20	36.877	88.49184	Graves
858	OTTER LAKE DAM	36.89851	88.4908	Graves
200	EAST FORK CLARKS RIVER FRS NO 32	36.919294	88.355955	Marshall
942	DANIEL PHELPS LAKE DAM	36.916762	88.593553	Graves
82	WEST FORK CLARKS RIVER FRS NO 22	36.923605	88.612765	Graves
202	EAST FORK CLARKS RIVER FRS NO 33	36.93175	88.40042	Marshall
402	PRIESTER LAKE DAM	37.031694	88.549416	McCracken

One USGS gaging station is located in the Clarks River watershed (Figure 3.7). This station (#03610200, Clarks River at Almo) is located at RM 57.3 of Clarks River, has a drainage area of 134 square miles and has discharge measurements back to October, 1982 (USGS, 2011).

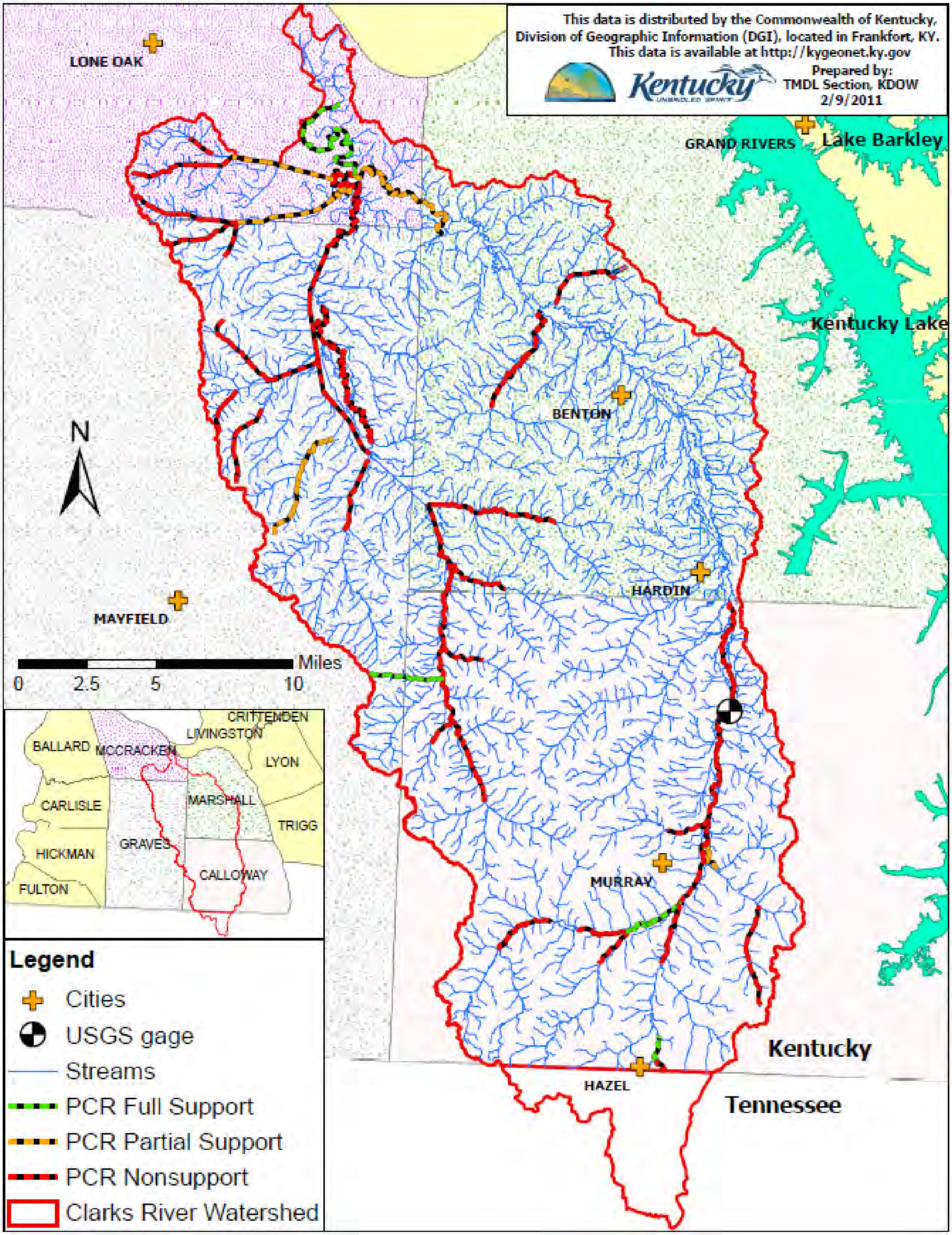

Figure 3.7 Location of USGS Gage in Clarks River Watershed

3.3 Land Cover Distribution

The 2001 National Land Cover Dataset (USGS, 2003) was used to determine the land cover within the Clarks River watershed. The 2001 National Land Cover Database (NLCD) Land Cover Class Definitions are in Appendix A. Table 3.4 lists the percent land cover by class within the watershed. For the land cover tables, all forms of developed area (i.e., high-, medium- and low-intensity developed area, as well as developed open space), were aggregated, as were all forms of forest and shrubland. This was done to simplify the source analysis. Land cover is shown graphically in Figure 3.8. The land cover indicates that approximately half the watershed is devoted to agricultural practices and 36 percent to forest lands. Additionally, there are a high percentage of wetlands (4 percent) in this watershed.

Table 3.4 Amount of Land Cover Class in Clarks River Watershed

Land Cover		% of Total Area	Square Miles	Acres
Forest		36.16	197.54	126427.82
Agriculture (total)		51.63	282.00	180482.29
	Pasture	14.93	81.56	52198.21
	Row Crop	36.70	200.44	128284.08
Developed		6.79	37.11	23749.10
Natural Grassland		1.01	5.49	3516.54
Wetland		4.11	22.44	14360.59
Barren		0.04	0.23	146.41
Open Water		0.26	1.41	904.73
Total		100.00	546.23	349587.47

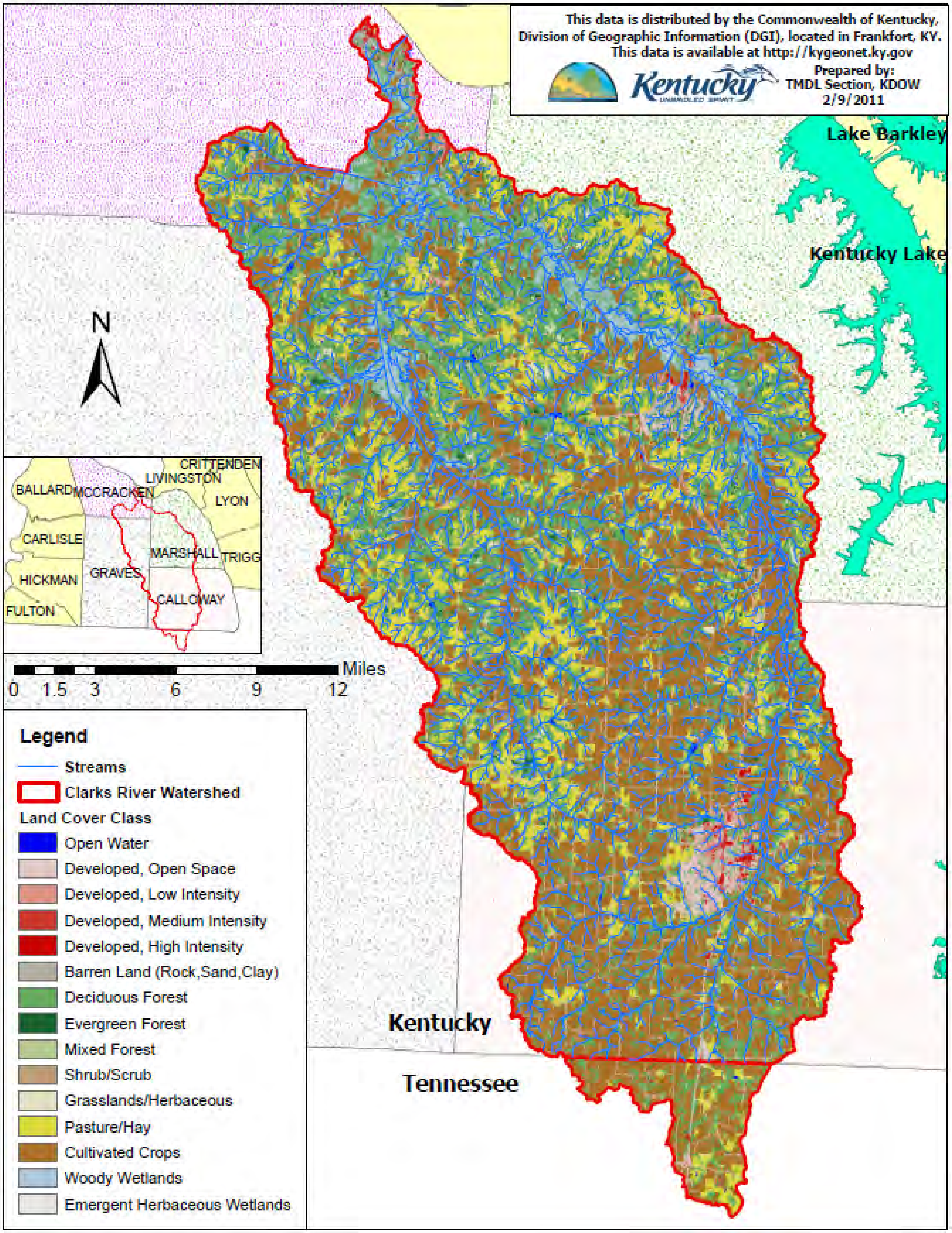

Figure 3.8 Land Cover in the Clarks River Watershed

4.0 Monitoring

This section relays historical and recent monitoring in the Clarks River watershed. Only bacteria sites with data that passed KDOW quality assurance procedures and validation tests are shown in the figures below. Only validated data collected during the PCR season are summarized in the tables below. Additional data collected outside of the PCR season or that failed the sample validation process are available for some sites but are not presented in this Section. The data sets for each impaired segment are presented in Appendix B.

4.1 Historical Monitoring

The Tennessee Valley Authority (TVA) collected fecal coliform data at eleven sites in the Clarks River watershed during 1968 (STORET, 2011). These data are summarized in Table 4.1, while sample sites are shown in Figure 4.1. These data were not used to establish TMDLs. TVA also collected data that resulted in the initial listing for Clarks River RM 50.9 to 55.6 (see Section 2.1); however these data were not available.

Table 4.1 Historic TVA Sample Data Summary

Station Name	Number of Observations	% Exceeding WQC (400 colonies/100ml)	Minimum (colonies/ 100 ml)	Maximum (colonies/ 100 ml)	Average (colonies/ 100 ml)
202836	2	100.0	1200	2100	1650
202839	2	100.0	1410	560000	280705
202840	2	100.0	500	8000	4250
202841	2	50.0	170	2100	1135
202842	2	50.0	50	1500	775
202843	2	0.0	40	300	170
202849	4	100.0	54000	730000	270250
202850	3	100.0	18000	64000	41667
202851	3	100.0	800	7900	3567
202852	2	50.0	300	1700	1000
202853	2	0.0	310	400	355

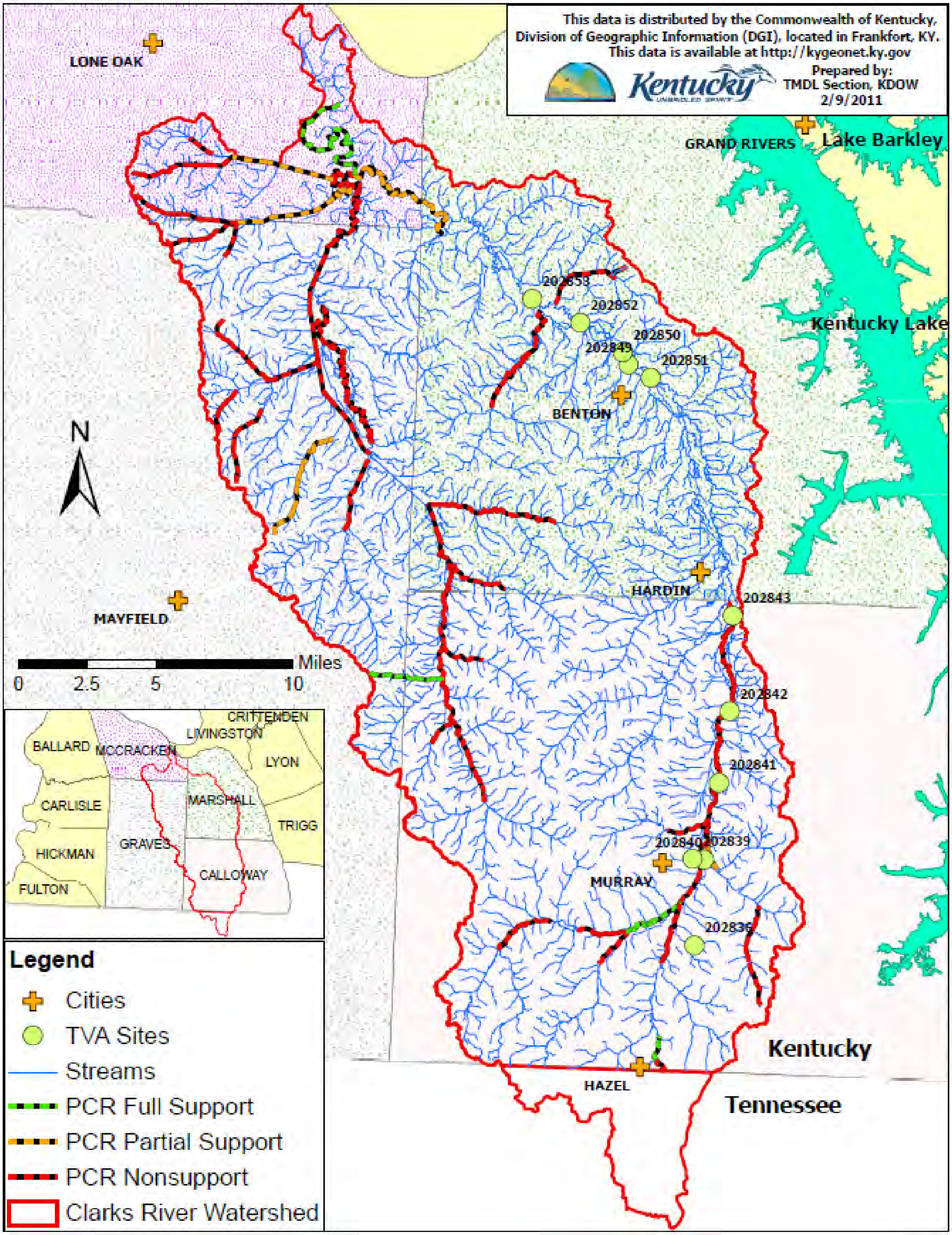

Figure 4.1 Historic TVA sites in Clarks River Watershed

4.2 KDOW Monitoring

The KDOW collected fecal coliform data at six sites during the 1990's. Some of these sites are still monitored by KDOW; however, the indicator now used is *E. coli*. Table 4.2 summarizes these data while Figure 4.2 shows the location of these KDOW sites. *E. coli* data from sites PRI068, PRI106, and PRI107 were used in TMDL development.

Table 4.2 KDOW Sample Data Summary

Station Name	Number of Observations	% Exceeding WQC [400 (FC) or 240 (EC) colonies/100ml]	Minimum (colonies/ 100 ml)	Maximum (colonies/ 100 ml)	Average (colonies/ 100 ml)
JPTMDL01	6 (FC)	0.0 (FC)	10 (FC)	200 (FC)	63 (FC)
PRI038	80 (FC)	5.0 (FC)	8 (FC)	8000 (FC)	259 (FC)
PRI068	3 (FC), 3 (EC)	33.3 (FC), 66.7 (EC)	30 (FC), 11 (EC)	450 (FC), >2420 (EC)	183 (FC), 1089 (EC)
PRI106	40 (FC), 13 (EC)	17.5 (FC), 23.1 (EC)	10 (FC), 15 (EC)	1300 (FC), 1414 (EC)	242 (FC), 253 (EC)
PRI107	38 (FC), 13 (EC)	31.6 (FC), 38.5 (EC)	10 (FC), 44 (EC)	1800 (FC), >2420 (EC)	375 (FC), 468 (EC)
TRW002	6 (FC)	16.7 (FC)	10 (FC)	600 (FC)	163 (FC)

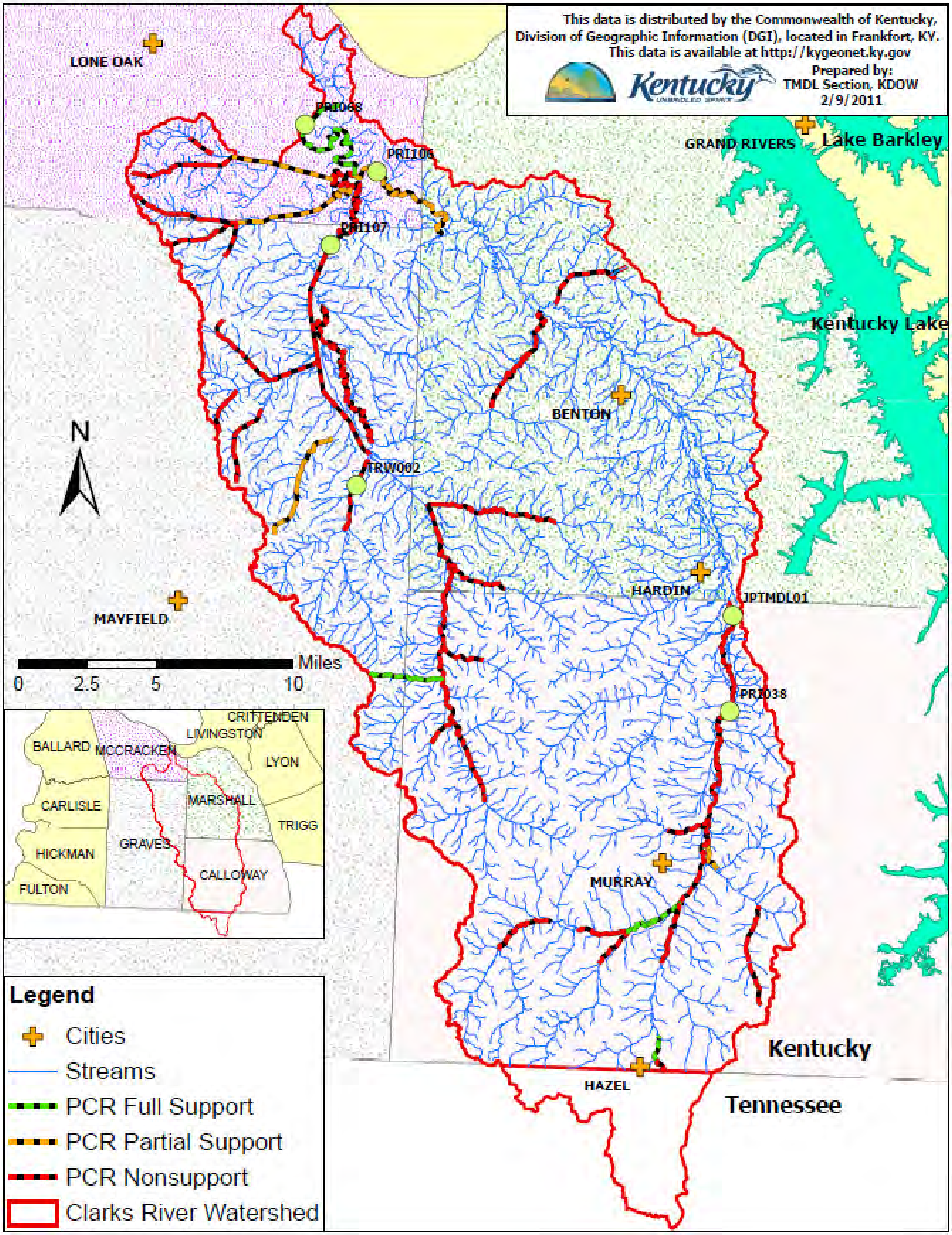

Figure 4.2 KDOW Sites in Clarks River Watershed

4.3 Watershed Based Plan (WBP) Monitoring

A 319 (h) grant (#C9-994861-99) was awarded to MSU to assess fecal coliform in the Lower Cumberland, Tennessee, and Mississippi River Basins. As part of this project, thirteen sites in Clarks River were monitored during the 2000 PCR season. Table 4.3 summarizes these data while Figure 4.3 shows the location of these Murray WBP sites. These data were not used in TMDL development.

Table 4.3 Murray WBP Sample Data Summary

Station Name	Map #	Number of Observations	% Exceeding WQC (400 colonies/100ml)	Minimum (colonies/ 100 ml)	Maximum (colonies/ 100 ml)	Average (colonies/ 100 ml)
Bee Creek at North 4th Street Bridge	1	6	50	70	11,000	2,593
Blizzard Pond at 450 Bridge	2	6	50	30	48,200	9,830
Camp Creek at 450 Bridge	3	6	33	30	1,850	513
Chestnut Creek at Oak Valley Road	4	6	33	10	92,800	15,788
Clayton Creek at 121 Bridge	5	4	100	600	11,400	3,610
Damon Creek at 1836 Bridge	6	6	100	750	228,000	72,475
Duncan Creek at 1836 Bridge	7	6	33	70	47,400	8,277
East Fork Clarks River at 94 Bridge	8	6	33	10	9,400	1,775
Middle Fork Clarks River at 641 Bridge	9	6	50	30	6,800	1,425
Middle Fork Creek at 348 Bridge	10	6	50	10	463,867	77,848
West Fork Clarks River 3 at 348 Bridge	11	6	50	40	3,050	1,067
West Fork Clarks River 7 at Tim Road Bridge	12	6	50	20	6,000	1,577
West Fork Clarks River at 464 Bridge	13	6	33	90	82,000	14,955

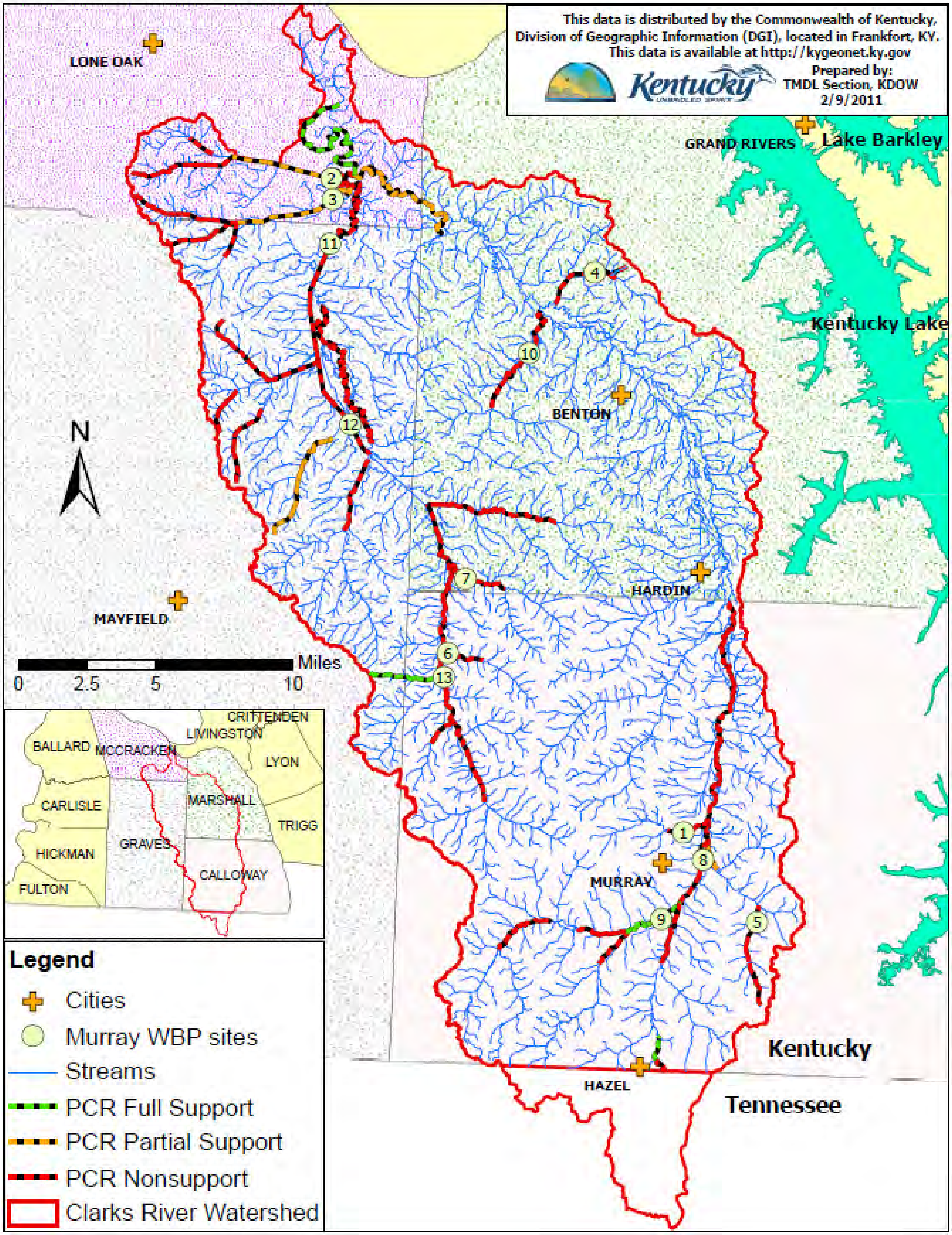

Figure 4.3 Murray WBP Sample Sites in Clarks River Watershed

Another 319(h) grant (#C9-994861-02) was awarded to the Jackson Purchase Resource Conservation and Development Foundation, Inc. (JP RC&D) to develop a watershed based plan (WBP) for portions Clarks River in Marshall and Calloway counties. As part of this project, five sample sites were monitored for *E. coli* during four targeted events. Only one event occurred during the PCR season (during 2006) so only those data are presented in Table 4.4. Figure 4.4 shows the location of the sample sites. These data were used in TMDL development.

Table 4.4 JP RC&D WBP Sample Data Summary

Station ID	Number of Observations	% Exceeding WQC (240 colonies/100ml)	*E. coli* colonies/ 100 ml
CR05	1	100	370
CR07	1	0	63
CR08	1	0	98
CR09	1	0	52
CR11	1	0	30
CR14	1	0	211

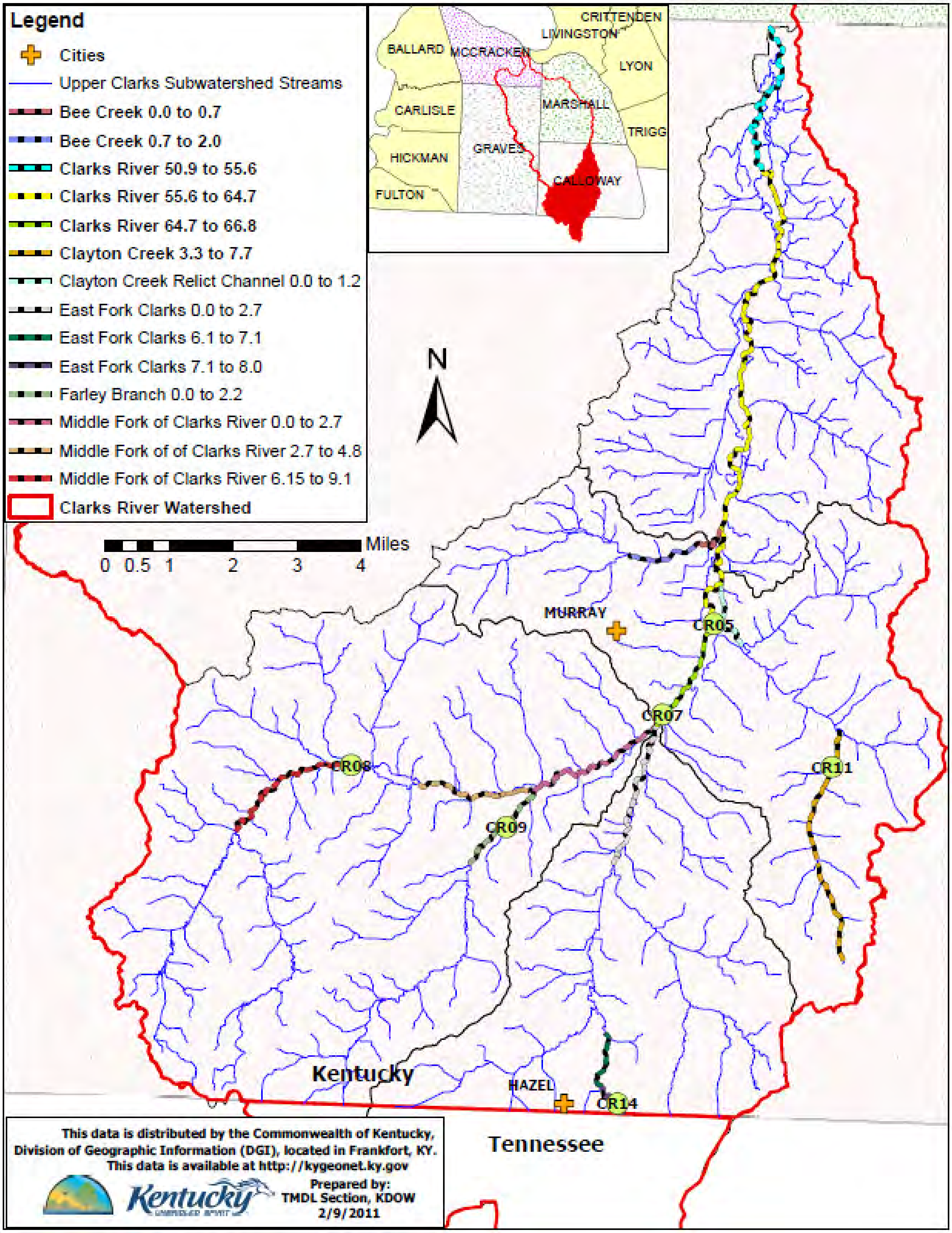

Figure 4.4 JP RC&D WBP Sample Sites in Clarks River Watershed

4.4 TMDL Monitoring

To facilitate TMDL development, KDOW contracted with Murray State University's Hancock Biological Station and Center for Reservoir Research (MSU) to monitor *E. coli* at fifty-one sites during the 2005 PCR season, with additional sampling in 2006 at Clayton Creek. These data are summarized in Table 4.5 while the site locations are shown in Figures 4.5 through 4.9. These data were used in TMDL development. The JP RC&D sites are co-located with the TMDL site having the same station number. In addition, KDOW sites PRI068 and PRI107 are co-located with TMDL sites 42 and 41 respectively.

Table 4.5 TMDL Sample Data Summary

Station Name	Number of Observations	% Exceeding WQC (240 colonies/100ml)	Minimum (colonies/ 100 ml)	Maximum (colonies/ 100 ml)	Average (colonies/ 100 ml)
1	16	37.5	20	7308	738
2A	14	42.9	20	1326	328
3	18	44.4	<20	28272	2422
4	18	66.7	<20	48392	5740
5	19	36.8	<20	6152	502
7	21	28.6	20	34658	1808
8	11	90.9	196	3248	710
9	10	60	40	700	258
10	17	29.4	<20	3058	295
11	10	80	170	17328	3913
12	18	33.3	20	844	243
13	18	11.1	<20	590	137
14	16	43.8	40	1162	371
15	9	55.6	20	18416	3003
16	13	46.2	20	15402	2178
17	9	100	422	48392	6672
18	12	16.7	20	4718	516
19	11	36.4	20	9768	1558
20A	15	53.3	20	2100	443
20B	8	50	126	1210	382
21	18	72.2	104	3936	661
22	16	43.8	40	5974	602
23	18	38.9	20	3030	371
24	17	17.6	<20	1454	207
25	18	72.2	40	3340	1247
26	18	100	398	12262	1846
27	18	55.6	40	5510	587
28	18	44.4	40	3912	422

Station Name	Number of Observations	% Exceeding WQC (240 colonies/100ml)	Minimum (colonies/ 100 ml)	Maximum (colonies/ 100 ml)	Average (colonies/ 100 ml)
29	19	26.3	<20	786	182
30	17	35.3	40	1326	280
31	18	55.6	60	1146	351
32	11	27.3	82	1918	335
33	11	36.4	62	1096	315
34	19	21.1	40	976	206
35	6	66.7	220	49000	8582
36	3	100	290	718	500
37	8	37.5	40	432	189
38	3	66.7	<20	350	213
39	18	44.4	20	7568	888
40	8	37.5	<20	1300	336
41	16	56.3	62	1526	401
42	15	13.3	<20	602	140
43	15	26.7	20	22398	1940
44	12	41.7	40	6510	960
45	15	40	<20	9222	966
46	18	44.4	20	7308	639
47	17	23.5	<20	28272	1866
48	19	47.4	20	28272	3303
49	19	21.1	<20	9768	737
50	11	18.2	40	350	164
51	11	0	20	172	79

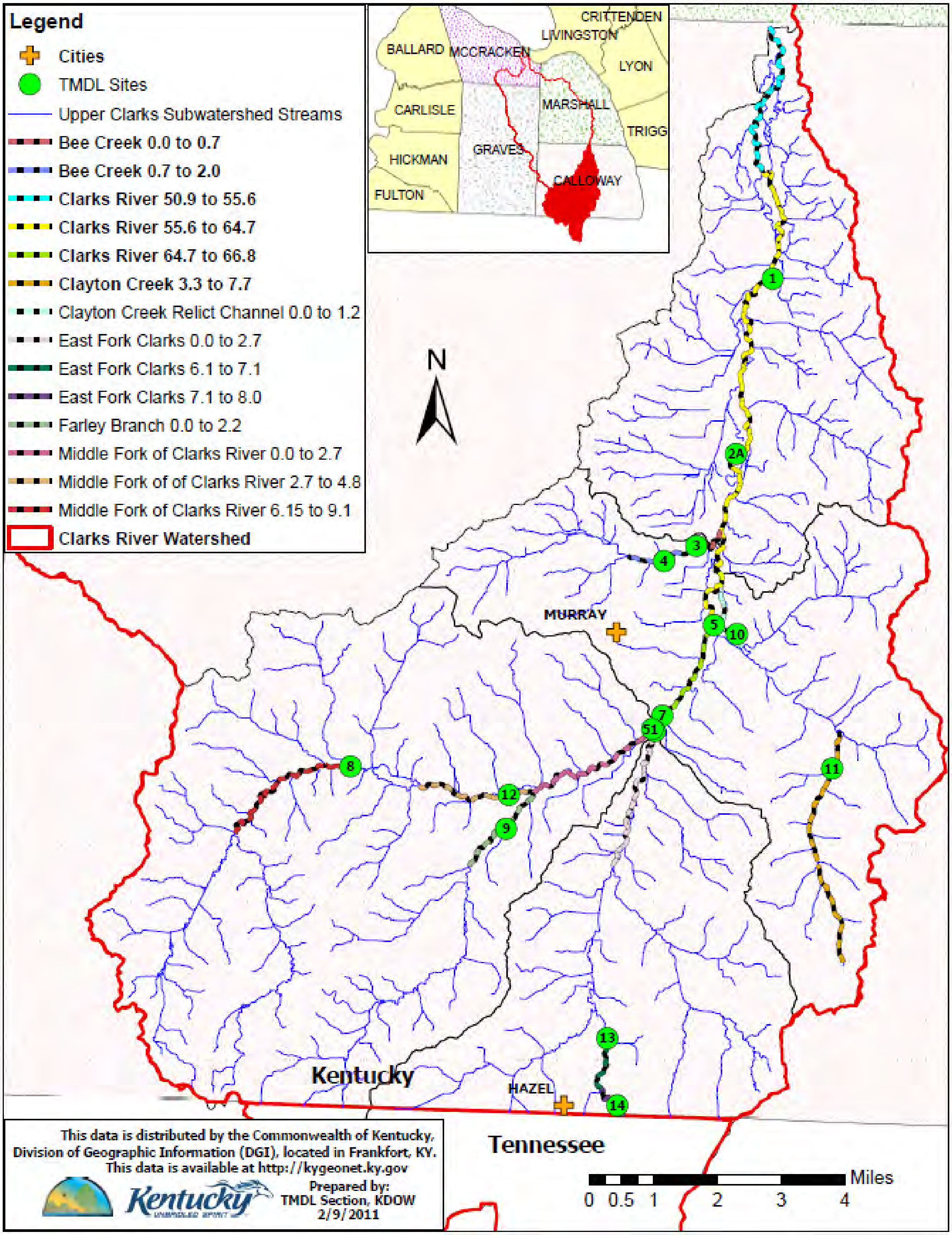

Figure 4.5 TMDL Sites in Upper Clarks Subwatershed

Note: Site 50 is under Site 51.

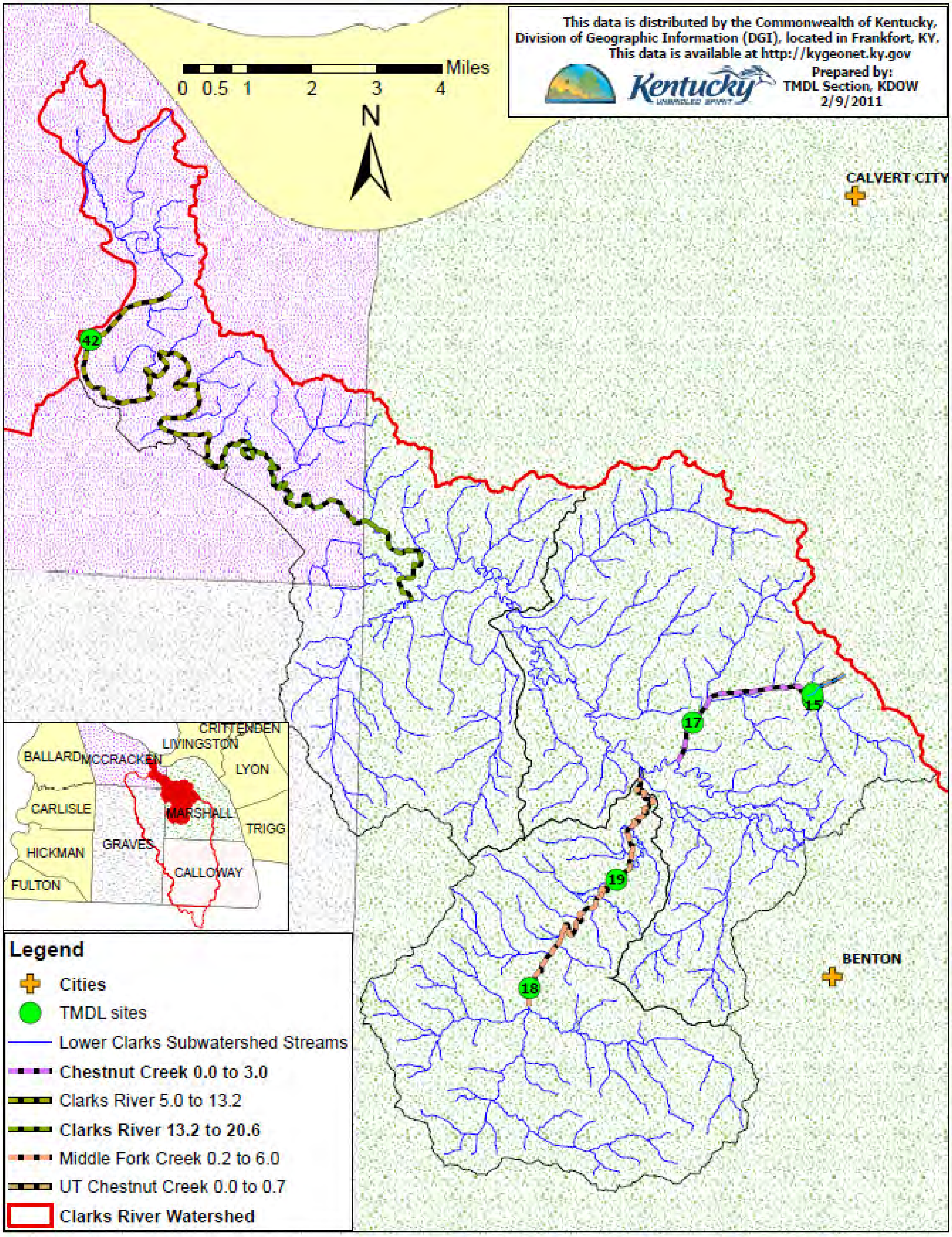

Figure 4.6 TMDL Sites in Lower Clarks Subwatershed

Note: Site 16 is under Site 15.

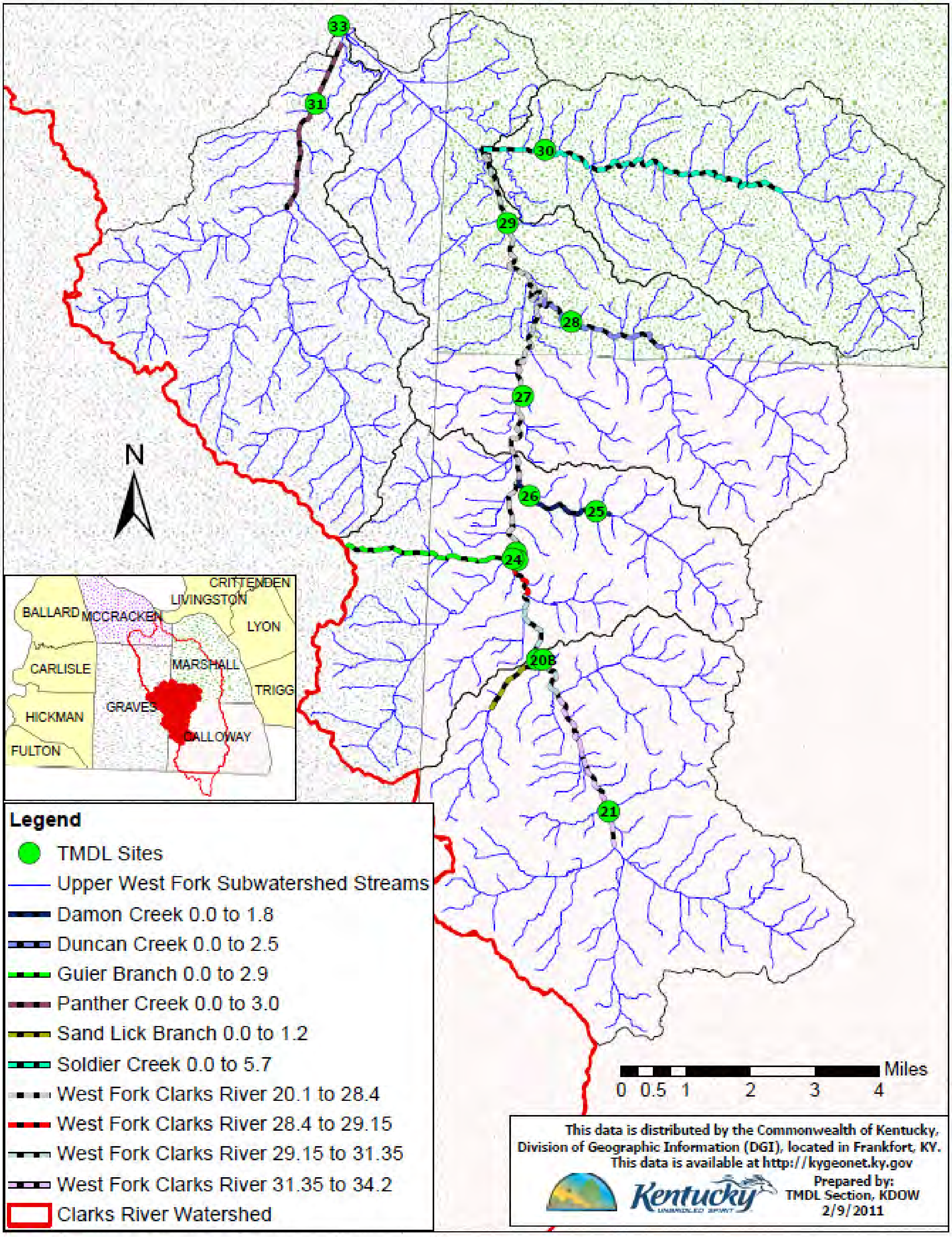

Figure 4.7 TMDL Sites in Upper West Fork Subwatershed
Note: Sites 22 and 23 are under Site 24 while Site 20A is under 20 B (see Figure 4.8 for detail)

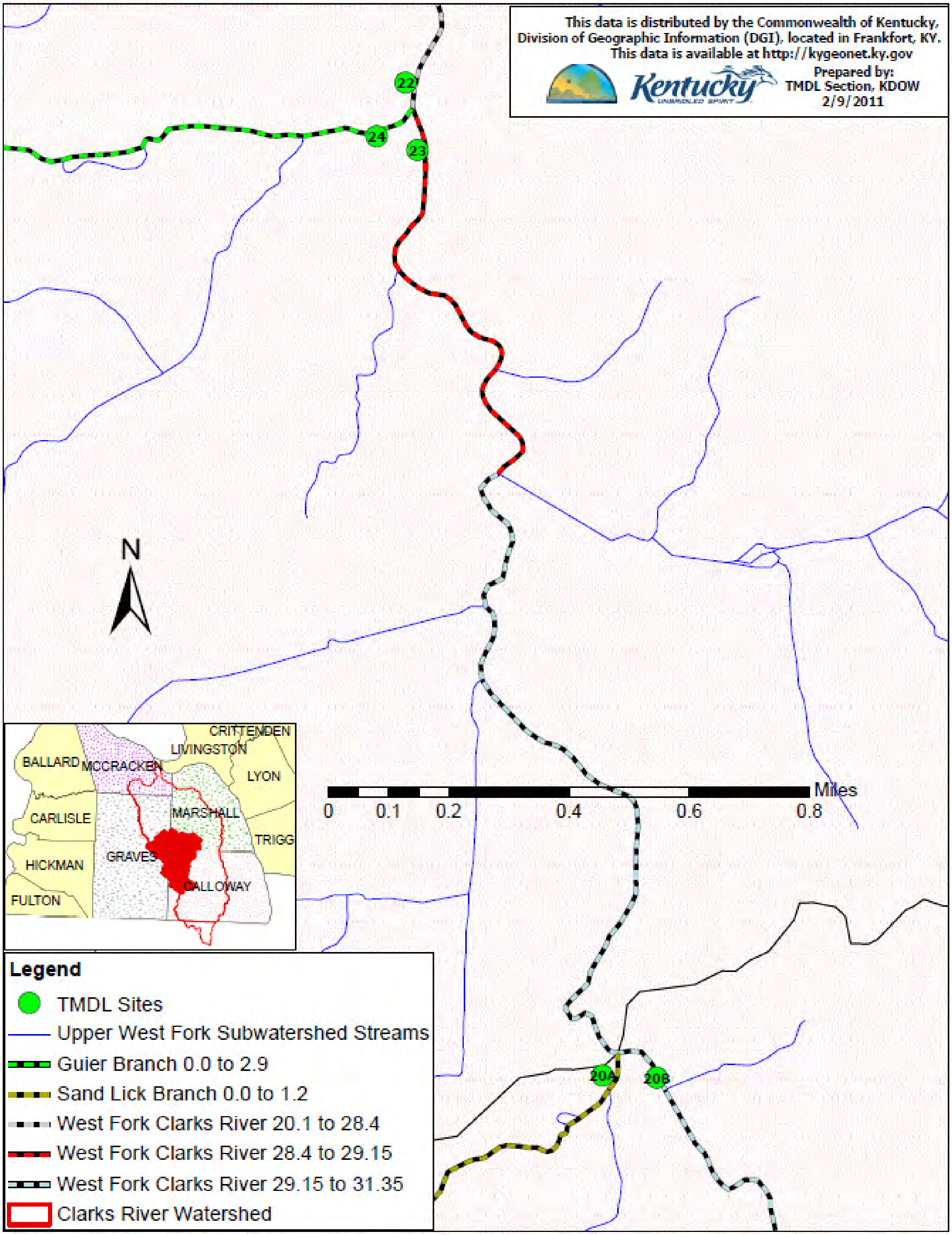

Figure 4.8 Detail of TMDL Sites near Guier Branch and Sand Lick Branch

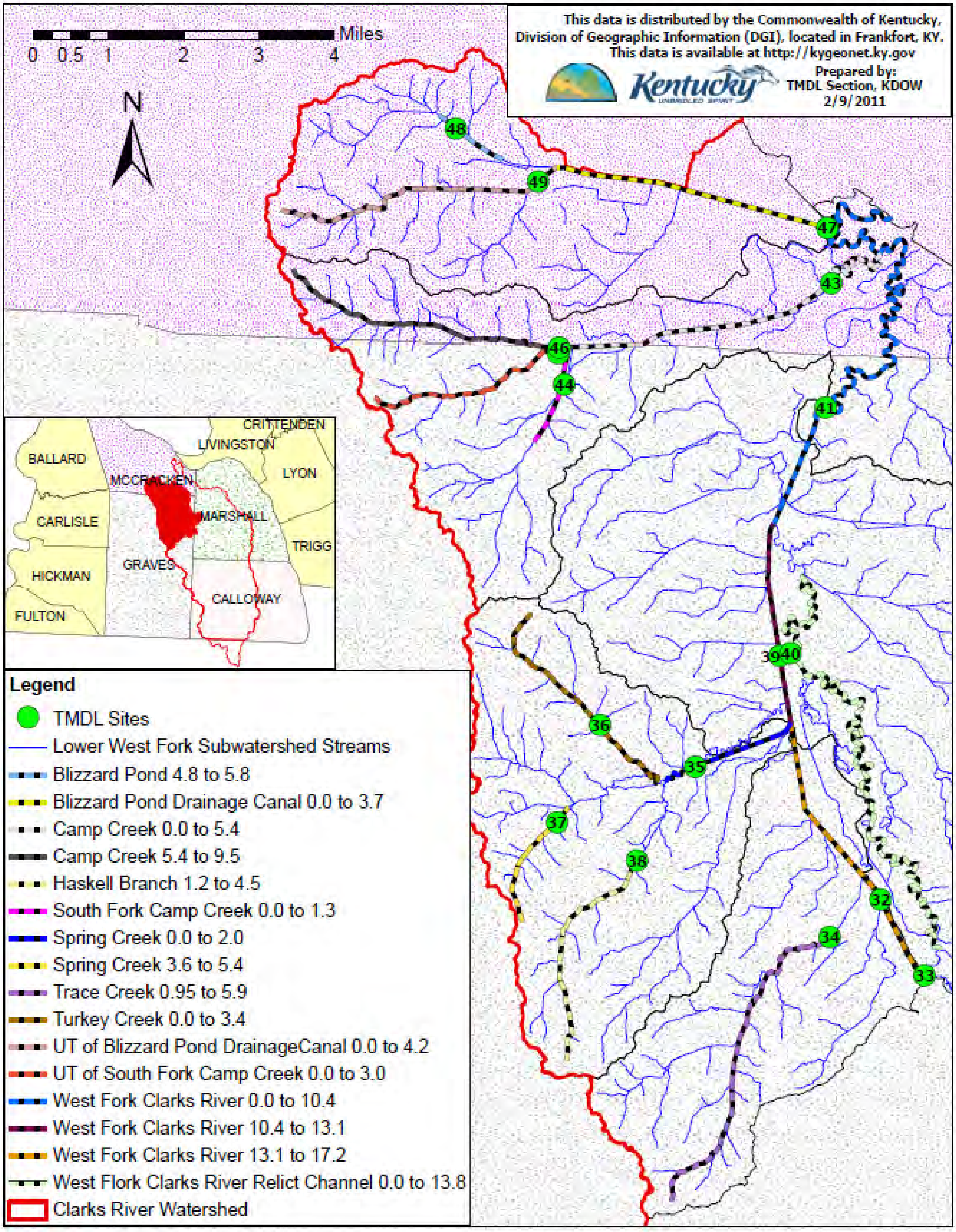

Figure 4.9 TMDL Sites in Lower West Fork Subwatershed
Note Site 45 is under site 46

The recent monitoring efforts resulted in the identification of forty-one segments as impaired (Table 4.6) and four segments as fully supporting (Table 4.7) of the PCR use for pathogen indicators. Table 4.8 indicates the site(s) used to determine the current support status of each segment and, for pathogen indicator impaired segments, the sites used in TMDL development.

Table 4.6 Pathogen Indicator Impaired Segments for TMDL Development

Waterbody Name	Pollutant(3)	County	GNIS Number	Suspected Sources	Impaired(3) Use (Support Status)
Bee Creek 0.0 to 0.7	*E. coli*	Calloway	KY486666_01	Source Unknown	PCR (NS)
Bee Creek 0.7 to 2.0	*E. coli*	Calloway	KY486666_02	Source Unknown	PCR (NS)
(1)Blizzard Pond 4.8 to 5.8	*E. coli*	McCracken	KY487484_02	Package Plant or Other Permitted Small Flows Discharges	PCR (NS)
Blizzard Pond Drainage Canal 0.0 to 3.7	*E. coli*	McCracken	KY487484_01	Source Unknown	PCR (PS)
Camp Creek 0.0 to 5.4	*E. coli*	McCracken	KY488685_00	Source Unknown	PCR (PS)
(1)Camp Creek 5.4 to 9.5	*E. coli*	Graves	KY488685_02	Source Unknown	PCR (NS)
Chestnut Creek 0.0 to 3.0	*E. coli*	Marshall	KY489424_00	Source Unknown	PCR (NS)
Clarks River 13.2 to 20.6	*E. coli*	McCracken	KY489552_02	Source Unknown	PCR (PS)
(2)Clarks River 50.9 to 55.6	Fecal Coliform	Calloway	KY489552_07	Package Plant or Other Permitted Small Flows Discharges	PCR (NS)
Clarks River 55.6 to 64.7	*E. coli*	Calloway	KY489552_08	Agriculture	PCR (NS)
Clarks River 64.7 to 66.8	*E. coli*	Calloway	KY489552_09	Source Unknown	PCR (NS)
Clayton Creek 3.3 to 7.7	*E. coli*	Calloway	KY489601_02	Source Unknown	PCR (NS)
(1)Clayton Creek Relict Channel 0.0 to 1.2	*E. coli*	Calloway	KY489552-63.7_01	Source Unknown	PCR (PS)
Damon Creek 0.0 to 1.8	*E. coli*	Calloway	KY490545_01	Animal Feeding Operations (NPS)	PCR (NS)
Duncan Creek 0.0 to 2.5	*E. coli*	Marshall	KY491300_00	Source Unknown	PCR (NS)
(1)East Fork Clarks River 0.0 to 2.7	*E. coli*	Calloway	KY491450_01	Source Unknown	PCR (NS)

Waterbody Name	Pollutant(3)	County	GNIS Number	Suspected Sources	Impaired(3) Use (Support Status)
(1)East Fork Clarks River 7.1 to 8.0	*E. coli*	Calloway	KY491450_03	Source Unknown	PCR (NS)
(1)Farley Branch of Middle Fork Clarks River 0.0 to 2.2	*E. coli*	Calloway	KY491983_01	Source Unknown	PCR (NS)
(1)Haskell Branch 1.2 to 4.5	*E. coli*	Graves	KY493854_01	Source Unknown	PCR (NS)
Middle Fork Creek of Clarks River 0.2 to 6.0	*E. coli*	Marshall	KY498118_00	Agriculture	PCR (NS)
(1)Middle Fork of Clarks River 2.7 to 4.8	*E. coli*	Calloway	KY498115_02	Source Unknown	PCR (NS)
(1)Middle Fork of Clarks River 6.15 to 9.1	*E. coli*	Calloway	KY498115_03	Source Unknown	PCR (NS)
Panther Creek 0.0 to 3.0	*E. coli*	Graves	KY500155_01	Source Unknown	PCR (NS)
(1)Sand Lick Branch 0.0 to 1.2	*E. coli*	Calloway	KY502926_01	Source Unknown	PCR (NS)
(1)Soldier Creek 0.0 to 5.7	*E. coli*	Marshall	KY503868_01	Source Unknown	PCR (NS)
(1)South Fork Camp Creek 0.0 to 1.3	*E. coli*	Graves	KY503908_01	Source Unknown	PCR (NS)
(1)Spring Creek 0.0 to 2.0	*E. coli*	Calloway	KY504124_01	Source Unknown	PCR (NS)
(1)Spring Creek 3.6 to 5.4	*E. coli*	Calloway	KY504124_02	Source Unknown	PCR (NS)
(1)Trace Creek 0.95 to 5.9	*E. coli*	Graves	KY505419_01	Source Unknown	PCR (PS)
(1)Turkey Creek 0.0 to 3.4	*E. coli*	Graves	KY505595_01	Source Unknown	PCR (NS)
(1)UT South Fork Camp Creek 0.0 to 3.0	*E. coli*	Graves	KY503908-0.05_01	Source Unknown	PCR (NS)
(1)UT Chestnut Creek 0.0 to 0.7	*E. coli*	Marshall	KY489424-2.8_00	Source Unknown	PCR (NS)
(1)UT Blizzard Pond Drainage Canal 0.0 to 4.2	*E. coli*	McCracken	KY487484-1.3_01	Source Unknown	PCR (NS)
(1)West Fork Clarks River Relict Channel 0.0 to 13.8	*E. coli*	Graves	KY506427_01	Source Unknown	PCR (NS)

Waterbody Name	Pollutant(3)	County	GNIS Number	Suspected Sources	Impaired(3) Use (Support Status)
West Fork of Clarks River 0.0 to 10.4	*E. coli*	McCracken	KY506426_01	Agriculture, Urban Runoff/Storm Sewers	PCR (NS)
(1)West Fork of Clarks River 10.4 to 13.1	*E. coli*	Graves	KY506426_02	Source Unknown	PCR (NS)
West Fork of Clarks River 13.1 to 17.2	*E. coli*	Graves	KY506426_03	Source Unknown	PCR (NS)
West Fork of Clarks River 20.1 to 28.4	*E. coli*	Marshall	KY506426_04	Source Unknown	PCR (NS)
(1)West Fork of Clarks River 28.4 to 29.15	*E. coli*	Calloway	KY506426_05	Source Unknown	PCR (NS)
(1)West Fork of Clarks River 29.15 to 31.35	*E. coli*	Calloway	KY506426_06	Source Unknown	PCR (NS)
(1)West Fork of Clarks River 31.35 to 34.2	*E. coli*	Calloway	KY506426_07	Source Unknown	PCR (NS)

Note: (1) Indicates a new listing not on the draft 2010-303(d) list.
(2) There was no recent sample collection on this segment. Re-assessment of this segment is recommended prior to either delisting or TMDL development for it.
(3)Pollutant and Support Status reflect the most recent assessments, which have not made it into the 303(d) listing process yet. In most cases, a previous impairment for fecal coliform has been updated to *E. coli* and support status reflects the level of *E. coli* impairment.

Table 4.7 Pathogen Indicator Fully Support Segments

Waterbody Name	County	Waterbody ID	Use (Support Status)
Clarks River 5.0 to 13.2	Marshall	KY489552_01	PCR (FS)
East Fork Clarks River 6.1 to 7.1	Calloway	KY491450_02	PCR (FS)
Guier Branch of West Fork Clarks River 0.0 to 2.9	Calloway	KY493462_01	PCR (FS)
Middle Fork of Clarks River 0.0 to 2.7	Calloway	KY498115_01	PCR (FS)

Table 4.8 Sites Associated with Each Assessed Segment

Stream Segment	Station Number	Latitude	Longitude	Sample Site RM
Bee Creek 0.0 to 0.7	3	36.63045	-88.293	0.7
Bee Creek 0.7 to 2.0	4	36.626783	-88.30195	1.5
Blizzard Pond 4.8 to 5.8	48	36.984236	-88.63455	5.5
Blizzard Pond Drain Canal 0.0 to 3.7	47	36.967246	-88.544824	0.1
Camp Creek 0.0 to 5.4	43	36.95656	-88.54343	1.7
Camp Creek 5.4 to 9.5	46	36.942527	-88.608167	5.5
Chestnut Creek 0.0 to 3.0	15	36.9196	-88.3579	2.9

Stream Segment	Station Number	Latitude	Longitude	Sample Site RM
Chestnut Creek 0.0 to 3.0	17	36.9137	-88.3913	0.7
Clarks River 5.0 to 13.2	42, PRI068	36.996017	-88.5629	6.4
Clarks River 13.2 to 20.6	PRI106	36.971806	-88.5149722	14.8
Clarks River 50.9 to 55.6	JPTMDL01	36.742222	-88.273333	52.4
Clarks River 55.6 to 64.7	1	36.691694	-88.273557	57.4
Clarks River 55.6 to 64.7	2A	36.6516	-88.282533	61.2
Clarks River 64.7 to 66.8	5, CR05	36.61255	-88.287467	64.8
Clarks River 64.7 to 66.8	7, CR07	36.591583	-88.3012	66.6
Clayton Creek 3.3 to 7.7	11, CR11	36.580647	-88.253117	4.1
Clayton Creek Relict Channel 0.0 to 1.2	10	36.61065	-88.280867	1.1
Damon Creek 0.0 to 1.8	25	36.7156	-88.440341	1.5
Damon Creek 0.0 to 1.8	26	36.718616	-88.459096	0.3
Duncan Creek 0.0 to 2.5	28	36.75817	-88.448791	0.8
East Fork Clarks River 0.0 to 2.7	50	36.58805	-88.30325	0.1
East Fork Clarks River 6.1 to 7.1	13	36.51785	-88.3142	6.2
East Fork Clarks River 7.1 to 8.0	14, CR14	36.502667	-88.310917	7.7
Farley Branch 0.0 to 2.2	9, CR09	36.564933	-88.344283	0.8
Guier Branch 0.0 to 2.9	24	36.704389	-88.463161	0.1
Haskell Branch 1.2 to 4.5	38	36.8439	-88.5858	1.2
Middle Fork Clarks River 0.0 to 2.7	51	36.588517	-88.303983	0.1
Middle Fork Clarks River 2.7 to 4.8	12	36.5726	-88.34375	3
Middle Fork Clarks River 6.15 to 9.1	8, CR08	36.578117	-88.38845	6.2
Middle Fork Creek 0.2 to 6.0	19	36.8778	-88.4114	2.8
Middle Fork Creek 0.2 to 6.0	18	36.8528	-88.4348	5.7
Panther Creek 0.0 to 3.0	31	36.796753	-88.457499	1.3
Sand Lick Branch 0.0 to 1.2	20A	36.682257	-88.455465	0.1
Soldier Creek 0.0 to 5.7	30	36.796753	-88.457499	1.1
South Fork Camp Creek 0.0 to 1.3	44	36.935442	-88.606696	0.5
Spring Creek 0.0 to 2.0	35	36.86238	-88.572497	1.4
Spring Creek 3.6 to 5.4	37	36.8508	-88.605183	3.8
Trace Creek 0.95 to 5.9	34	36.830248	-88.539121	1.1
Turkey Creek 0.0 to 3.4	36	36.869883	-88.595579	1.2
UT of Blizzard Pond Drainage Canal 0.0 to 4.2	49	36.974513	-88.614451	0.3
UT of Chestnut Creek 0.0 to 0.7	16	36.920927	-88.358109	0.1
UT of South Fork Camp Creek 0.0 to 3.0	45	36.941388	-88.608314	0.1
West Fork Clarks (Relict Channel) 0.0 to 13.8	40	36.884832	-88.550547	2.4
West Fork Clarks 0.0 to 10.4	41, PRI107	36.932511	-88.543938	8.6
West Fork Clarks River 10.4 to 13.1	39	36.884262	-88.553082	12.2

Stream Segment	Station Number	Latitude	Longitude	Sample Site RM
West Fork Clarks River 13.1 to 17.2	32	36.837811	-88.527267	15.9
West Fork Clarks River 13.1 to 17.2	33	36.823384	-88.516169	17.1
West Fork Clarks River 20.1 to 28.4	27	36.74112	-88.46169	25.3
West Fork Clarks River 20.1 to 28.4	29	36.779998	-88.467427	21.4
West Fork Clarks River 20.1 to 28.4	22	36.705713	-88.462338	28.2
West Fork Clarks River 28.4 to 29.15	23	36.704089	-88.461922	28.4
West Fork Clarks River 29.15 to 31.35	20B	36.6818	-88.45395	30.4
West Fork Clarks River 31.35 to 34.2	21	36.648033	-88.434417	33.4

5.0 Source Identification

For regulatory purposes, the sources of *E. coli* in a watershed can be placed into two broad categories: KPDES-permitted and non KPDES-permitted sources. A KPDES-permitted source requires a Kentucky Pollutant Discharge Elimination System (KPDES) discharge permit, a Storm Water permit, or a Municipal Separate Storm Sewer System (MS4) permit from the KDOW. KPDES discharge permits include wastewater treatment facilities that discharge directly to a stream, facilities discharging storm water, and some agricultural operations. The KPDES is not the only permitting program that may affect water quality or quantity within a watershed; other permitting examples include water withdrawal permits, permits to build structures within a floodplain, permits to construct an on-site sewage treatment disposal system (OSTDS), and permits to land apply waste from sewage treatment plants. However, within the framework of the TMDL process a KPDES-permitted source is defined as one regulated under the KPDES program.

A non KPDES-permitted source does not include surface or ground water dischargers regulated by the KPDES program but does include nonpoint sources of pollution. Nonpoint sources of pollution are caused by runoff from precipitation over and/or through the ground and are correlated to land use.

5.1 KPDES-Permitted Sources

KPDES- permitted sources include all sources regulated by the KPDES permitting program. KPDES permit and point source are defined in 401 KAR 10:001. A Waste Load Allocation (WLA) is assigned to KPDES-permitted sources.

5.1.1 Sanitary Wastewater Systems

Sanitary Wastewater Systems (SWSs) include all facilities with a design flow which are permitted to discharge fecal coliform or *E. coli*. This includes Wastewater Treatment Plants (WWTPs), Sewage Treatment Plants (STPs), package plants and home units.

Sixteen KPDES-permitted sanitary wastewater discharges are located within the Clarks River watershed (Table 5.1 and Figure 5.1). There are certainly other KPDES-permitted facilities in the impaired watersheds; however, the sixteen that are identified in this report treat sanitary wastewater and contribute an *E. coli* load to an impaired segment. There were no SWS-sources of bacteria in the Tennessee portion of the watershed (Vicki Steed, 2011 personal communication). Facilities in Table 5.1 receive WLAs. These sixteen facilities are described below. Information about permitted sources was obtained from the application for permit submitted by the permitted entity and from the KPDES permit. Discharge Monitoring Report (DMR) information was obtained from the EPA Permit Compliance System database (US EPA, 2010) and the TEMPO database maintained by the Department for Environmental Protection. The percent exceedance rate was calculated based upon the number of reported discharges; it does not include periods of no discharge reported. DMR results for each facility are presented in Appendix C. Additional records for permitted entities are available upon request from the KDOW records custodian. Information on the Kentucky Open Records Act is available at http://water.ky.gov.

Table 5.1 KPDES Permitted Facilities with Limits for *E. coli* (EC) or Fecal Coliform (FC)

KPDES Permit #	Facility	Design Capacity (MGD)	Des. Capacity (cfs)	Permit Limit Monthly Average (colonies/ 100 ml)	Permit Limit Maximum Weekly Average (colonies/ 100 ml)	Outfall Longitude	Outfall Latitude	Type	AI
KY0072761	Bee Creek WWTP	5.25	8.122	130 (EC)	240 (EC)	-88.293589	36.630035	Sewerage Systems	515
KY0021172	Benton WWTP	1.00	1.547	200 (FC)	400 (FC)	-88.343611	36.864722	Sewerage Systems	2921
KY0040738	East Calloway Elem School	.008	0.012	130 (EC)	240 (EC)	-88.241263	36.623382	Elementary & Secondary Schools	35392
KY0040428	Freemont Baptist Mission	.003	0.005	130 (EC)	240 (EC)	-88.608894	36.961943	Elementary & Secondary Schools	3040
KY0044164	Golden Acres Subdivision	.025	0.039	130 (EC)	240 (EC)	-88.480546	36.973426	Land Subdividers & Developers	2935
KY0080845	Great Oaks Subdivision	.07	0.108	130 (EC)	240 (EC)	-88.638627	36.986681	Land Subdividers & Developers	3041
KY0021016	Hardin WWTP	0.142	0.220	130 (EC)	240 (EC)	-88.293611	36.771944	Sewerage Systems	2936
KY0023906	Marshall Co High School	.03	0.046	130 (EC)	240 (EC)	-88.331550	36.912417	Elementary & Secondary Schools	35402
KY0044181	Marshall Co Sanitation District 2 WWTP	.0495	0.077	130 (EC)	240 (EC)	-88.349590	36.925598	Land Subdividers & Developers	2932
KY0028991	Memory Lane Trailer Court	.002	0.003	130 (EC)	240 (EC)	-88.343609	36.909447	Operator of Mobile Home Sites	2953

KPDES Permit #	Facility	Design Capacity (MGD)	Des. Capacity (cfs)	Permit Limit Monthly Average (colonies/ 100 ml)	Permit Limit Maximum Weekly Average (colonies/ 100 ml)	Outfall Longitude	Outfall Latitude	Type	AI
KY0086703	Murray Mobile Home & RV Park	.007	0.011	130 (EC)	240 (EC)	-88.272465	36.616685	Operator of Mobile Home Sites	508
KY0040711	North Calloway Elementary School	.008	0.012	130 (EC)	240 (EC)	-88.323500	36.651230	Elementary & Secondary Schools	35389
KY0028371	S 641 Water District WWTP	0.03	0.046	200 (FC)	400 (FC)	-88.316411	36.505891	Sewerage Systems	519
KY0023914	South Marshall Elementary School	.006	0.009	130 (EC)	240 (EC)	-88.334459	36.799148	Elementary & Secondary Schools	35396
KY0040720	Southwest Calloway Elementary School	.008	0.012	130 (EC)	240 (EC)	-88.383235	36.585707	Elementary & Secondary Schools	35393
KY0055271	Symsonia WWTP	0.1	0.155	200 (FC)	400 (FC)	-88.526401	36.909994	Sewerage Systems	1549

Note: The AI number is an internal KDOW tracking number.

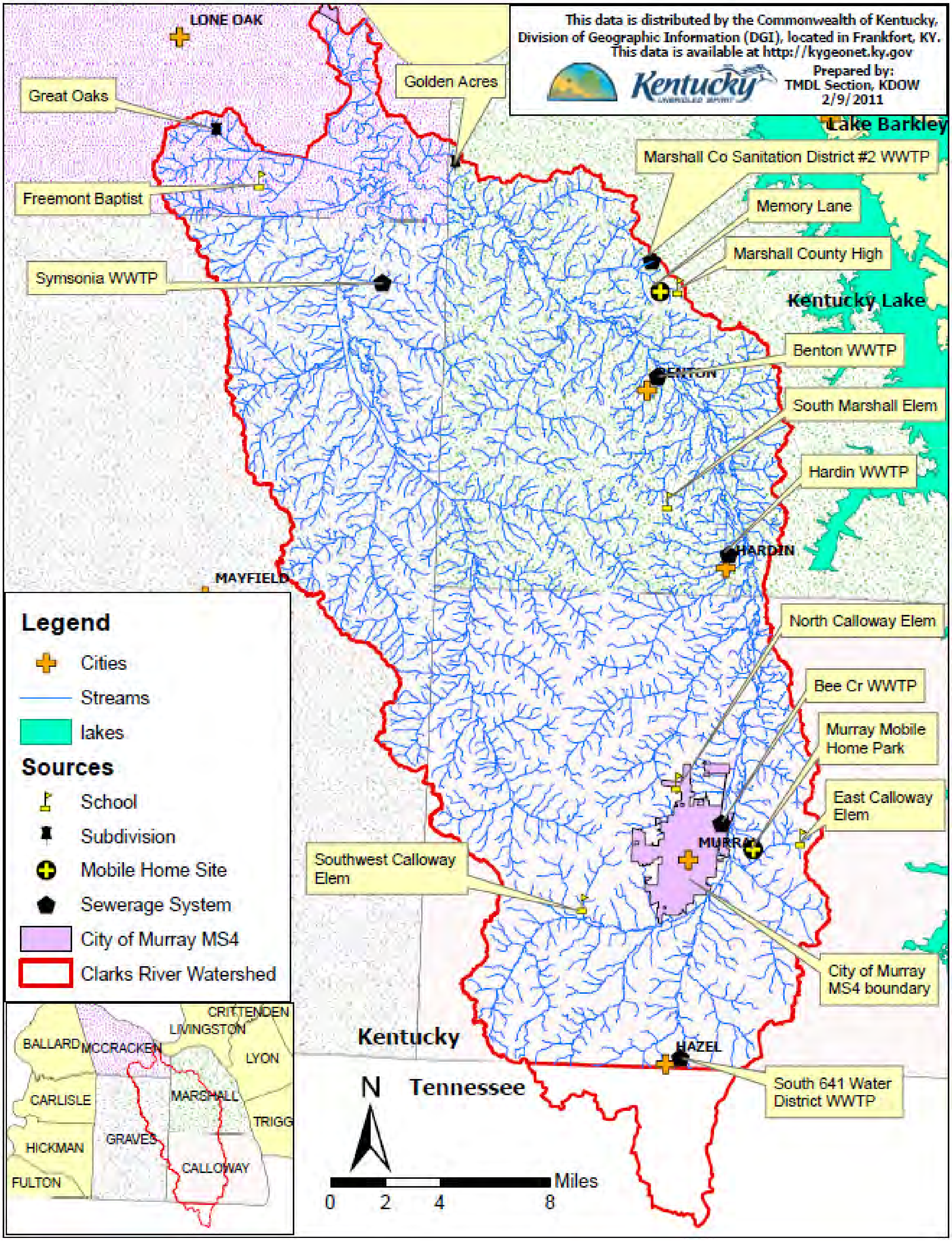

Figure 5.1 KPDES Permitted Sources of Pathogen Indicators in the Clarks River Watershed

Bee Creek WWTP permit #KY0072761 (effective Nov. 1, 2009 - Oct. 31, 2014)
The Bee Creek WWTP is currently a 5.25 million gallon per day (MGD) regional facility owned by the City of Murray in Calloway County. This facility has approval to expand to 8.75 MGD and this value is used as the design flow to calculate TMDLs. Its effluent is discharged at RM 0.7 of Bee Creek. It serves about 15,000 residents in the city of Murray plus approximately 9,000 Murray State university students for nine months of the year. The treatment process consists of screening, grit removal, oxidation ditches, clarifiers, chlorine disinfection, de-chlorination, and post aeration. Sludge solids are thickened in a holding tank, pumped to drying beds or belt filter process, and hauled to an approved landfill for disposal. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Nov. 2009 through Apr. 2011 indicated a 39% exceedance rate of the maximum weekly average permit limit. Prior to Nov. 2009, this facility had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of DMRs from Jan. 2005 through Oct. 2009 indicated a 9% exceedance rate of this maximum weekly average permit limit.

Benton WWTP permit # KY0021172 (effective Mar. 1, 2005 - Mar 31, 2009)
Benton WWTP is a 1 MGD facility owned by the City of Benton in Marshall County. It serves about 4,200 residents in and around the city of Benton. Its effluent is discharged at RM 0.25 of UT to Straw Branch at RM 0.3. The treatment process consists of a single cell primary lagoon, a two stage artificial wetlands system (three cell, gravel marsh and a second stage rock filter nitrification process), chlorine disinfection, de-chlorination, and post aeration. KPDES permit limits for this discharge are: Fecal coliform effluent gross limit of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Jan. 2005 through May 2011 indicated only one exceedance of the maximum weekly average permit limit. This permit is up for renewal and it is expected that new permit limits for *E. coli* will apply: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average.

East Calloway Elementary School permit #KY0040738 (effective Nov. 1, 2009 – Oct. 31, 2014)
East Calloway Elementary School has a .008 MGD treatment system owned by the Calloway County Board of Education. It serves about 357 students. Effluent is discharged at RM 2.7 of East Fork Clayton Creek. The treatment process consists of grinding, chlorine disinfection, and activated sludge process. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Jun. 2010 through Sep. 2010 indicated no exceedances of the maximum weekly average permit limit. Prior to the quarter ending Jun. 2010, this facility had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of DMRs from Jun. 2005 through Mar. 2010 indicated a 20% exceedance rate of this maximum weekly average permit limit.

Freemont Baptist Mission permit #KY0040428 (effective Feb. 1, 2007 - Jan 31, 2012)
Freemont Baptist Mission is a privately owned school with a .003 MGD treatment system. It serves about 107 students. Its effluent is discharged at RM 0.3 of a ditch to Arnold Branch at

RM 2.2. Treatment consists of a septic tank and sand filtration. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Mar. 2005 through Mar. 2011 indicated no discharge from the treatment system.

Golden Acres Subdivision permit #KY0044164 (effective Jan. 1, 2009 - Dec. 31, 2014)
Golden Acres Subdivision in Marshall County has a 0.025 MGD treatment system owned by Purchase Public Service Corporation. It serves approximately 60 residential dwellings. Its effluent is discharged to RM 1.3 of UT to Clarks River at RM 18.2. Treatment consists of sedimentation, activated sludge process, and chlorine disinfection. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Jun. 2010 through Mar. 2011 indicated a 75% exceedance rate of the maximum weekly average permit limit. Prior to Dec. 2009, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Jan. 2005 through Nov. 2009 indicated a 17.2 % exceedance rate of this maximum weekly average permit limit.

Great Oaks Subdivision permit #KY0080845 (effective Feb. 1, 2007 - Jan 31, 2012)
Great Oaks Subdivision in McCracken County has a 0.07 MGD treatment system owned by Purchase Public Service Corporation. It serves about 137 residential customers. Its effluent is discharged to RM 5.8 of Blizzard Pond Drainage Canal. Effluent is treated by extended aeration package treatment plant with disinfection. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Feb. 2007 through Dec. 2011 indicated no exceedances of the maximum weekly average permit limit. Prior to Feb. 2007, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Jan. 2005 through Jan. 2007 indicated one exceedance of this maximum weekly average permit limit.

Hardin WWTP permit #KY0021016 (effective Sep. 1, 2006 – Aug. 31, 2011)
Hardin WWTP is a 0.142 MGD facility owned by the city of Hardin. It serves about 699 residents. Its effluent is discharged at RM 0.8 of Martins Creek. The treatment consists of an aerated lagoon and two artificial wetland cells. Unit processes include: aeration, clarification, and digestion. The two wetland cells are used to polish the effluent from the lagoon. The lagoon is used for long-term storage of the sludge. This facility has no existing disinfection. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Sep. 2006 through Dec. 2010 indicated a 69.2% exceedance rate of the maximum weekly average permit limit. Prior to Sep. 2006, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Jan. 2005 through Aug. 2006 indicated an 88.9% exceedance rate of this maximum weekly average permit limit.

<u>Marshall Co High School permit #KY0023906 (effective Apr. 1, 2010 - Mar. 31, 2015)</u>
Marshall County High School has a 0.03 MGD treatment system owned by the Marshall County Board of Education. It serves about 1520 students and effluent is discharged to RM 4.7 of Chestnut Creek. The treatment consists of mixing, sedimentation, chlorine disinfection, activated sludge processes, and aerobic digestion. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Apr. 2010 through Dec. 2010 indicated a 33.3% exceedance rate of the maximum weekly average permit limit. Prior to Apr. 2010, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Mar. 2006 through Mar. 2010 indicated a 56% exceedance rate of this maximum weekly average permit limit.

<u>Marshall Co Sanitation District #2 WWTP permit # KY0044181 (effective Nov. 1, 2009 - Mar 31, 2013)</u>
Marshall County Sanitation District #2 WWTP is a 0.15 MGD facility owned by Marshall County. Treatment consists of comminutor, bar screen, pump station to one of three sequence batch reactor chambers for biological treatment, post aeration, and ultraviolet disinfection. Sludge solids are processed by thickening with digested sludge hauled to an approved WWTP on 15 day intervals. This facility expanded in 2009 from 0.5 MGD and the outfall was moved to the opposite side of the creek at RM 0.65 of UT to Chestnut Creek at RM 2.8. KPDES permit limits for the discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from May 2008 through Oct. 2009 indicated a 61% exceedance rate of the maximum weekly average permit limit for the original outfall while DMRs from Nov. 2009 through Dec. 2010 indicated a 21% exceedance rate of the maximum weekly average permit limit for the new outfall. Prior to May 2008, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Jan. 2005 through Apr. 2008 indicated a 48.6% exceedance rate of this maximum weekly average permit limit for the original outfall.

<u>Memory Lane Trailer Court permit #KY0028991 (effective Aug. 1, 2009 – Jul. 31, 2014)</u>
Memory Lane Trailer Court has a 0.002 MGD treatment system serving 32 residents. Treatment consists of activated sludge process and aerobic digestion. Its effluent is discharged to RM 4.05 of Chestnut Creek. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Sep. 2009 through Dec. 2010 indicated a 75% exceedance rate of the maximum weekly average permit limit. Prior to Jul. 2009, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Mar. 2005 through Jun. 2009 indicated a 72% exceedance rate of this maximum weekly average permit limit.

<u>Murray Mobile Home & RV Park permit #KY0086703 (effective Oct. 1, 2009 - Sep. 30, 2014)</u>
Murray Mobile Home and RV Park has a 0.007 MGD treatment system serving a 40 space mobile home park. Treatment consists of aeration, clarifier, and chlorine disinfection. Its

effluent is discharged to RM 0.4 of UT to East Fork Clayton Creek at RM 0.7. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Mar. 20010 through Dec. 2010 indicated a 33% exceedance rate of the maximum weekly average permit limit. Prior to Jan. 2010, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Mar. 2005 through Dec. 2009 indicated a 20% exceedance rate of this maximum weekly average permit limit.

<u>North Calloway Elementary School permit # KY0040711 (effective Dec. 1, 2009 - Nov. 30, 2014)</u>
North Calloway Elementary School has a 0.008 MGD treatment system owned by the Calloway County Board of Education. It serves 561 students. Treatment consists of grinding, chlorine disinfection, and activated sludge process. Its effluent is discharged to RM 3.5 of UT to Clarks River at RM 59.7. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Jun. 20010 through Dec. 2010 indicated a no exceedances of the maximum weekly average permit limit. Prior to Apr. 2010, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Jun. 2005 through Mar. 2010 indicated a 13.6% exceedance rate of this maximum weekly average permit limit.

<u>S 641 Water District WWTP permit # KY0028371 (effective Jun. 14, 1999 – Mar. 31, 2004)</u>
South 641 Water District WWTP is a 0.030 MGD treatment system that serves about 480 people in the city of Hazel. Treatment consists of a 5 acre hydrograph-controlled release facultative lagoon. The effluent is discharged to RM 7.1 of East Fork Clarks River. KPDES permit limits for this discharge are: fecal coliform effluent gross limit of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Jan. 2005 through Dec. 2010 indicated a 60% exceedance rate of the maximum weekly average permit limit. This permit is up for renewal and it is expected that new permit limits for *E. coli* will apply: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average.

<u>South Marshall Elementary School permit # KY0023914 (effective Jun. 1, 2009 - May 31, 2014)</u>
South Marshall Elementary School has a 0.006 MGD treatment system owned by the Marshall County Board of Education. It serves about 640 students. Treatment consists of slow sand filtration, chlorine disinfection, anaerobic treatment, septic tank, and anaerobic digestion. The effluent is discharged to RM 0.5 UT to South Fork Watch Creek at RM 2.0. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Sep. 2009 through Dec. 2010 indicated no exceedances of the maximum weekly average permit limit. Prior to Jul. 2009, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Jun. 2005 through Jun. 2009 indicated a 41% exceedance rate of this maximum weekly average permit limit.

Southwest Calloway Elementary School permit # KY0040720 (effective Apr. 1, 2010 - Mar. 31, 2015)
Southwest Calloway Elementary School has a 0.008 MGD treatment system owned by the Calloway County Board of Education. It serves approximately 333 students. Treatment consists of grinding, chlorine disinfection, and activated sludge process. Effluent is discharged to RM 0.55 of Haynes Creek. KPDES permit limits for this discharge are: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Jun. 2010 through Dec. 2010 indicated no exceedances of the maximum weekly average permit limit. Prior to Apr. 2010, this treatment system had fecal coliform permit limits of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of quarterly DMRs from Jun. 2005 through Mar. 2010 indicated a 10% exceedance rate of this maximum weekly average permit limit.

Symsonia WWTP permit # KY0055271 (effective Jul. 1, 2005 – Apr. 30, 2009)
Symsonia WWTP is a 0.100 MGD treatment plant owned by the Symsonia Sewer District. Treatment consists of screening, aerated lagoons, hypochlorite disinfection, and dissolved air floatation. Solids are processed by sludge drying beds and sludge disposal. The effluent is discharged to RM 1.6 of Bear Creek. KPDES permit limits for this discharge are: fecal coliform effluent gross limit of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average. A review of monthly DMRs from Jan. 2005 through Apr. 2011 indicated no exceedances of the maximum weekly average permit limit. This permit is up for renewal and it is expected that new permit limits for *E. coli* will apply: *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average.

5.1.2 MS4 Sources

MS4s are defined in 401 KAR 5:002. EPA has categorized MS4s into three categories: small, medium, and large. The medium and large categories are regulated under the Phase I Storm Water program. Large systems, such as the cities of Lexington and Louisville, have populations in excess of 250,000. Medium systems have populations in excess of 100,000 but less than 250,000; however, there are currently no medium-sized systems in Kentucky. Phase I systems have five-year permitting cycles and have annual reporting requirements. The small MS4 category includes all MS4s not covered under Phase I. Since this category covers a large number of systems, only a select group are regulated under the Phase II rule, either being automatically included based on population (i.e., having a total population over 10,000 or a population per square mile in excess of 1000) or on a case-by-case basis due to the potential to cause adverse impact on surface water. Water quality monitoring is not a requirement of Phase II MS4s, unless the waterbody has an approved TMDL and the MS4 causes or contributes to the impairment for which the TMDL was written. A WLA is assigned to all MS4 permit holders, including communities, the Kentucky Transportation Cabinet (KYTC), universities and military bases.

There is one MS4 community, City of Murray permit # KYG200011, in the Clarks River watershed. Murray State University is a co-permittee on the City of Murray MS4 permit. The

KYTC also has a MS4 permit, # KYS000003, and is responsible for stormwater from the pavement and right of way of interstates, parkways, U.S. highways, and state routes within the City of Murray MS4 boundary. The City of Murray permit requirements include development of "a stormwater quality management program that is designed to reduce the discharge of pollutants to the maximum extent practible (MEP). The MEP standard involves applying best management practices that are effective in reducing the discharge of pollutants in stormwater runoff. This requires that the permittee use known, available, and reasonable methods of prevention and control of stormwater discharges." The City of Murray MS4 boundary is shown in Figure 5.1.

5.1.3 Concentrated Animal Feeding Operations

Operations that are defined as a CAFO pursuant to 401 KAR 5:002 are required to obtain a KPDES permit. Once defined as a CAFO, the operation can be permitted under a KPDES General Permit or a KPDES Individual Permit depending upon the nature of the operation. Conditions of both types of permits include no discharge to surface waters; however, holders of a KPDES Individual Permit may discharge to surface waters during a 25-year (24-hour) or greater storm event. There are no CAFOs in the Clarks River Watershed.

5.2 Non KPDES-permitted Sources

Non KPDES-permitted sources include all sources not permitted by the KPDES permitting program and are often associated with land use. The loads to surface water from non-KPDES permitted sources are regulated by laws such as the Kentucky Agricultural Water Quality Act (AWQA, KRS 224.71-100 through 224.71-145, i.e., implementation of individual agriculture water quality plans and corrective measures), the federal Clean Water Act (i.e., the TMDL process) and 401 KAR 5:037 (Groundwater Protection Plans (GPPs), among others. Unlike KPDES-permitted sources, non KPDES-permitted sources typically discharge pollutants to surface water in response to rain events. A Load Allocation (LA) is assigned to non KPDES-permitted sources.

5.2.1 Kentucky No Discharge Operating Permits

As stated in 401 KAR 5:005, facilities with agricultural waste handling systems or that dispose of their effluent by spray irrigation but do not discharge to surface waters are required to obtain a Kentucky No Discharge Operating Permit (KNDOP) from the KDOW prior to construction and operation. Animal Feeding Operations (AFOs) receive KNDOP permits. These operations handle liquid waste in a storage component of the operation (e.g. lagoon, pit, or tank) and may land apply the waste via spray irrigation or injection to cropped acreages. Land application of the waste that results in runoff to a stream is prohibited. Facilities that handle animal waste as a liquid are required to submit a Short Form B, construction plans, and a Comprehensive Nutrient Management Plan to the KDOW. Also included in KNDOP requirements are golf courses that land apply treated wastewater via spray irrigation, typically from a holding pond - some industrial operations also spray-irrigate. Four KNDOPs exist in the Clarks River watershed as shown in Figure 5.2 and summarized in Table 5.2.

The state of Tennessee has a permit similar to KDOW's KNDOP permit, the State Operating Permit that is issued to facilities with no discharge. In the Tennessee portion of the Clarks River watershed, there is one facility with a State Operating permit, the Town of Puryear (SOP-89067). The Town of Puryear operates a sewage collection system, lagoon, and spray irrigation system with a design flow of 0.08 MGD (Vicki Steed, 2011 personal communication). The location of this facility is shown in Figure 5.2.

Table 5.2 Summary of KNDOPs in Clarks River Watershed

Facility Name	Permit #	County	# of Animals	Type of Animal	Longitude	Latitude	AI
Kevin Crider Hog Farm	083009859	Graves	12000	Swine	-88.547500	36.809170	9859
Heather Howell Davis Hog Farm	157075571	Marshall	4960	Swine	-88.409444	36.795278	75571
MJ Farms	09004012	Marshall	2400	Swine	-88.425417	36.873056	6077
Ronald Dale Davis Hog Farm	09010027	Marshall	2480	Swine	-88.383333	36.770278	75570

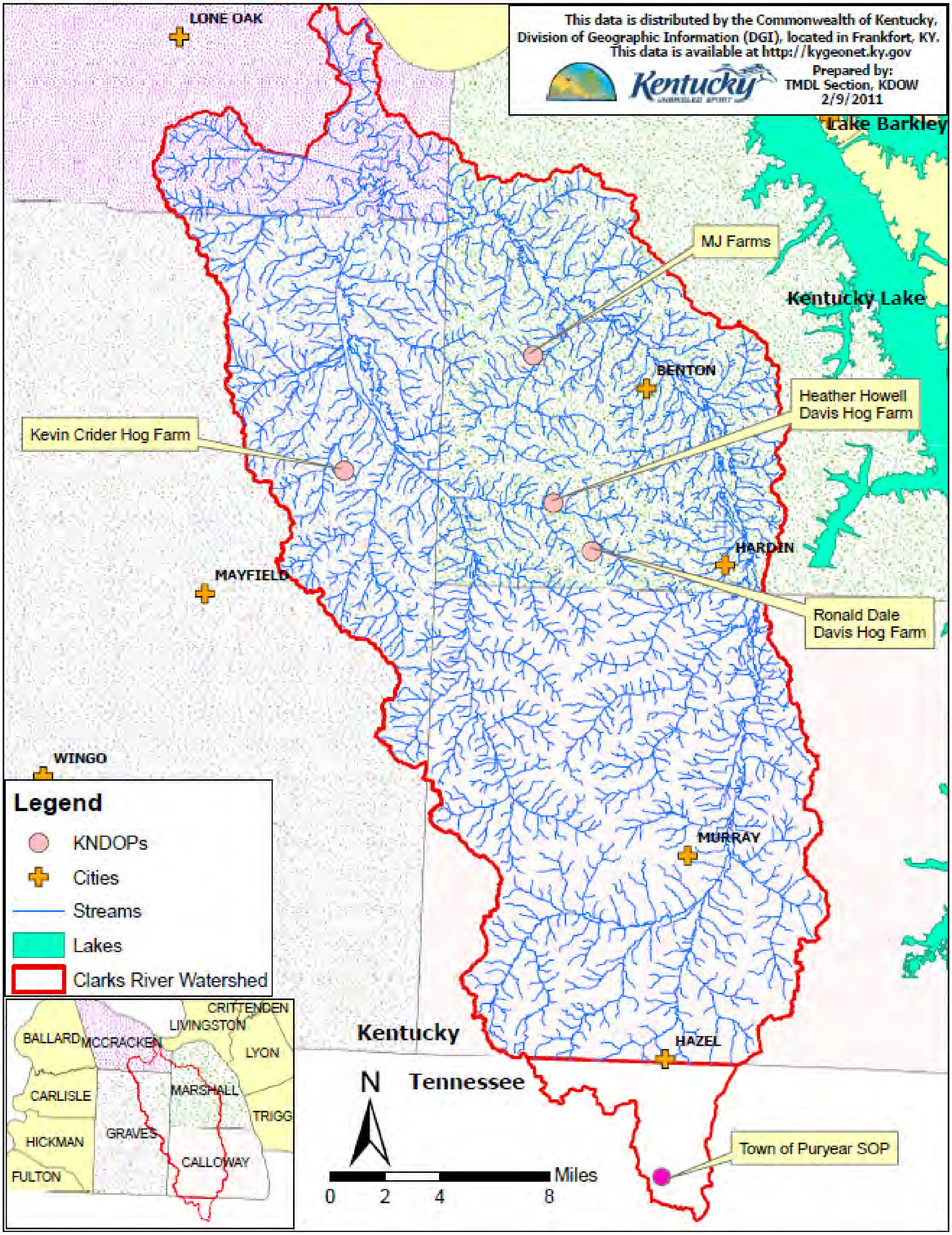

Figure 5.2 Locations of KNDOPs and TN SOP in Clarks River Watershed

5.2.2 Agriculture

The Kentucky AWQA was passed by the 1994 General Assembly. The law focuses on the protection of surface water and groundwater resources from agricultural and silvicultural activities. The Act created the Kentucky Agriculture Water Quality Authority (KAWQA), a 15-member peer group comprised of farmers and representatives from various agencies and organizations. The Act requires farms greater than 10 acres in size to adhere to the Best Management Practices (BMPs) specified in the Kentucky Agriculture Water Quality Plan. Specific BMPs have been designated for all operations.

The Clarks River has a large agricultural base, with around 52% (cultivated crops + pasture/hay) of the land use in agricultural uses. Along with agriculture is the potential for pathogen and bacteria loading from animal waste. Agricultural animals are both a direct and indirect source of fecal bacteria loadings to streams. Cattle with access to streams can have a direct impact on water quality when feces are deposited on stream banks or directly in the stream. Cattle often loaf in or near the streams in search of shade or water to drink. Animals grazing in pasturelands will often deposit feces on the land and bacteria that do not decay will runoff into the streams during precipitation events. Runoff from pastureland is an indirect source of fecal bacteria, as a rainfall event is required to transport the coliform to the stream.

The USDA National Agricultural Statistics Service (NASS) compiles a Census of Agriculture data by county for virtually every facet of U.S. agriculture (USDA, 2002). The "Census of Agriculture Act of 1997" (Title 7, United States Code, Section 2204g) directs the Secretary of Agriculture to conduct a census of agriculture on a 5-year cycle collecting data for the years ending in 2 and 7. Livestock inventory from the 2002 and 2007 Census of Agriculture reports for counties in the Clarks River watershed are listed in Table 5.3. The dominant livestock in Calloway, Graves, and Marshall Counties is poultry followed second by cattle. The dominant livestock in McCracken County is cattle. These data are based on countywide data; no assumptions are made on a watershed level. However the percentage of agricultural land use is calculated for each impaired stream segment in Section 8.0.

Table 5.3 Livestock Inventory for Counties in the Clarks River Watershed (USDA 2002, 2007)

Livestock Type	Number of Farms(1)		Inventory	
	2002	2007	2002	2007
Calloway County				
Cattle and Calves	235	219	13,748	11,103
Beef	208	194	6,287	5,088
Dairy	9	9	735	165
Other Cattle	18	16	6726	5850
Swine	6	11	(D)3	4,339
Poultry(6)	36	56	13,254,305	12,360,113 (D)
Sheep and Lamb	20	23	306	1,010
Goats(4)	N/A(2)	50	N/A	1,148
Horses(5)	171	176	1,198	1,020

Livestock Type	Number of Farms[1]		Inventory	
	2002	2007	2002	2007
Graves County				
Cattle and Calves	388	374	17,092	20,972
Beef	329	300	7,726	7,745
Dairy	24	19	901	703
Other Cattle	35	55	8,465	12,524
Swine	19	13	17,600	(D)
Poultry[6]	115	125	47,516,902	55,739,111
Sheep and Lamb	8	12	95	205
Goats[4]		68		992
Horses[5]	265	275	1,450	1,758
McCracken County				
Cattle and Calves	133	102	3,105	4,590
Beef	119	81	(D)	(D)
Dairy	2	2	(D)	(D)
Other Cattle	12	19	(D)	(D)
Swine	3	6	(D)	(D)
Poultry[6]	9	27	(D)	(D)
Sheep and Lamb	11	11	127	101
Goats[4]		51		638
Horses[5]	119	119	802	795
Marshall County				
Cattle and Calves	350	275	12,237	11,485
Beef	314	247	6,114	5,178
Dairy	5	11	24	79
Other Cattle	31	17	6,138	6,228
Swine	14	10	(D)	(D)
Poultry[6]	26	47	7,351,037 (D)	5,516,748
Sheep and Lamb	9	20	178	231
Goats[4]		49		1,024
Horses[5]	234	176	1,167	877

[1] – A farm is defined as any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year.
[2] – N/A = Not Available
[3] – D = data withheld to avoid disclosing data for individual farms.
[4] – reported as a total inventory, 2002 + 2007 (USDA 2002, 2007)
[5] – reported as a total inventory, 1997 + 2002 (USDA 2002)
[6] – total layers and broilers

5.2.3 Wildlife

Wildlife undoubtedly contributes bacteria to the watershed, noting the high percentage of forest in all sub-watersheds. Table 5.4 shows the estimates of deer population and density in 2005 and 2006 by county in the Clarks River watershed provided by the Kentucky Department of Fish and Wildlife (Dr. Tina Brunjes, personal communication, 2010). Estimates on numbers of other types of wildlife are not available. There is one Wildlife Management Area, Kaler Bottoms, in the watershed, located in the Lower West Fork Subwatershed (Figure 5.3). Although wildlife contributes bacteria to surface water, such contributions represent natural background conditions.

Table 5.4 Estimated Deer Population and Density by County
based on Deer Harvest Model Results in 2005 and 2006 (Kentucky Dept. of Fish and Wildlife)

County	Estimated Deer Population		Estimated Deer Density (#/mi^2)	
	2005	2006	2005	2006
Calloway	8,570	8,655	23	23
Graves	15,621	16,048	29	29
Marshall	4,862	4,953	17	17
McCracken	5,149	5,611	22	24

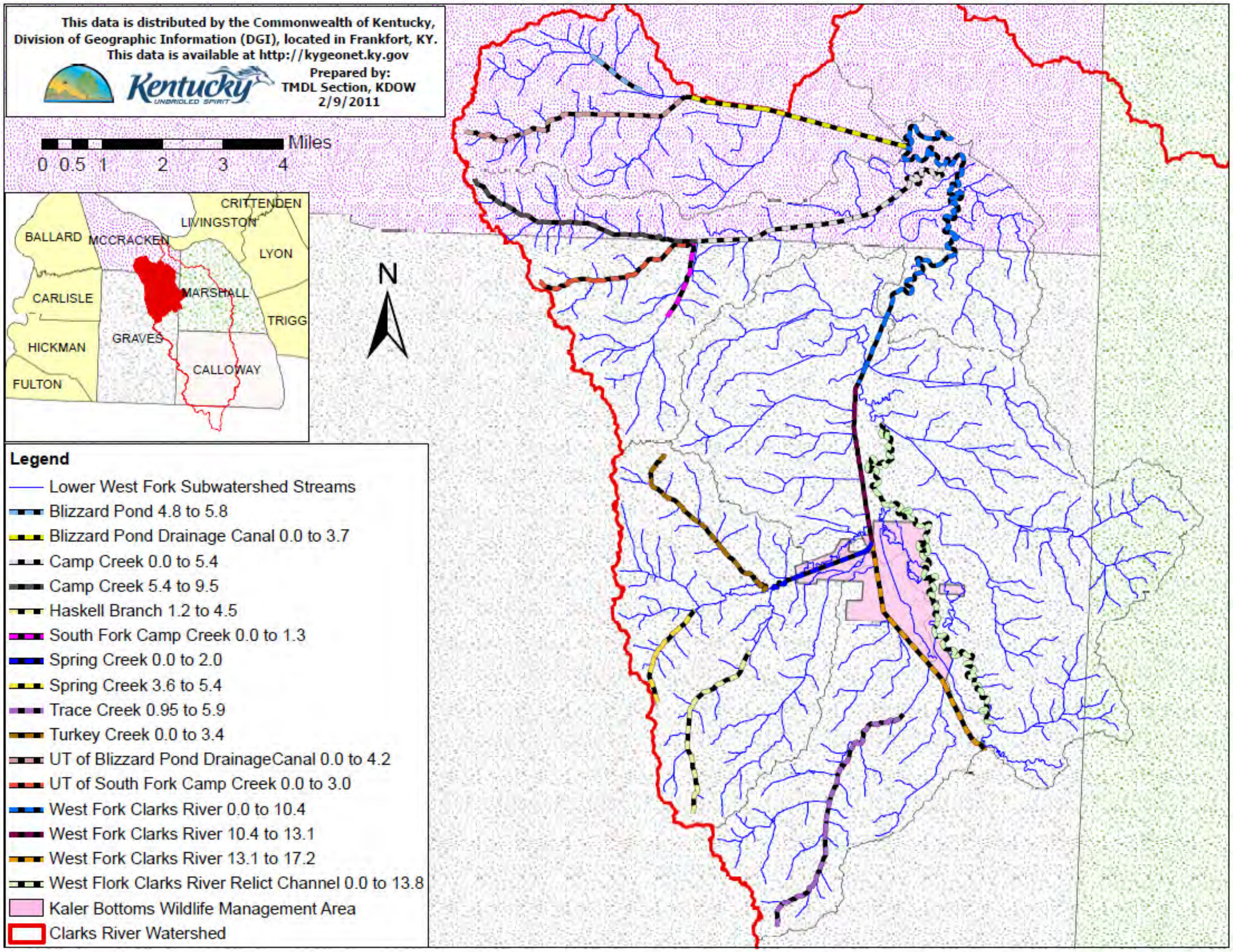

Figure 5.3 Wildlife Management Area in Clarks River Watershed

5.2.4 Human Waste

Human waste disposal is of particular concern in rural areas. Areas not served by sewers either employ an On Site Sewage Treatment and Disposal System (OSTDS) or do not treat their sewage. OSTDSs, including septic tank systems, are commonly used in areas where providing a centralized sewage collection and treatment system is not cost-effective or practical. When properly sited, designed, constructed, maintained, and operated, septic systems are an effective means of disposing and treating domestic waste. The effluent from a well-functioning OSTDS is comparable to secondarily treated wastewater from a sewage treatment plant. When not functioning properly, they can be a source of *E. coli* (or fecal coliform) to both groundwater and surface water, see Section 5.3, Illegal Sources, for further discussion of failing OSTDSs. Another type of non KPDES-permitted source that may exist in the watershed is straight-pipes, which are discrete conveyances that discharge sewage, gray water (i.e., water from household sinks, laundry, etc.), and stormwater to the surface waters of the Commonwealth without treatment.

The Kentucky Infrastructure Authority (KIA) compiled a report titled "2010 Wastewater Management Plan" as part of the Water Resource Information System (KIA, 2010) and with data from the Purchase Area Development District (PUADD). The estimated percent of the human population within the four counties of the Clarks River watershed serviced by municipal wastewater utilities, on-site septic systems and smaller sewerage treatment systems such as Package Treatment Plants (PTPs) in 2008 are reported in Table 5.5. The citiy of Benton has a population of 4,349 , Hardin has 615, Murray has 17,741, and Hazel has 410 (U.S. Census Bureau, 2010). Existing and proposed sewer lines in Clarks River watershed are shown in Figures 5.4-5.9. These maps show that households around the cities are sewered while households in the more rural areas are served by on-site systems.

Table 5.5 Population Serviced by Public Sewer, On-Site Systems, and Package Treatment Plants (From KIA 2010, Randy Anderson, personal communication)

County	2008 Population	% Pop. Served by WW Reg/Mun Utility	% Pop. Served by On-Site Systems and PTP
Calloway	36,240	52%	48%
Graves	37,487	39%	61%
McCracken	65,109	71%	29%
Marshall	31,189	28%	72%

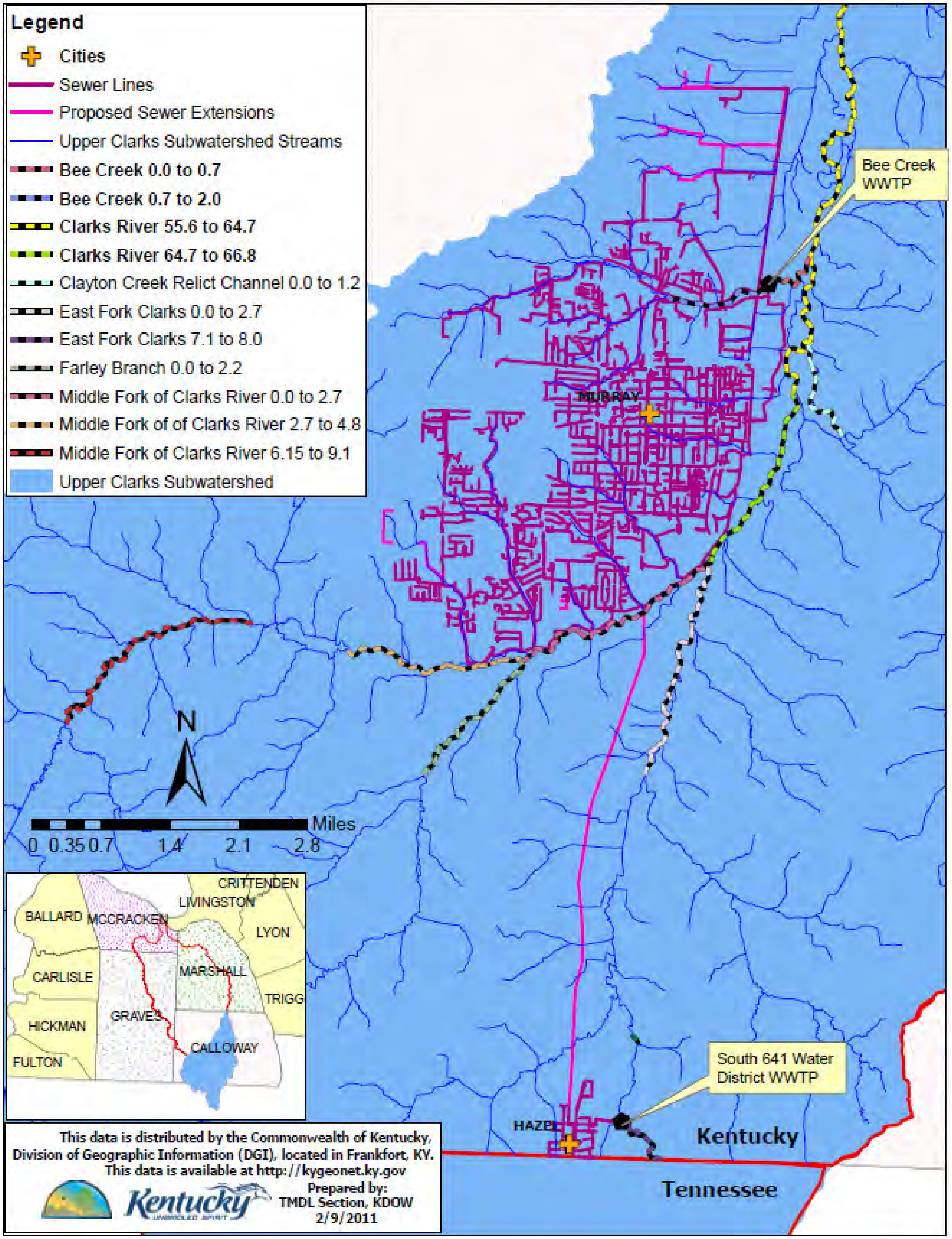

Figure 5.4 Existing and Proposed Sewer Lines in the Upper Clarks Subwatershed

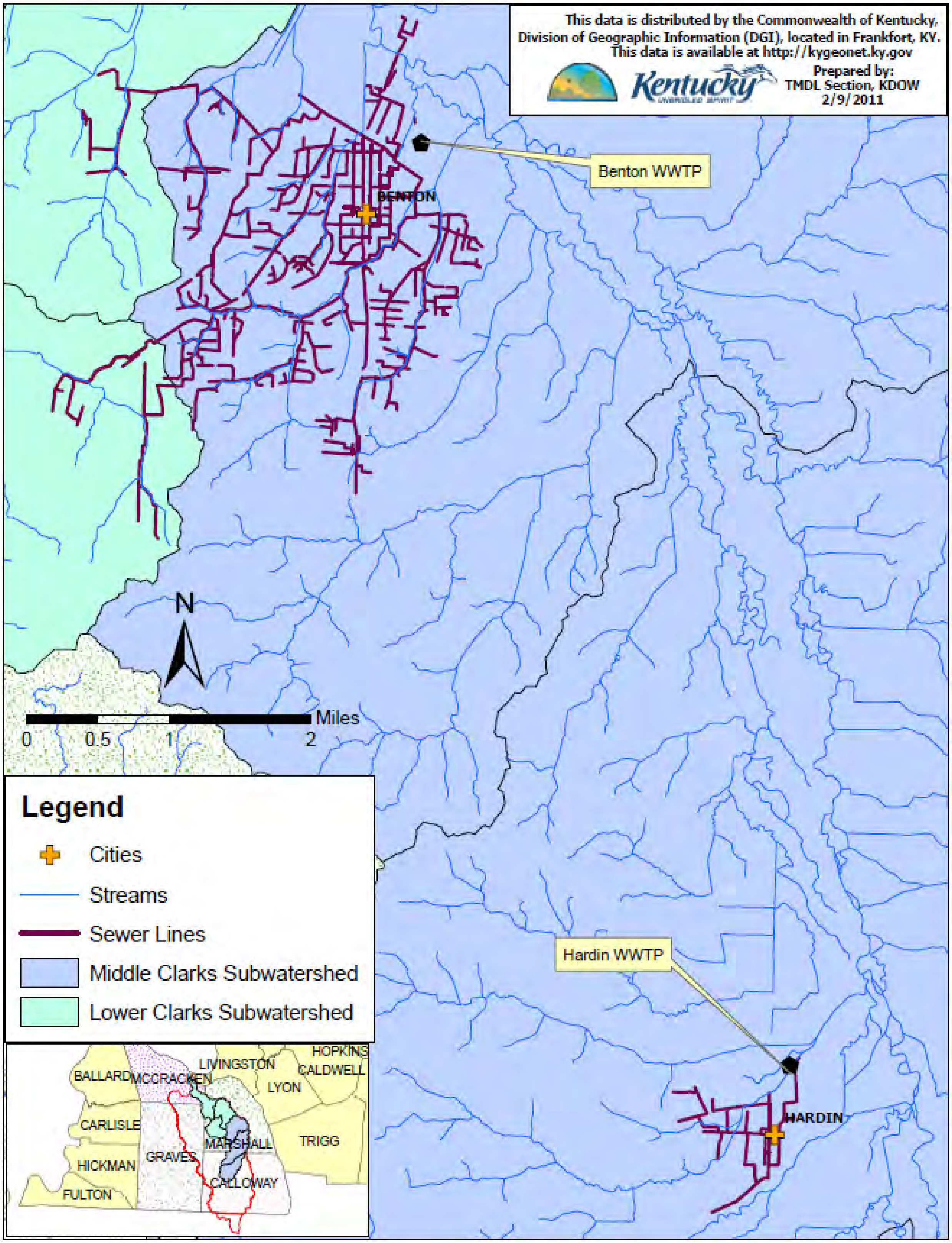

Figure 5.5 Existing Sewer Lines in Middle Clarks Subwatershed

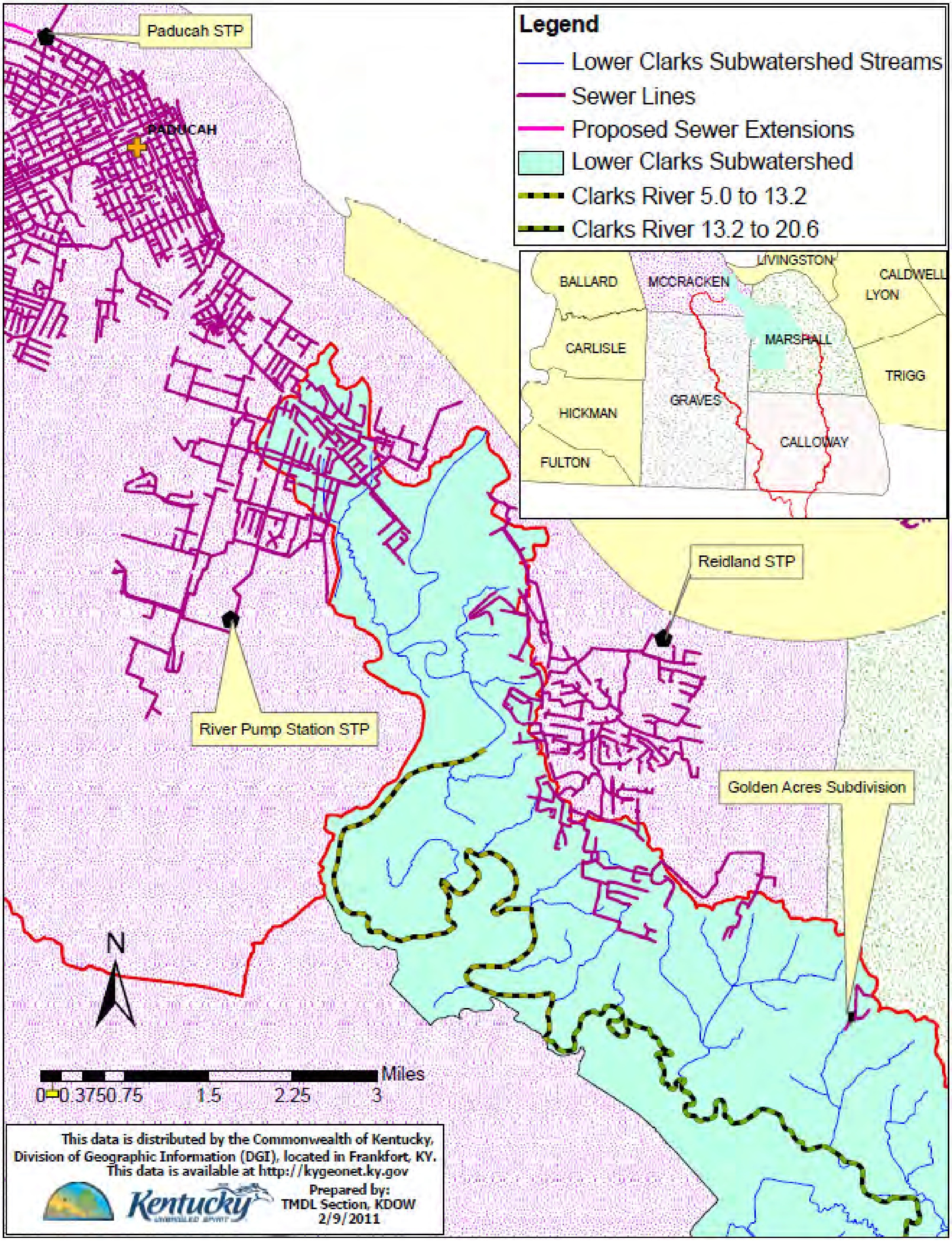

Figure 5.6 Existing and Proposed Sewer Lines in Lower Clarks Subwatershed (Upper Portion)

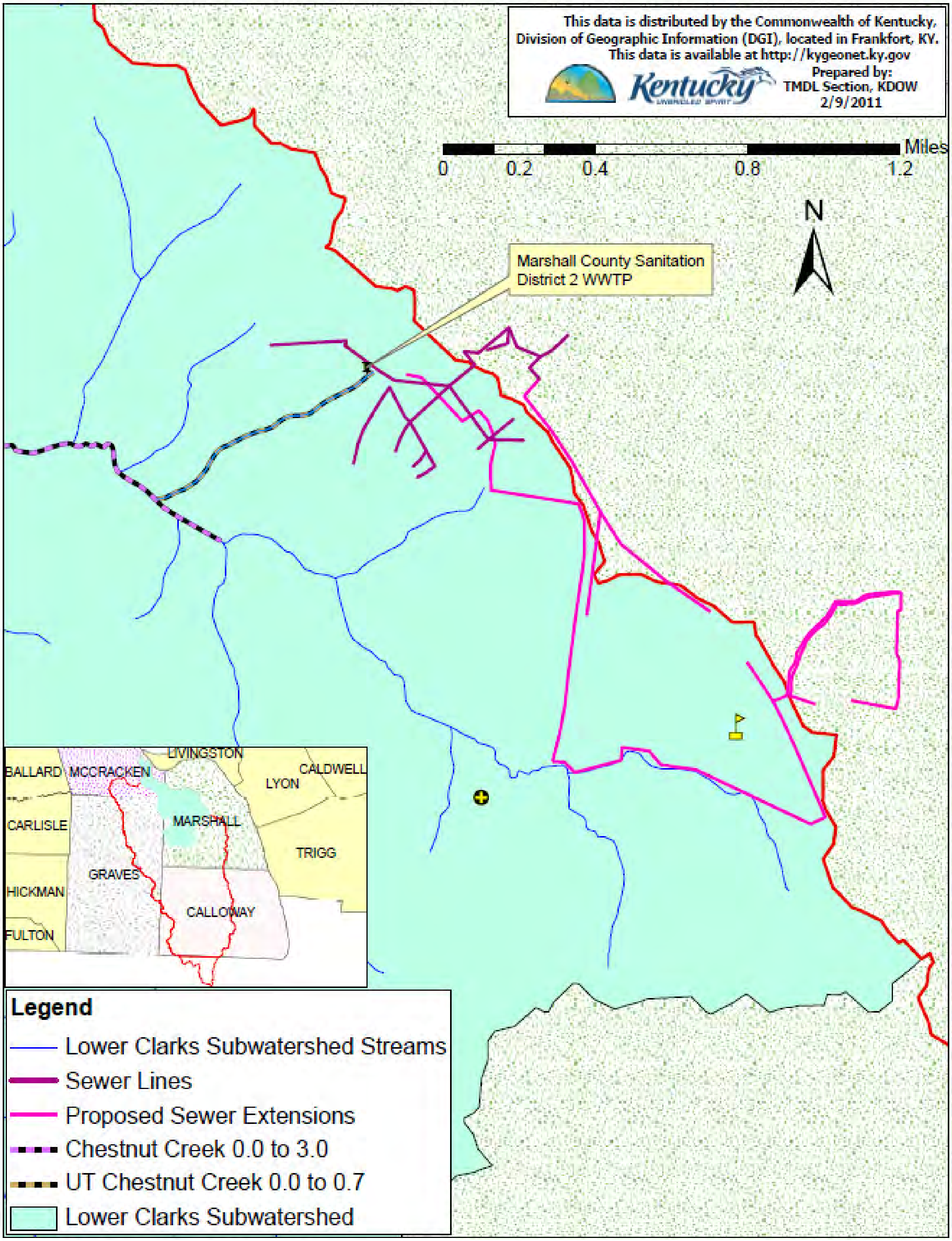

Figure 5.7 Existing and Proposed Sewer Lines in Lower Clarks Subwatershed (Lower Portion)

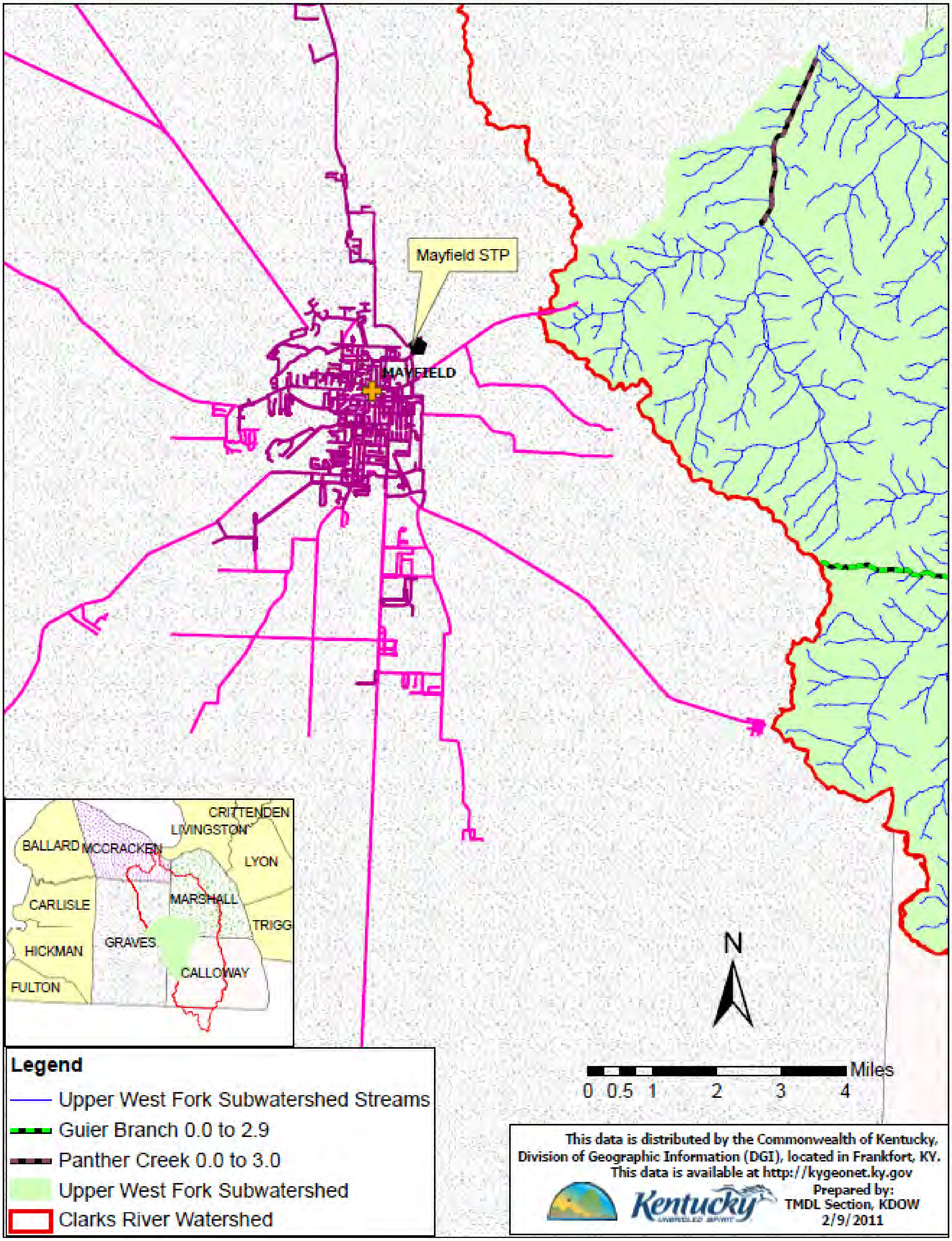

Figure 5.8 Existing and Proposed Sewer Lines in Upper West Fork Clarks Subwatershed

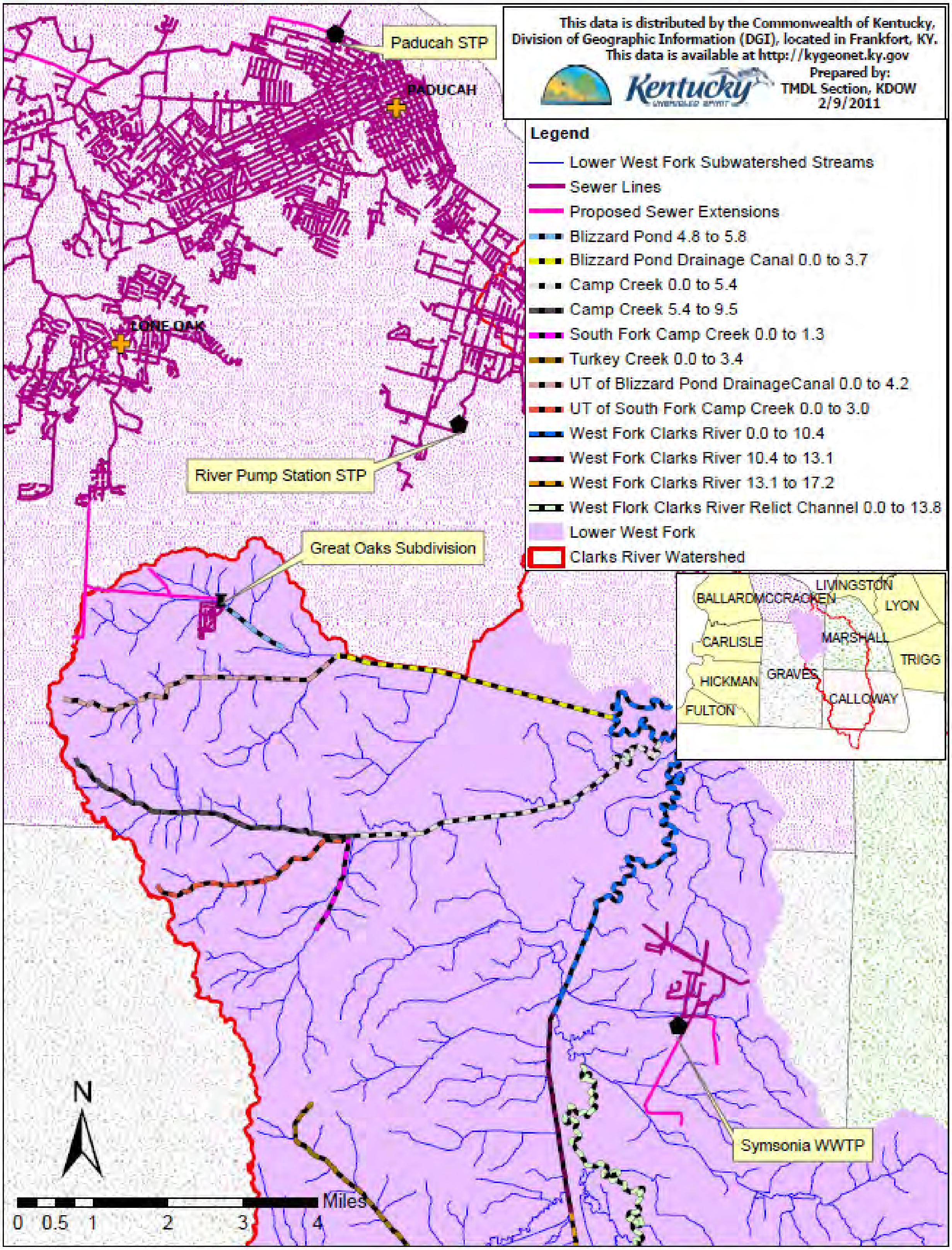

Figure 5.9 Existing and Proposed Sewer Lines in Lower West Fork Clarks Subwatershed

5.2.5 Household Pets

Although household pets undoubtedly exist in this watershed, their contribution to the LA is deemed to be minimal compared to other sources. Pet waste may, however, be a larger contributor to bacteria runoff in areas where there is a higher density of households and less-permeable surfaces.

5.3 Illegal Sources

Both KPDES-permitted and non KPDES-permitted sources can discharge bacteria to surface water illegally. This includes sources that are illegal simply by their existence, such as straight-pipes, Sanitary Sewer Overflows, or leaking sewer lines, which receive no allocation. There may also be legal sources that are operating illegally (e.g., outside of regulations, permit limits or conditions, etc.), such as a WWTP bypass or a failing OSTDSs, which receive no allocation above that of a properly functioning system.

Another potential illegal source is livestock on farms that have no BMPs (as required under the AWQA) as well as farms where BMPs are present but are insufficient or failing in a manner that causes or contributes to surface water impairment; such farms receive no allocation above that of a farm with properly installed and functioning BMPs. Also included are KNDOPs, AFOs and CAFOs not in compliance with the appropriate regulations that cause or contribute to surface water impairment.

KDOW expects implementation of these TMDLs to begin with the elimination of illegal sources. This is intended to prevent legally operating sources from having to effect reductions in order to accommodate the pollutant loading of illegal sources. Note this Section of the TMDL is not intended to summarize the universe of potential illegal sources that may discharge pollutants into surface waters, nor does it attempt to summarize the universe of legal sources that may be operating illegally. Instead, it gives examples of illegal sources known to be present or that could be present in the watersheds (e.g., straight-pipes).

6.0 Water Quality Criteria

The WQC in 401 KAR 10:031 (Kentucky's Surface Water Standards) for the PCR use are based on both fecal coliform and *E. coli*. Per 401 KAR 10:031:

"The following criteria shall apply to waters designated as primary contact recreation use during the primary contact recreation season of May 1 through October 31: Fecal coliform content or Escherichia coli content shall not exceed 200 colonies per 100 ml or 130 colonies per 100 ml respectively as a geometric mean based on not less than five (5) samples taken during a thirty (30) day period. Content also shall not exceed 400 colonies per 100 ml in twenty (20) percent or more of all samples taken during a thirty (30) day period for fecal coliform or 240 colonies per 100 ml for Escherichia coli."

Both the geomean and instantaneous criteria of 130 and 240 *E. coli* colonies/100 ml, respectively, were applied to calculate allowable loadings to bring the watershed into compliance with the PCR designated use. The loading requiring the greatest percent reduction was set as the TMDL for a segment. See Section 7.0 for TMDL loading calculations.

7.0 Total Maximum Daily Load

7.1 TMDL Equation and Definitions

A TMDL calculation is performed as follows:

$$TMDL = WLA + LA + MOS$$
(Equation 1)

The WLA has three components:

$$WLA = SWS\text{-}WLA + MS4\text{-}WLA + \text{Future Growth-}WLA$$
(Equation 2)

Definitions:
TMDL: the WQC, expressed as a load. The WQC was defined in Section 6.0 as a geomean concentration of 130 and instantaneous concentration of 240 *E. coli* colonies/100 ml.
MOS: the Margin of Safety, which can be an implicit or explicit additional reduction applied to sources of pollutants that accounts for uncertainties in the relationship between effluent limits and water quality.
TMDL Target: the TMDL minus the MOS.
WLA: the Wasteload Allocation, which is the allowable loading of pollutants into the stream from KPDES-permitted sources such as SWSs and MS4s.
SWS-WLA: the WLA for KPDES-permitted sources, which have discharge limits for bacteria (including wastewater treatment plants, package plants and home units).
Future Growth-WLA: the allowable loading for future KPDES-permitted sources, including new SWSs, expansion of existing SWSs, new storm water sources, and growth of existing storm water sources (such as MS4s).
Remainder: the TMDL minus the MOS and minus the SWS-WLA (also equal to Future Growth-WLA plus the MS4-WLA and the LA).
MS4-WLA: the WLA for KPDES-permitted municipal separate storm water sewer systems (including, but not limited to cities, counties, KYTC, universities and military bases).
LA: the Load Allocation, which is the allowable loading of pollutants into the stream from sources not permitted by KPDES and from natural background.
Seasonality: Yearly factors that affect the relationship between pollutant inputs and the ability of the stream to meet its designated uses.
Critical Condition: The period when the pollutant conditions are expected to be at their worst.
MAF: the Mean Annual Flow as defined by USGS.
Adjusted MAF: the MAF plus SWS-WLA design flows.
Critical Flow: the flow used to calculate the TMDL as a load (is equivalent to the Adjusted MAF for MAF TMDLS)
Existing Conditions: the load that exists in the watershed at the time of TMDL development (i.e., sampling) and is causing the impairment.
Percent Reduction: the reduction needed to bring the existing conditions in line with the TMDL Target.

Load: Concentration * Flow * Conversion Factor in colonies per day (colonies/day)
Concentration: colonies per 100 milliliters (colonies/100ml)
Flow (i.e. stream discharge): cubic feet per second (cfs)
Conversion Factor: the value which converts the product of Concentration and Flow to Load (in units of colonies per day); it is derived from the calculation of the following components: (28.31685L/cf * 86400sec/day * 1000ml/L)/ (100 ml) and is equal to 24465758.4.

Calculation Procedure:

1) The MOS, if an explicit value, is calculated and subtracted from the TMDL first, giving the TMDL Target;
2) Percent reductions are calculated to show the difference between Existing Conditions and the TMDL Target;
3) The SWS-WLA is calculated and subtracted from the TMDL Target, leaving the Remainder;
4) The Future Growth-WLA is calculated and subtracted from the Remainder;
5) If there is a MS4 present upstream of the impaired segment, the MS4-WLA is subtracted from the Remainder based on percent landcover, leaving the LA.

7.2 Margin of Safety

There are two methods for incorporating a MOS in the TMDL analysis: implicitly include the MOS using conservative assumptions, or explicitly set aside a (numerical) portion of the TMDL as the MOS and divide the remainder of the allowable load (i.e., the TMDL Target load) between the LA and WLA. For this TMDL, a 10% explicit MOS (i.e., 10% of the WQC— 13 or 24 *E. coli* colonies/100 ml for geomean and instantaneous WQC, respectively-- but expressed as a load where possible) was reserved to address uncertainties involving loading from non-SWS sources. SWS sources have an implicit MOS based on the fact that they seldom operate at their design flow. The explicit MOS load was calculated using the following equation:

13 geomean or 24 instantaneous (colonies/100ml)	×	Critical Flow (cfs)	×	Conversion Factor 24465758.4	=	MOS (colonies/day)

7.3 WLA

The WLA is the portion of the TMDL allocated to KPDES-permitted sources within the watershed(s).

7.3.1 SWS-WLA

The SWS-load was calculated using the following equation:

$$\begin{array}{c} \text{130 geomean or} \\ \text{240} \\ \text{instantaneous} \\ \text{(colonies/100ml)} \end{array} \times \begin{array}{c} \text{Design} \\ \text{Flow} \\ \text{(cfs)} \end{array} \times \begin{array}{c} \text{Conversion Factor} \\ 24465758.4 \end{array} = \begin{array}{l} \text{SWS-WLA} \\ \text{(colonies/day)} \end{array}$$

The individual SWS-WLAs for each facility that discharges to an impaired segment are summed to create a final SWS-WLA for that segment.

7.3.2 Remainder

The Remainder is not part of the TMDL; however, it is used in the TMDL calculations. It is determined as the Target Load minus the sum of all SWS-WLAs.

7.3.3 Future Growth-WLA

Because the WLA must account for all KPDES-permitted sources, often a TMDL will account for future growth of these sources (i.e., an increase in the number of WLA sources or in the loading per discharger) in order to avoid having to re-open the TMDL and change the WLA when new sources come online. Future growth is represented by a portion of the Remainder which is set aside (i.e., is not part of the LA nor is it part of the WLA for current/known sources). It can also account for existing storm water sources which are later discovered to discharge the pollutant of concern, even though this fact was not known at the time the TMDL was written. Of course, any and all of the sources mentioned above must meet the WQC and KDOW's permitting requirements. The amount set aside for future growth is determined using Table 7.1, which assumes that growth occurs more rapidly in developed areas (which is determined by the sum of developed open space, developed low intensity, developed medium intensity and developed high intensity areas as defined by the USGS NLCD) than in rural areas:

Table 7.1 Future Growth

Percent Developed Area in the Subwatershed	Future Growth WLA Percentage
≥25%	5%
≥20% – <25%	4%
≥15% – <20%	3%
≥10% – <15%	2%
≥5% – <10%	1%
<5%	0.5%

The Future Growth WLA is calculated using the following formula:

Remainder	×	Future Growth-WLA percentage	=	Future Growth-WLA

7.3.4 City of Murray and KYTC MS4-WLA

If there is a city-MS4 within the upstream area of the impaired segment, a MS4-WLA must be calculated. The MS4-WLA is calculated using the following equation:

(TMDL - MOS - SWS-WLA)	×	% of (developed acres in MS4 boundary)/(total acres in subwatershed)	=	MS4-WLA

7.4 LA

The LA is where non KPDES-permitted sources (e.g., nonpoint sources, or those sources not permitted by KPDES) receive their allocation within the TMDL. Non KPDES-permitted sources include properly operating OSTDS (i.e. septic systems), wildlife, household pets and facilities (e.g., farms, landfarms for municipal STP sludge) with properly functioning BMPs. The LA is calculated using the following equation:

Remainder	-	Future Growth WLA	-	Sum of MS4-WLAs	=	LA

The available sampling data were insufficient to apportion the existing loading among the various LA sources; therefore, it is attributed to all LA sources.

7.5 Seasonality

Seasonality considers yearly factors such as temporal variations on source behavior and stream loading than can affect the relationship between pollutant inputs and the ability of the stream to meet its designated uses. This TMDL addresses seasonality by only using samples collected within the PCR season (May - October).

7.6 Critical Condition

The critical condition for nonpoint source pathogen loadings is typically an extended dry period followed by a rainfall runoff event. During the dry weather period, pathogens and bacteria build up on the land surface, and are washed off by subsequent rainfall. Conversely, the critical condition for point source loading typically occurs during periods of low stream flow when dilution is minimized. The Clarks River watershed contains both types of sources; therefore the critical condition for each PCR-impaired segment is defined by the sample showing the highest exceedance.

7.7 Existing Conditions

The maximum exceedance or greatest geomean of all samples collected along a segment was selected to represent existing conditions. This concentration was converted to a load using the following equation:

$$\begin{matrix}\text{Maximum} \\ \text{Exceedance or} \\ \text{Greatest} \\ \text{Geomean} \\ \text{(colonies/100ml)}\end{matrix} \times \begin{matrix}\text{Critical} \\ \text{Flow} \\ \text{(cfs)}\end{matrix} \times \begin{matrix}\text{Conversion Factor} \\ 24465758.4\end{matrix} = \begin{matrix}\text{Existing Load} \\ \text{(colonies/day)}\end{matrix}$$

7.8 Calculation of Percent Reductions

A ‘percent reduction’ was calculated for informational purposes only to illustrate the difference between existing conditions and the TMDL Target at the time the streams were sampled. The percent reduction for each impaired segment is provided and in Section 8.

7.9 TMDLs Calculated as a Daily Load

Federal guidelines of the Clean Water Act require a TMDL to be expressed in terms of a daily load. Due to the limited amount of data available, particularly the absence of stream gages or in-stream flow data, a method was developed utilizing the WQC and Mean Annual Flow (MAF) as outlined in the *Pathogen TMDL [Standard Operating Procedure] SOP* (KDOW, 2009) to convert bacteria concentrations to loads. The USGS has generated a MAF value for streams across Kentucky. The MAF values were calculated using the equation found in the USGS Water-Resources Investigations Report 02-4206 "Estimating Mean Annual Stream flow of Rural Streams in Kentucky" (http://ky.water.usgs.gov/pubs/wrir_2002_4206.pdf). The MAF values can be found on the Hydrology of Kentucky webpage (http://kygeonet.ky.gov/kyhydro/main.htm). The MAF was determined at the downstream end of each impaired segment. Once obtained, SWS inputs (i.e. WWTP, home unit, etc., design capacity) were added to the MAF to generate an Adjusted MAF, which is also the critical flow. The critical flow is then multiplied by the WQC minus the MOS (10%) times the appropriate conversion factors to obtain the TMDL Target (i.e., the allowable daily load).

8.0 TMDL Calculations

8.1 Data Validation

Data validation was performed as follows:

- Bacteria samples collected outside of the PCR months of May through October were not considered during TMDL analysis.
- Only samples collected from a flowing stream were considered in analysis.
- Quality Analysis/Quality Control Samples (e.g., duplicates) were excluded from the dataset.
- Some samples were reported using either the *less than* (denoted using the "<") symbol or the *greater than* (denoted using the ">") symbol, indicating the true concentration was unknown but it was either below or above the reported value, respectively. For samples *less than* the reported value, the reported value was used verbatim. For *greater than* values, the values were used verbatim because all showed exceedances of the WQC. While in such cases the exact value of the exceedance is unknown and likely higher than the number reported, the sample still gave insight into the status of the waterbody at the time the sample was taken.

8.2 Individual Stream Segment Analysis

Data from various sources (including Federal, State and local government and public entities) were collected and analyzed for each individually listed stream segment and its associated drainage area. Most of the data collected for the development of this document can be accessed and downloaded from the KYGEONET (http://kygeonet.ky.gov/kyhydro/main.htm)

Subwatersheds were delineated using HUC14 or HUC12 boundaries if the impaired stream segment ended at a HUC boundary. Otherwise, best professional judgment was used to delineate the subwatershed. In areas of braiding, relict channels, and canals, this delineation may be slightly off.

In the subsections below, descriptions of each impaired segment are presented in alphabetic order. Included are tables of general subwatershed information, sample site information, watershed land cover, validated sample data, and TMDL allocations. Stream order is based upon a 1:100 scale. A Waterbody Identification Number (WBID) is included in the table of general information about the impaired segment. This number is a unique identifier assigned to all assessed waters in KY. The land cover table for each segment includes the percentage used to calculate the Future Growth WLA. If the watershed includes a MS4 area, the table of general watershed information indicates the acres of developed land within the MS4 and the % of this developed land within the watershed, which is used for MS4-WLA allocations. For all sample data tables, a light green highlight indicates an exceedance of the geomean or instantaneous WQS (130 or 240 *E. coli* colonies/100 ml, respectively) while a dark green highlight indicates the sample used in the TMDL calculations. The geomean data in these tables are geomeans of at least five samples collected within 30 days beginning on the date next to the geomean result. The TMDL tables can be interpreted as follows:

> The columns with the blue highlight indicate the TMDL allocations. If in the watershed, the rows with green highlight indicate KPDES permit information and the design capacity (in cfs) that feeds into the WLA calculation for each KPDES-permitted source. The WLA (in blue) for a particular KPDES-permitted source is on the same row as the information for the KPDES-permitted source (in green). The purple highlight indicates the sum of KPDES flow inputs, if any, that were added to the MAF to yield the adjusted MAF.

Only the instantaneous sample or geomean that had the greatest concentration (the sample or geomean indicated by the dark green highlight in the sample data tables) was used to calculate the TMDLs for the segment, regardless of the number of sample sites on a segment. When both geomean and instantaneous TMDLs could be calculated, the one that required the greatest percent reduction was selected to set the TMDL for the segment. For these TMDLs, the allocations selected for the segment are highlighted with a yellow-orange border in the TMDL table. Not all data allowed the calculation of a geomean TMDL, either because there were not at least 5 samples collected within 30 days or the geomean(s) did not exceed the WQC, in which case the instantaneous TMDL automatically set the TMDL for the segment.

8.2.1 Bee Creek RM 0.0 to 0.7

Bee Creek at RM 0.0 is a second order stream located in Calloway County (Figure 8.1). The impaired reach is about ½ mile north of downtown Murray, KY. Information about Bee Creek RM 0.0 to 0.7, including its WBID and MAF is shown in Table 8.1. Site information is presented in Table 8.2. Site 3 is downstream of the Bee Creek WWTP in Murray, KY. The subwatershed for the impaired segment has a total drainage area of approximately 6.8 square miles. The land use in this subwatershed is predominantly agricultural (40%, mostly row crops) followed by urban/residential development (34%) and mixed forest (25%) (Table 8.3).

There is one KPDES permitted SWS discharge within the subwatershed boundary. Portions of the City of Murray MS4 also exist in this subwatershed along with the KYTC MS4. Sampling data from site 3 are presented in Table 8.4, and the TMDL allocations in Table 8.5.

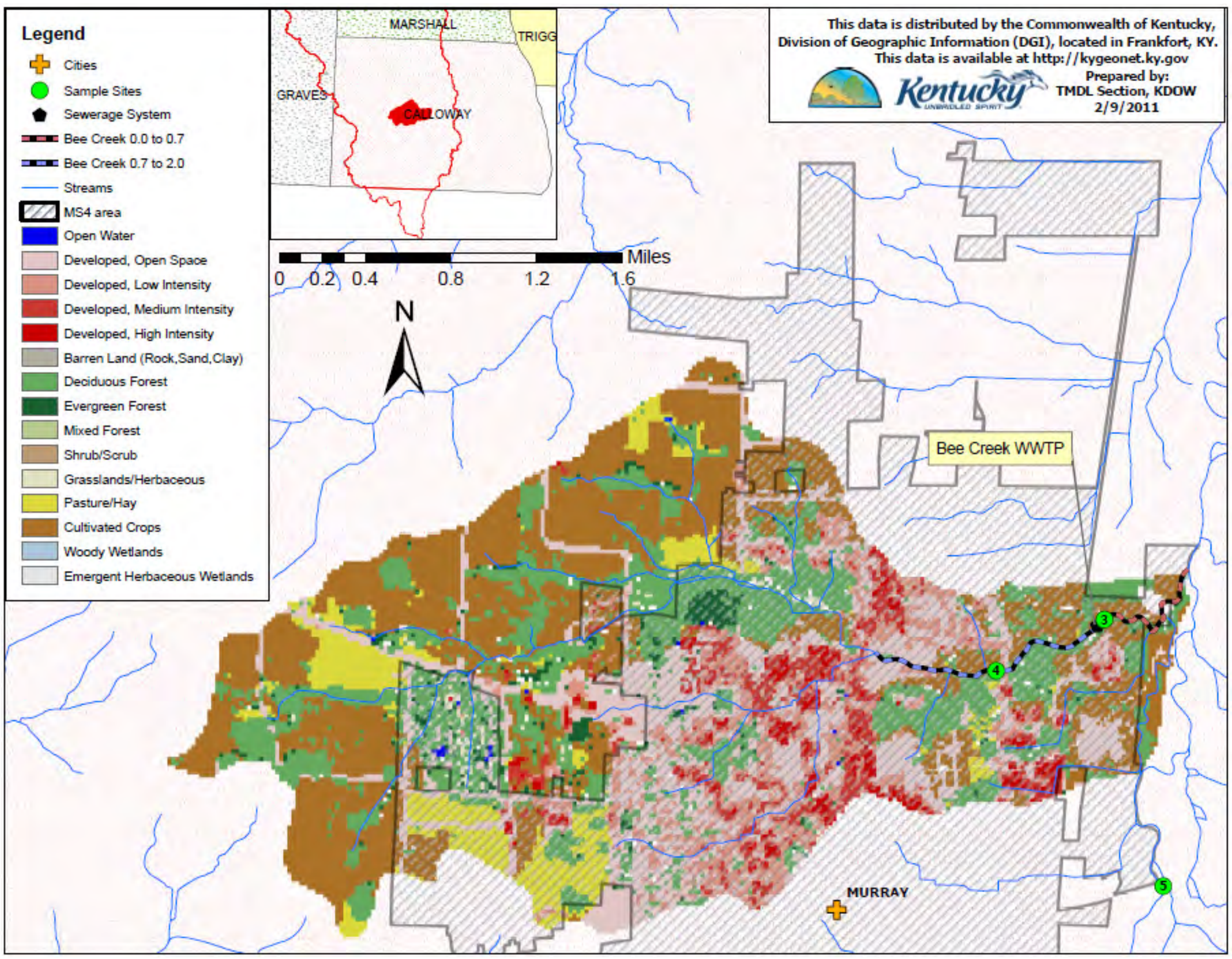

Figure 8.1 Bee Creek RM 0.0 to 0.7 Subwatershed

Table 8.1 Bee Creek RM 0.0 to 0.7 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Bee Creek	Bee Creek RM 0.0 to 0.7	KY486666_01	Calloway	4388	6.8	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)	MS4 Developed Land (Acres)	% Developed MS4 in Watershed	
9.4	0	13.538	22.9	1275.54	29.06	

Note: The MAF at RM 0.0 on this stream was adjusted to more accurately reflect stream size and connectivity. Due to an erroneous stream braiding connection in the MAF files, the MAF at RM 0.0 was indicated to be 162.4 cfs, an extremely high value for this 2nd order stream. The MAF used for this TMDL was calculated from the area right above this erroneous braid (MAF=8.9 cfs) plus the MAF from tributaries to this erroneous braid (MAF =0.5 cfs) to yield a MAF for RM 0.0 of 9.4 cfs.

Table 8.2 Bee Creek RM 0.0 to 0.7 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
3	3	0.65	36.63045	-88.29300

Table 8.3 Bee Creek RM 0.0 to 0.7 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	33.88	1486.80	2.32	5
Agriculture (total)	39.94	1752.78	2.74	
Pasture	6.90	302.98	0.47	
Row Crop	33.03	1449.80	2.27	
Forest	25.40	1114.71	1.74	
Natural Grassland	0.54	23.85	0.04	
Water	0.11	4.90	0.01	
Wetland	0.06	2.68	0.00	
Barren	0.07	3.12	0.00	
Total	100.00	4388.85	6.86	

Table 8.4 Bee Creek RM 0.0 to 0.7 Data (Site 3)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/18/2005	82	148.48	
5/25/2005	82	172.24	✓
6/1/2005	148		
6/8/2005	196		
6/15/2005	370		
6/22/2005	82		
7/12/2005	11588		
7/20/2005	214		
7/27/2005	346		
8/10/2015	322		
8/17/2005	28272		✓
8/24/2005	218		
8/31/2005	816		
9/21/2005	264		
9/28/2005	320		
10/12/2005	19		
10/19/2005	82		
10/26/2005	170		

Table 8.5 TMDL Calculations for Bee Creek RM 0.0 to 0.7

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			1.59E+13	9.67E+10	Existing Load
			1.35E+11	**7.30E+10**	**Total TMDL**
			1.35E+10	**7.30E+09**	**MOS**
			1.21E+11	6.57E+10	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	99.2%	32.1%	% reduction
KY0072761	Bee Creek WWTP	13.538	**7.95E+10**	**4.31E+10**	**SWS WLA**
	Addition to MAF (sum of cfs)	13.538	4.17E+10	2.26E+10	remainder
KYG200011 and KYS000003	Murray MS4 and KYTC MS4	N/A[3]	1.21E+10	6.57E+09	**MS4 WLA**
			2.09E+09	**1.13E+09**	**Future Growth WLA[2]**
			2.75E+10	**1.49E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
[3]N/A indicates that the MS4 does not have a design capacity.

8.2.2 Bee Creek RM 0.7 to 2.0

Bee Creek at RM 2.0 is a second order stream located in Calloway County (Figure 8.2). The impaired reach is about ½ mile north of downtown Murray, KY. Information about Bee Creek RM 0.7 to 2.0, including its WBID and MAF is shown in Table 8.6. Site information is presented in Table 8.7. Site 4 is above the Bee Creek WWTP in Murray, KY. The subwatershed for the impaired segment has a total drainage area of approximately 6.1 square miles. The land use in this subwatershed is predominantly agricultural (40%, mostly row crops) followed by urban/residential development (34%) and mixed forest (25%) (Table 8.8).

Portions of the City of Murray MS4 exist in this subwatershed along with the KYTC MS4. Sampling data from site 4 are presented in Table 8.9, and the TMDL allocations in Table 8.10.

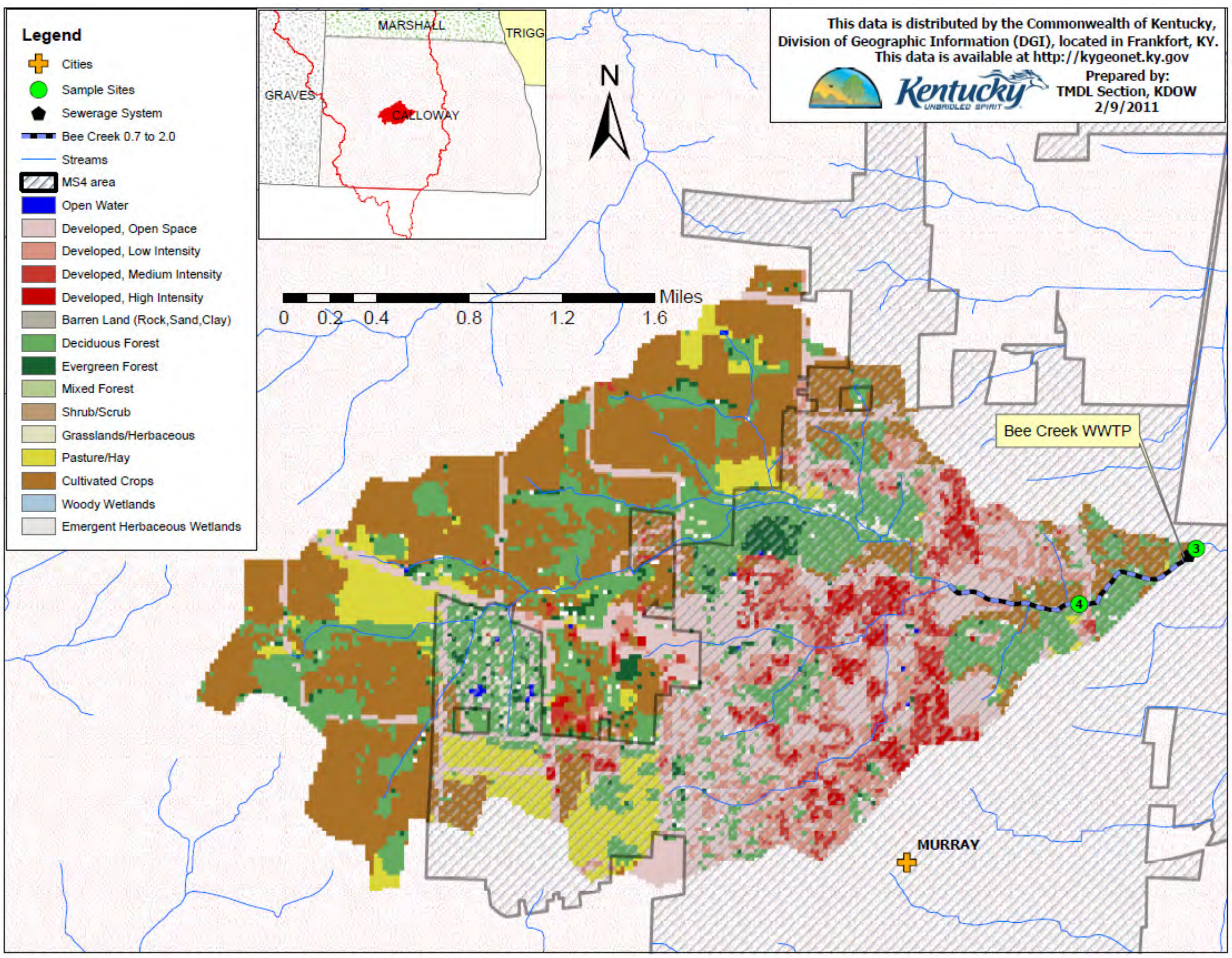

Figure 8.2 Bee Creek RM 0.7 to 2.0 Subwatershed

Table 8.6 Bee Creek RM 0.7 to 2.0 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Bee Creek	Bee Creek RM 0.7 to 2.0	KY486666_02	Calloway	3896	6.1	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)	MS4 Developed Land (Acres)	%Developed MS4 in Watershed	
8.6	0.7	0	8.6	1125.85	28.9	

Table 8.7 Bee Creek RM 0.7 to 2.0 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
4	4	1.45	36.626783	-88.301950

Table 8.8 Bee Creek RM 0.7 to 2.0 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	34.22	1333.24	2.08	5
Agriculture (total)	39.78	1549.88	2.42	
Pasture	7.36	286.93	0.45	
Row Crop	32.42	1262.95	1.97	
Forest	25.17	980.47	1.53	
Natural Grassland	0.61	23.58	0.04	
Water	0.13	4.89	0.01	
Wetland	0.02	0.89	0.00	
Barren	0.08	3.11	0.00	
Total	100.00	3896.06	6.09	

Table 8.9 Bee Creek RM 0.7 to 2.0 Data (Site 4)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/18/2005	402	462.577	✓
5/25/2005	398	389.43	
6/1/2005	296		
6/8/2005	758		
6/15/2005	590		
6/22/2005	170		
7/12/2005	48392		✓
7/20/2005	398		
7/27/2005	62		
8/10/2015	482		
8/17/2005	48392		
8/24/2005	218		
8/31/2005	1812		
9/21/2005	338		
9/28/2005	374		
10/12/2005	20		
10/19/2005	196		
10/26/2005	20		

Table 8.10 TMDL Calculations for Bee Creek 0.7 to 2.0

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			1.02E+13	9.73E+10	Existing Load
			5.05E+10	**2.74E+10**	**Total TMDL**
			5.05E+09	**2.74E+09**	**MOS**
			4.54E+10	2.46E+10	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	99.6%	74.7%	% reduction
	Addition to MAF (sum of cfs)	N/A[3]	4.54E+10	2.46E+10	remainder
KYG200011 and KYS000003	Murray MS4 and KYTC MS4	N/A[3]	1.31E+10	7.11E+09	MS4
			2.27E+09	**1.23E+09**	**Future Growth WLA[2]**
			3.00E+10	**1.63E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
[3]N/A indicates that the MS4 does not have a design capacity.

8.2.3 Blizzard Pond of West Fork Clarks River RM 4.8 to 5.8

Blizzard Pond of West Fork Clarks River at RM 4.8 is a second order stream in the extreme northwest part of the Clarks River watershed in McCracken County (Figure 8.3). Information about Blizzard Pond RM 4.8 to 5.8, including its WBID and MAF is shown in Table 8.11. Site information is presented in Table 8.12. The subwatershed for the impaired segment has a total drainage area of approximately 3.1 square miles. The land use in the subwatershed is predominantly agricultural (48%, mostly pasture) followed by mixed forest (39%), while urban/suburban development represents about 9% of the land use (Table 8.13).

There is one KPDES permitted SWS discharge within the subwatershed boundary. Sampling data from site 48 are presented in Table 8.14 and the TMDL allocations in Table 8.15.

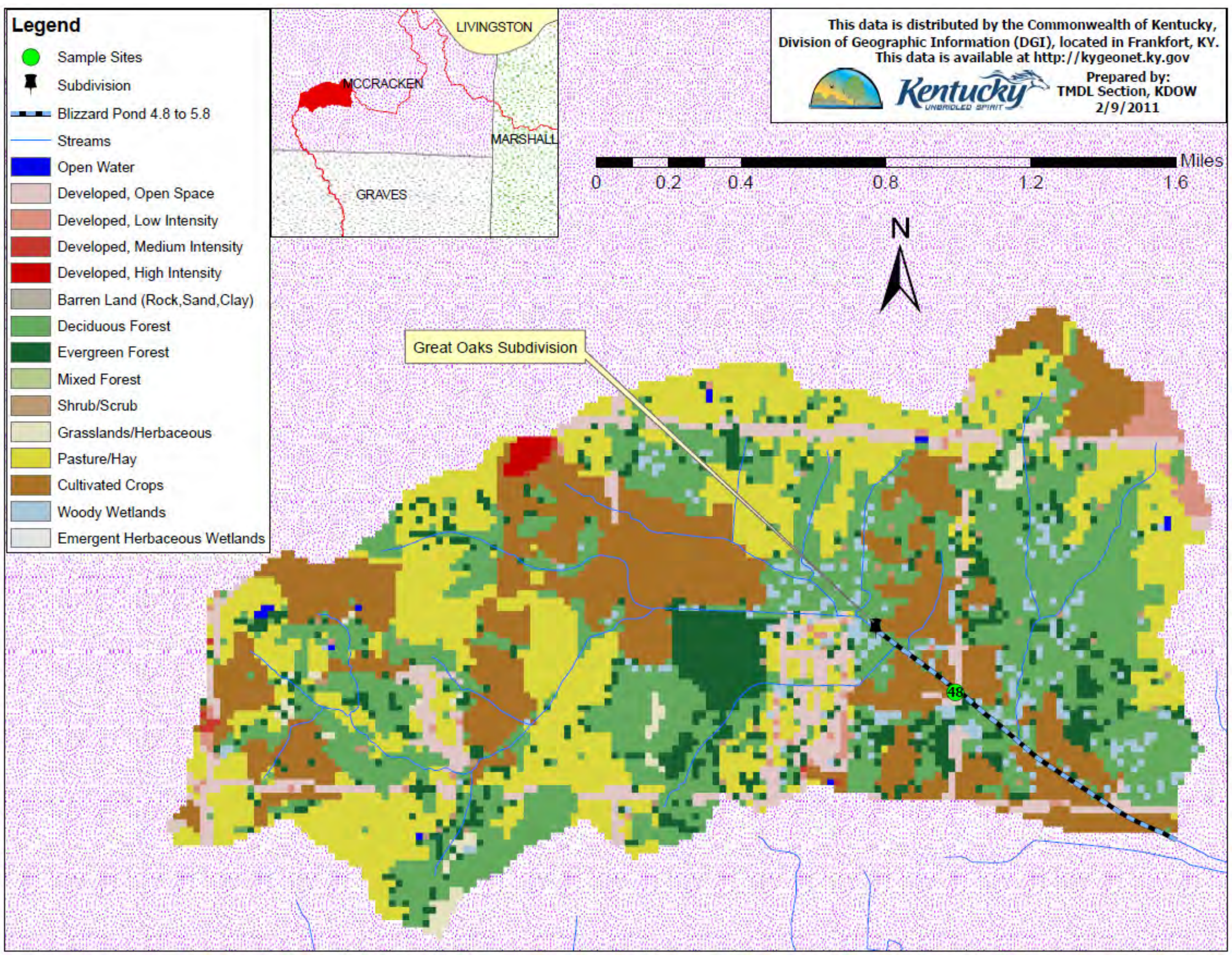

Figure 8.3 Blizzard Pond RM 4.8 to 5.8 Subwatershed

Table 8.11 Blizzard Pond RM 4.8 to 5.8 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Blizzard Pond	Blizzard Pond RM 4.8 to 5.8	KY487484_02	McCracken	1988	3.1	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
3.9	4.8	.108	4.008			

Table 8.12 Blizzard Pond RM 4.8 to 5.8 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
48	48	5.5	36.984236	-88.63455

Table 8.13 Blizzard Pond RM 4.8 to 5.8 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	8.62	171.42	0.27	1
Agriculture (total)	48.20	958.03	1.50	
Pasture	25.81	512.92	0.80	
Row Crop	22.39	445.11	0.70	
Forest	38.98	774.83	1.21	
Natural Grassland	0.96	19.12	0.03	
Water	0.16	3.11	0.00	
Wetland	3.08	61.14	0.10	
Barren	0.00	0.00	0.00	
Total	100.00	1987.66	3.11	

Table 8.14 Blizzard Pond RM 4.8 to 5.8 Data (Site 48)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/26/2005	220	795.7	✓
6/2/2005	976	653.1	
6/9/2005	29272		✓
6/16/2005	196		
6/23/2005	268		
6/29/2005	82		
7/13/2005	214		
7/21/2005	422		
7/28/2005	20		
8/11/2015	11588		
8/25/2005	17328		
9/1/2005	1146		
9/16/2005	506	298.0	
9/22/2005	220	195.8	
9/29/2005	718	191.3	
10/6/2005	196		
10/13/2005	150		
10/18/2005	148		
10/20/2005	82		

Table 8.15 TMDL Calculations for Blizzard Pond RM 4.8 to 5.8

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			2.77E+12	7.80E+10	Existing Load
			2.35E+10	**1.27E+10**	**Total TMDL**
			2.35E+09	**1.27E+09**	**MOS**
			2.12E+10	1.15E+10	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	99.2%	85.3%	% reduction
KY0080845	Great Oaks Subdivision	0.108	**6.36E+08**	**3.44E+08**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.108	2.05E+10	1.11E+10	remainder
			2.05E+08	**1.11E+08**	**Future Growth WLA[2]**
			2.03E+10	**1.10E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.4 Blizzard Pond Drainage Canal RM 0.0 to 3.7

Blizzard Pond Drainage Canal of West Fork Clarks River at RM 0.0 is a third order stream in the northwest part of the Clarks River watershed in McCracken County (Figure 8.4). Information about Blizzard Pond Drainage Canal RM 0.0 to 3.7, including its WBID and MAF is shown in Table 8.16. Site information is presented in Table 8.17. The subwatershed for the impaired segment has a total drainage area of approximately 14.7 square miles. The land use in this subwatershed is predominantly agricultural (47%, mostly row crop) followed by mixed forests (38.7%) and wetlands (7.7%) while urban/suburban development represents about 5.8% of the land use (Table 8.18).

There are two KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 47 are presented in Table 8.19, and the TMDL allocations in Table 8.20.

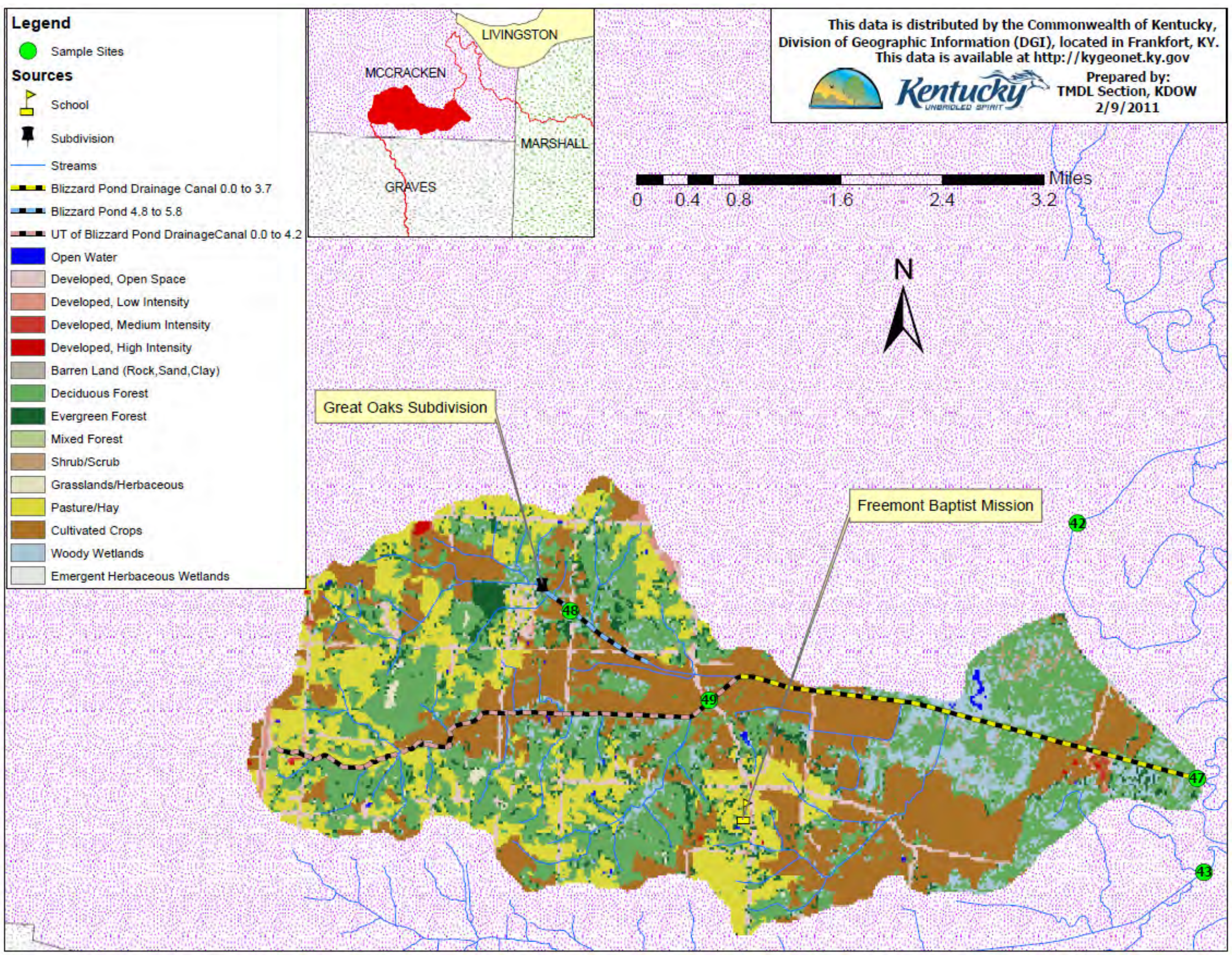

Figure 8.4 Blizzard Pond Drainage Canal RM 0.0 to 3.7 Subwatershed

Table 8.16 Blizzard Pond Drainage Canal RM 0.0 to 3.7 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Blizzard Pond Drainage Canal	Blizzard Pond Drainage Canal RM0.0 to 3.7	KY487484_01	McCracken	9399	14.7	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
18.4	0.0	.113	18.513			

Table 8.17 Blizzard Pond Drainage Canal RM 0.0 to 3.7 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
47	47	0.1	36.967246	-88.544824

Table 8.18 Blizzard Pond Drainage Canal RM 0.0 to 3.7 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	5.83	547.84	0.86	1
Agriculture (total)	47.04	4421.89	6.91	
Pasture	17.71	1664.43	2.60	
Row Crop	29.34	2757.46	4.31	
Forest	38.73	3639.92	5.69	
Natural Grassland	0.49	46.47	0.07	
Water	0.22	20.68	0.03	
Wetland	7.68	721.49	1.13	
Barren	0.01	1.11	0.00	
Total	100.00	9399.41	14.69	

Table 8.19 B Blizzard Pond Drainage Canal RM 0.0 to 3.7 Data (Site 47)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	126		
5/26/2005	20		
6/9/2005	28272		✓
6/16/2005	338		
6/23/2005	126		
6/29/2005	104		
7/13/2005	218		
7/21/2005	148		
7/28/2005	82		
8/11/2015	296		
8/25/2005	40		
9/16/2005	220	200.5	✓
9/22/2005	214	124.1	
9/29/2005	1354		
10/6/2005	82		
10/13/2005	62		
10/20/2005	20		

Table 8.20 TMDL Calculations for Blizzard Pond Drainage Canal RM 0.0 to 3.7

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			1.28E+13	9.08E+10	Existing Load
			1.09E+11	**5.89E+10**	**Total TMDL**
			1.09E+10	**5.89E+09**	**MOS**
			9.78E+10	5.30E+10	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	99.2%	41.6%	% reduction
KY0040428	Freemont Baptist Mission	0.005	**2.73E+07**	**1.48E+07**	**SWS WLA**
KY0080845	Great Oaks Subdivision	0.108	**6.36E+08**	**3.44E+08**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.113	**6.63E+08**	**3.59E+08**	**Total SWS WLA**
			9.72E+10	5.26E+10	remainder
			9.72E+08	**5.26E+08**	**Future Growth WLA[2]**
			9.62E+10	**5.21E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.5 Camp Creek RM 0.0 to 5.4

Camp Creek of Clarks River at RM 0.0 is a third order stream in the northwest part of the Clarks River watershed in McCracken County (Figure 8.5). Information about Camp Creek RM 0.0 to 5.4, including its WBID and MAF is shown in Table 8.21. Site information is presented in Table 8.22. The subwatershed for the impaired segment has a total drainage area of approximately 15.2 square miles. The landcover in this subwatershed is predominantly mixed forest (46%) followed by agriculture (43%, mostly row crop) then wetlands (5.5%) while urban/suburban development represents about 3.3% of the land cover (Table 8.23).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 43 are presented in Table 8.24, and the TMDL allocations in Table 8.25.

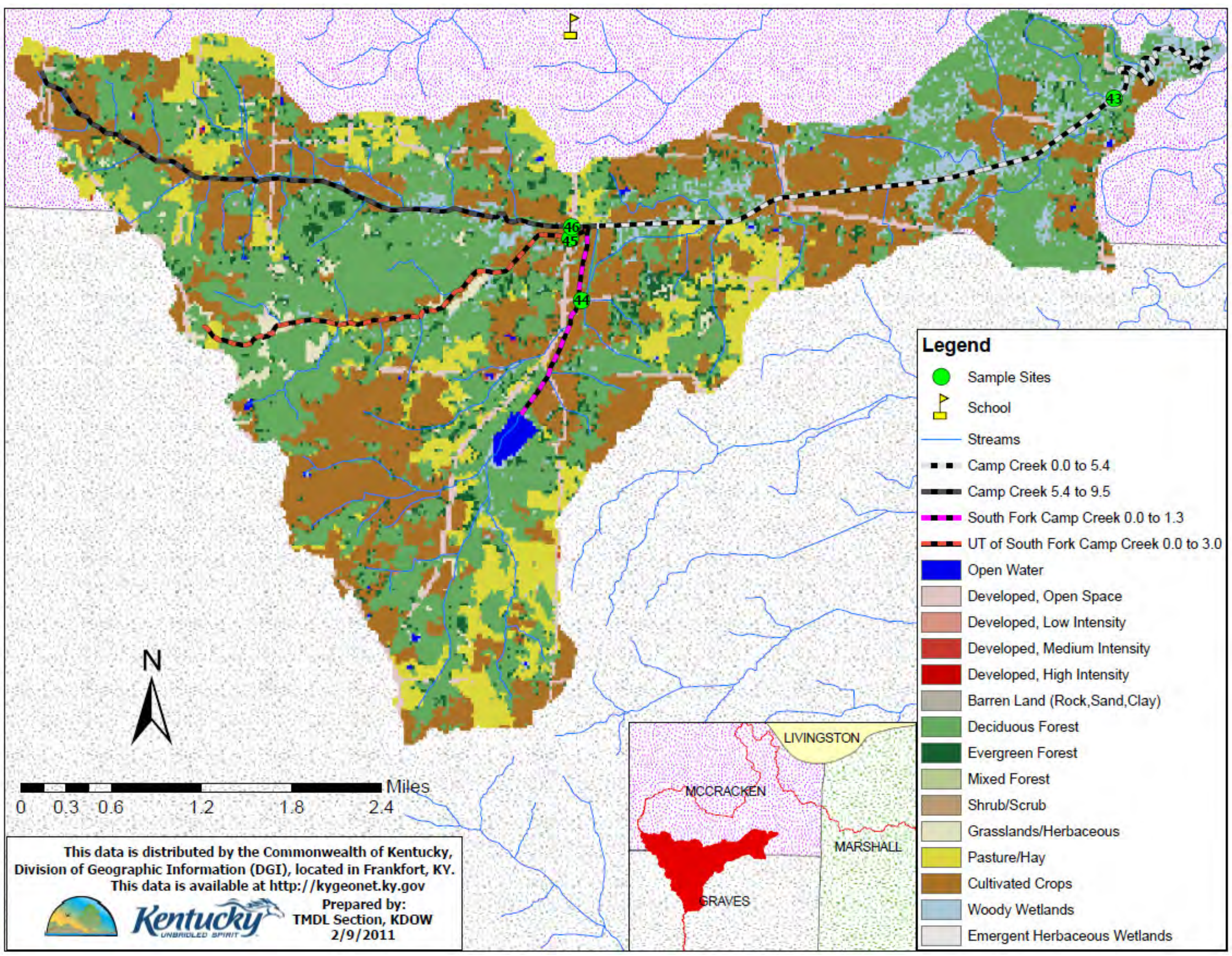

Figure 8.5 Camp Creek RM 0.0 to 5.4 Subwatershed

Table 8.21 Camp Creek RM 0.0 to 5.4 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Camp Creek of West Fork Clarks River	Camp Creek RM 0.0 to 5.4	KY488685_00	McCracken	9712	15.2	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
19.0	0.0	0	19.0			

Table 8.22 Camp Creek RM 0.0 to 5.4 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
43	43	1.7	36.95656	-88.54343

Table 8.23 Camp Creek RM 0.0 to 5.4 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.30	320.74	0.50	0.5
Agriculture (total)	42.74	4151.12	6.49	
Pasture	11.05	1073.20	1.68	
Row Crop	31.69	3077.92	4.81	
Forest	46.48	4513.45	7.05	
Natural Grassland	1.42	137.46	0.21	
Water	0.54	52.49	0.08	
Wetland	5.50	534.26	0.83	
Barren	0.02	2.00	0.00	
Total	100.00	9711.52	15.17	

Table 8.24 Camp Creek RM 0.0 to 5.4 Data (Site 43)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	40		
5/26/2005	172		
6/9/2005	22398		✓
6/16/2005	4800		
7/13/2005	20		
7/28/2005	192		
8/11/2015	260		
8/25/2005	40		
9/1/2005	930		
9/16/2005	20	31.9	
9/22/2005	20	36.7	
9/29/2005	20		
10/6/2005	40		
10/13/2005	104		
10/20/2005	40		

Table 8.25 TMDL Calculations for Camp Creek RM 0.0 to 5.4

Instantaneous *E. coli* (colonies/day)	
1.04E+13	Existing Load
1.12E+11	**Total TMDL**
1.12E+10	**MOS**
1.00E+11	TMDL Target
99.0%	% reduction
1.00E+11	remainder
5.02E+08	**Future Growth WLA**[1]
9.99E+10	**LA**

Notes: [1]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031. 8.2.6 Camp Creek RM 5.4 to 9.5

8.2.6 Camp Creek RM 5.4 to 9.5

Camp Creek of Clarks River at RM 5.4 is a first order stream in the northwest part of the Clarks River watershed in McCracken County (Figure 8.6). Information about Camp Creek RM 5.4 to 9.5, including its WBID and MAF is shown in Table 8.26. Site information is presented in Table 8.27. The subwatershed for the impaired segment has a total drainage area of approximately 3.9 square miles. The landcover in this subwatershed is predominantly mixed forest (50%) followed by agriculture (42%, mostly row crop) while urban/suburban development represents about 3.4% of the land cover (Table 8.28).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 46 are presented in Table 8.29, and the TMDL allocations in Table 8.30.

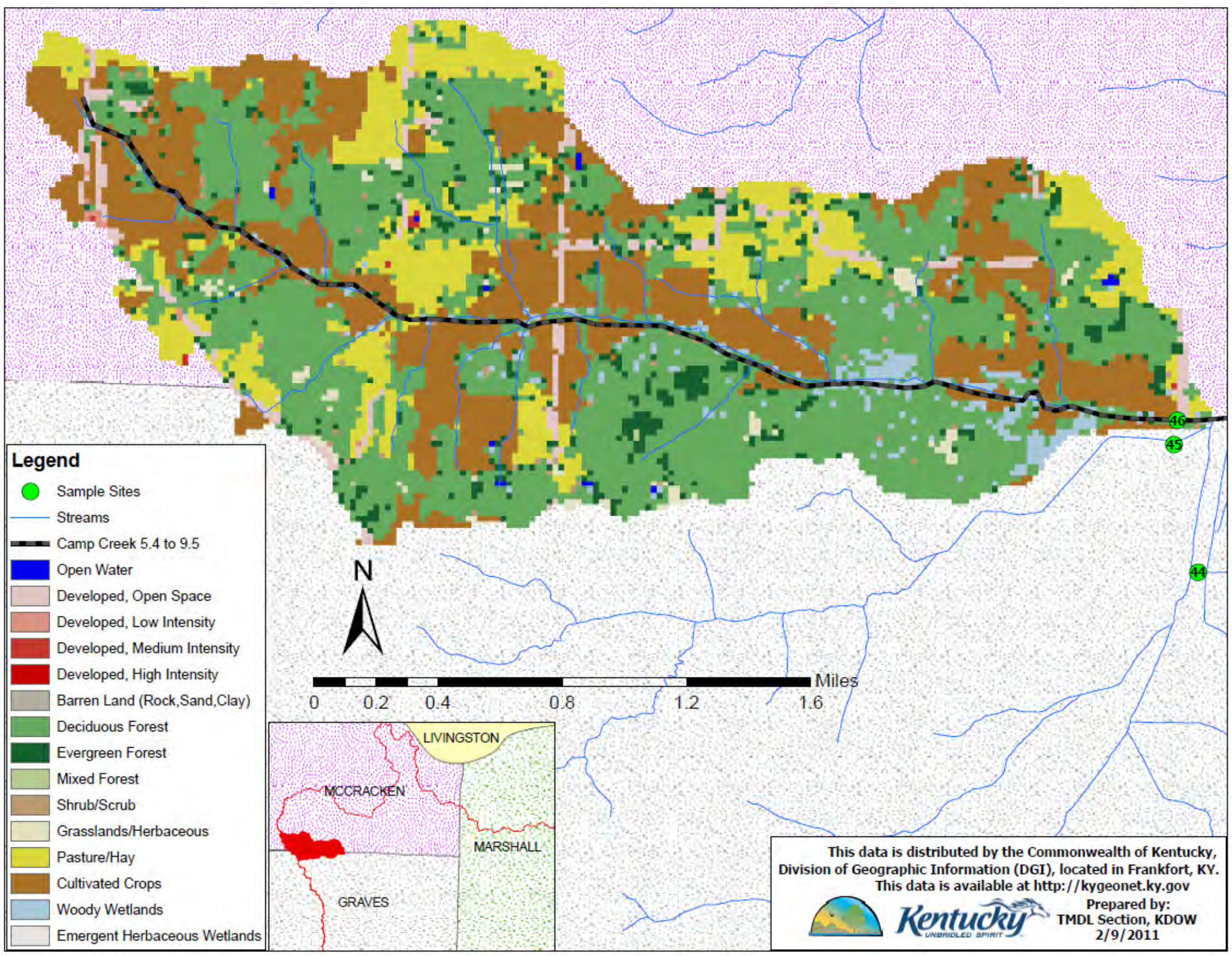

Figure 8.6 Camp Creek RM 5.4 to 9.5 Subwatershed

Table 8.26 Camp Creek RM 5.4 to 9.5 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Camp Creek of West Fork Clarks River	Camp Creek RM 5.4 to 9.5	KY488685_02	Graves	2483	3.9	1st
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
4.9	5.4	0	4.9			

Table 8.27 Camp Creek RM 5.4 to 9.5 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
46	46	5.5	36.942527	-88.608167

Table 8.28 Camp Creek RM 5.4 to 9.5 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.42	84.95	0.13	0.5
Agriculture (total)	42.13	1045.85	1.63	
Pasture	14.08	349.58	0.55	
Row Crop	28.05	696.27	1.09	
Forest	50.24	1247.32	1.95	
Natural Grassland	1.17	29.13	0.05	
Water	0.15	3.78	0.01	
Wetland	2.88	71.61	0.11	
Barren	0.00	0.00	0.00	
Total	100.00	2482.64	3.88	

Table 8.29 Camp Creek RM 5.4 to 9.5 Data (Site 46)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	104	235.5	
5/26/2005	20	234.6	
6/2/2005	322	461.6	✓
6/9/2005	7308		✓
6/16/2005	148		
6/23/2005	102		
6/29/2005	590		
7/13/2005	150		
7/21/2005	170		
7/28/2005	124		
8/25/2005	482		
9/1/2005	378		
9/16/2005	194	225.9	
9/22/2005	172	268.0	
9/29/2005	264		
10/6/2005	214		
10/13/2005	312		
10/20/2005	456		

Table 8.30 TMDL Calculations for Camp Creek RM 5.4 to 9.5

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
8.76E+11	5.53E+10	Existing Load
2.88E+10	**1.56E+10**	**Total TMDL**
2.88E+09	**1.56E+09**	**MOS**
2.59E+10	1.40E+10	TMDL Target
97.0%	74.7%	% reduction
2.59E+10	1.40E+10	remainder
1.29E+08	**7.01E+07**	**Future Growth WLA**[2]
2.58E+10	**1.40E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.7 Chestnut Creek RM 0.0 to 3.0

Chestnut Creek at RM 0.0 is a second order stream in the northeast part of the Clarks River watershed in Marshall County (Figure 8.7). Information about Chestnut Creek RM 0.0 to 3.0, including its WBID and MAF is shown in Table 8.31. Site information is presented in Table 8.32. The subwatershed for the impaired segment has a total drainage area of approximately 8.1 square miles. The landcover in this subwatershed is predominantly agriculture (46%, mostly pasture) followed by mixed forest (42%) while urban/suburban development represents about 9% of the land cover (Table 8.33).

There are three KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from sites 15 and 17are presented in Tables 8.34 and 8.35, and the TMDL allocations in Table 8.36.

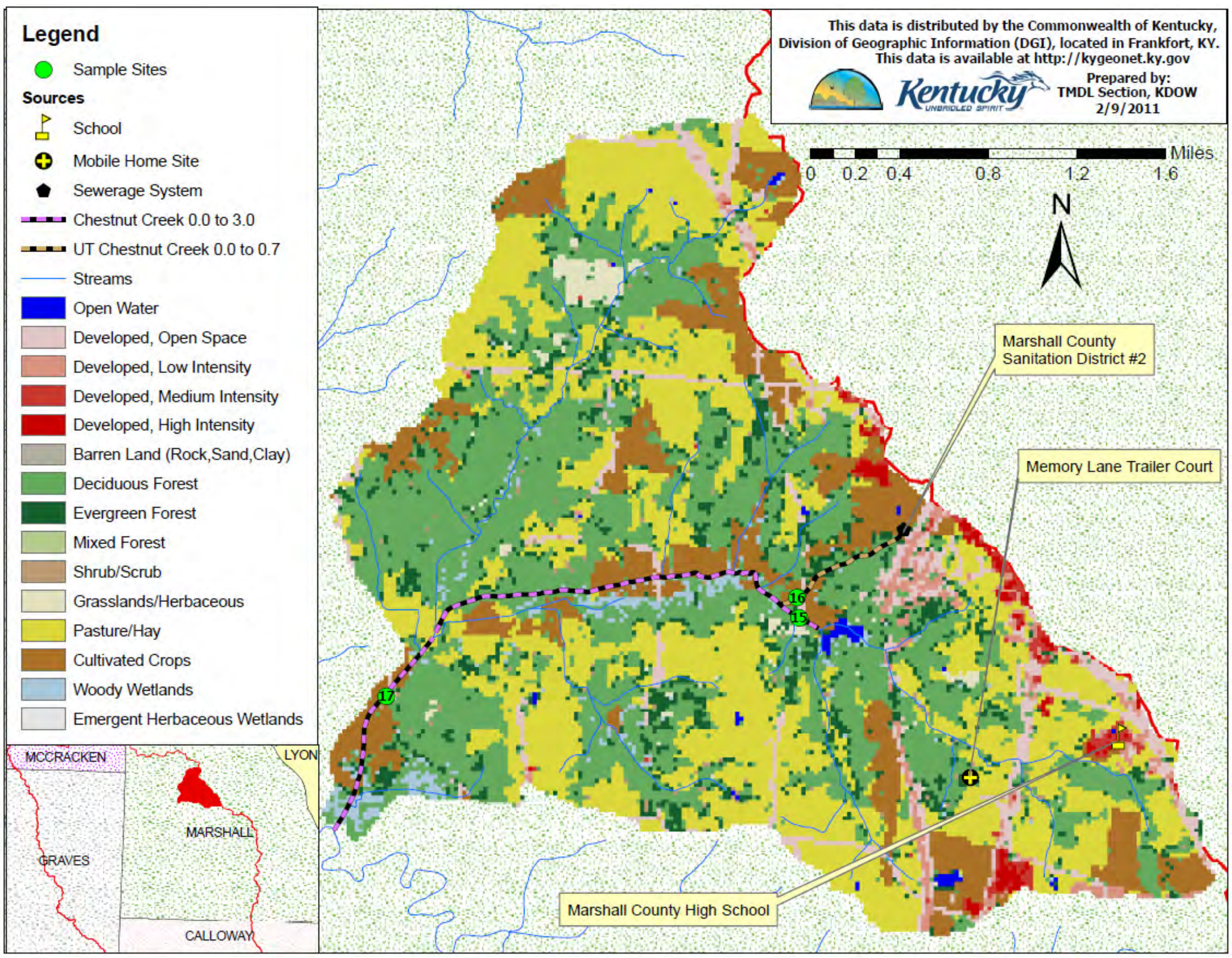

Figure 8.7 Chestnut Creek RM 0.0 to 3.0 Subwatershed

Table 8.31 Chestnut Creek RM 0.0 to 3.0 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Chestnut Creek of Clarks River	Chestnut Creek RM 0.0 to 3.0	KY489424_00	Marshall	5154	8.1	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
10.2	0	0.282	10.5			

Table 8.32 Chestnut Creek RM 0.0 to 3.0 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
15	15	2.9	36.919600	-88.357900
17	17	0.7	36.913700	-88.391300

Table 8.33 Chestnut Creek RM 0.0 to 3.0 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	8.96	461.60	0.72	1
Agriculture (total)	45.81	2361.13	3.69	
Pasture	33.26	1714.32	2.68	
Row Crop	12.55	646.81	1.01	
Forest	41.77	2153.01	3.36	
Natural Grassland	1.19	61.15	0.10	
Water	0.37	18.90	0.03	
Wetland	1.90	97.83	0.15	
Barren	0.01	0.67	0.00	
Total	100.00	5154.29	8.05	

Table 8.34 Chestnut Creek RM 0.0 to 3.0 Data (Site 15)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/17/2005	370	
5/24/2005	20	
5/31/2005	20	
6/14/2005	126	
7/14/2005	126	
7/19/2005	244	
8/30/2005	7308	
9/20/2005	18416	□
9/27/2005	398	

Table 8.35 Chestnut Creek RM 0.0 to 3.0 Data (Site 17)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/17/2005	2200	
5/24/2005	3978	
6/14/2005	1188	
6/21/2005	914	
7/14/2005	896	
7/19/2005	48392	✓
9/8/2005	422	
9/20/2005	1446	
9/27/2005	610	

Table 8.36 TMDL Calculations for Chestnut Creek RM 0.0 to 3.0

			Instantaneous *E. coli* (colonies/day)	
			1.24E+13	Existing Load
			6.15E+10	**Total TMDL**
			6.15E+09	**MOS**
			5.54E+10	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	99.6%	% reduction
KY0023906	Marshall County High School & Technical Center	0.046	**2.73E+08**	**SWS WLA**
KY0044181	Marshall County Sanitation District #2	0.232	**1.36E+09**	**SWS WLA**
KY0028991	Memory Lane Trailer Court	0.003	**1.82E+07**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.282	**1.65E+09**	**Total SWS WLA**
			5.37E+10	remainder
			5.37E+08	**Future Growth WLA[(1)]**
			5.32E+10	**LA**

Notes: [(1)]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.8 Clarks River RM 13.2 to 20.6

Clarks River at RM 13.2 is a fourth order stream in the northeast part of the Clarks River watershed in Marshall County (Figure 8.8). Information about Clarks River RM 13.2 to 20.6, including its WBID and MAF is shown in Table 8.37. Site information is presented in Table 8.38. The subwatershed for the impaired segment has a total drainage area of approximately 299 square miles. The landcover in this subwatershed is predominantly agriculture (55%, mostly row crop) followed by mixed forest (32%) while urban/suburban development represents about 8.6% of the land cover (Table 8.39).

There are thirteen KPDES permitted SWS discharges within the subwatershed boundary. The City of Murray MS4 also exists in this subwatershed along with the KYTC MS4. Sampling data from site PRI106 are presented in Tables 8.40 and the TMDL allocations in Table 8.41.

Portions of this subwatershed exist in TN. While there are no WLA sources in the TN portion of the watershed, the LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).

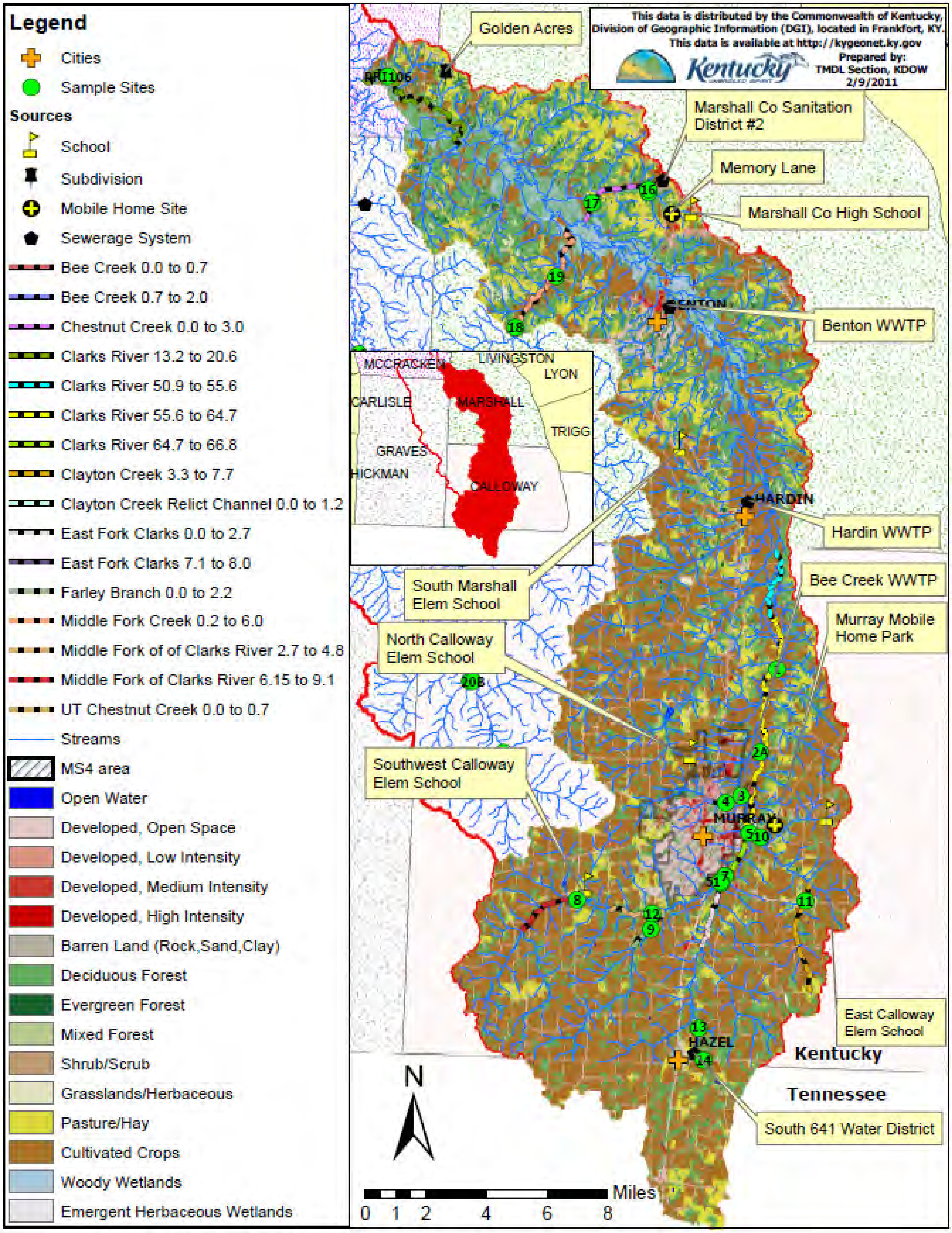

Figure 8.8 Clarks River RM 13.2 to 20.6 Subwatershed

Table 8.37 Clarks River RM 13.2 to 20.6 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Clarks River	Clarks River RM 13.2 to 20.6	KY489552_02	McCracken	191,384	299	4th
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)	MS4 Developed Land (Acres)	% Developed MS4 in Watershed	
402.6	13.2	15.729	418.3	3654.48	1.9	

Table 8.38 Clarks River RM 13.2 to 20.6 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
PRI106	PRI106	14.9	36.9718055	-88.5149722

Table 8.39 Clarks River RM 13.2 to 20.6 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	8.58	16417.52	25.65	1
Agriculture (total)	55.05	105349.66	164.61	
Pasture	11.95	22875.87	35.74	
Row Crop	43.09	82473.79	128.87	
Forest	31.88	61022.41	95.35	
Natural Grassland	0.80	1530.16	2.39	
Water	0.16	313.68	0.49	
Wetland	3.48	6654.13	10.40	
Barren	0.05	96.33	0.15	
Total	100.00	191383.88	299.04	

Table 8.40 Clarks River RM 13.2 to 20.6 Data (PRI106)

Sampling Date	Instantaneous Fecal Coliform colonies/100 mL	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
12/14/1999	600		
5/10/2000	30		
6/13/2000	30		
7/12/2000	20		
7/13/2000	100		
8/17/2000	30		
9/13/2000	80		
10/26/2000	10		
11/15/2000	60		
1/11/2001	10		
2/14/2001	30		
3/12/2001	10		
5/17/2001	20		
6/14/2001	40		
7/9/2001	382		
7/18/2001	190		
8/22/2001	100		
9/18/2001	110		
10/17/2001	290		
5/22/2002	60		
6/20/2002	600		
7/18/2002	110		
8/20/2002	320		
9/17/2002	340		
10/22/2002	170		
5/21/2003	480		
6/12/2003	600		
8/18/2003	180		
9/16/2003	120		
10/20/2003	60		
5/20/2004	120		
6/17/2004	*Present < QL		
8/11/2004	65		
10/13/2004	1300		
5/18/2005	730		
6/15/2005	290		

Sampling Date	Instantaneous Fecal Coliform colonies/100 mL	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
7/13/2005	100		
8/10/2005	310		
9/20/2005	340		
10/18/2005	40		
5/11/2006	480		
6/14/2006	200		
7/18/2006	160		
8/16/2006	160		
9/12/2006	800		
10/10/2006	120		
6/12/2007		50	
9/11/2007		50	
5/12/2008		165	
6/12/2008		15	
7/14/2008		600	
10/21/2008		25	
6/15/2009		641	
8/18/2009		33	
10/20/2009		186	
5/19/2010		1414	✓
6/10/2010		34	
7/15/2010		40	
8/19/2010		37	

Note: QL indicates the Quantitation Limit.

Table 8.41 TMDL Calculations for Figure 8.6 Clarks River RM 13.2 to 20.6

			Instantaneous *E. coli* (colonies/day)	
			1.45E+13	Existing Load
			2.46E+12	**Total TMDL**
			2.46E+11	**MOS**
			2.21E+12	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	84.7%	% reduction
KY0072761	Bee Creek WWTP	13.538	**7.95E+10**	**SWS WLA**
KY0086703	Murray Mobile Home & RV Park	0.011	**6.36E+07**	**SWS WLA**
KY0028371	South 641 Water District	0.046	**2.73E+08**	**SWS WLA**
KY0040711	North Calloway Elementary School	0.012	**7.27E+07**	**SWS WLA**
KY0040720	Southwest Calloway Elementary School	0.012	**7.27E+07**	**SWS WLA**
KY0044164	Golden Acres Subdivision	0.039	**2.27E+08**	**SWS WLA**
KY0021172	Benton STP	1.547	**9.08E+09**	**SWS WLA**
KY0021016	Hardin STP	0.220	**1.29E+09**	**SWS WLA**
KY0023914	South Marshall Elementary & Middle School	0.009	**5.45E+07**	**SWS WLA**
KY0044181	Marshall Co Sanitation District 2 WWTP	0.232	**1.36E+09**	**SWS WLA**
KY0023906	Marshall Co High School	0.046	**2.73E+08**	**SWS WLA**
KY0028991	Memory Lane Trailer Court	0.003	**1.82E+07**	**SWS WLA**
KY0040738	East Calloway Elem School	0.012	**7.27E+07**	**SWS WLA**
	Addition to MAF (sum of cfs)	15.729	**9.24E+10**	**Total SWS WLA**
			2.12E+12	remainder
KYG200011 and KYS000003	Murray MS4 and KTC MS4	N/A(3)	**4.04E+10**	**MS4 WLA**
			2.12E+10	**Future Growth WLA(1)**
			2.06E+12	**LA**

Notes: (1)Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
(2)The LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml.
(3)N/A indicates that the MS4 does not have a design capacity.

8.2.9 Clarks River RM 50.9 to 55.6

Clarks River at RM 50.9 is a fourth order stream in the south part of the Clarks River watershed in Calloway County (Figure 8.9). Information about Clarks River RM 50.9 to 55.6, including its WBID and MAF is shown in Table 8.42. Site information is presented in Table 8.43. The subwatershed for the impaired segment has a total drainage area of approximately 142 square miles. The landcover in this subwatershed is predominantly agriculture (63.5%, mostly row crop) followed by mixed forest (25%) while urban/suburban development represents about 10.7% of the land cover (Table 8.44).

There are six KPDES permitted SWS discharges within the subwatershed boundary. Most of the City of Murray MS4 also exists in this subwatershed along with the KYTC MS4. Sampling data from site TMDL01 are presented in Table 8.45.

Because there are no recent sampling data for this segment, it is recommended that it be reassessed using the *E. coli* bacteria indicator prior to TMDL development. For this reason, no TMDL calculations are presented in this section. If this segment shows a PCR impairment upon reassessment, an update to this document will be prepared and TMDL calculations submitted to EPA at that time. Although TMDLS are not currently calculated for this segment, the six KPDES permitted SWS discharges must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

Portions of this subwatershed exist in TN, which has no permitted SWS sources. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).

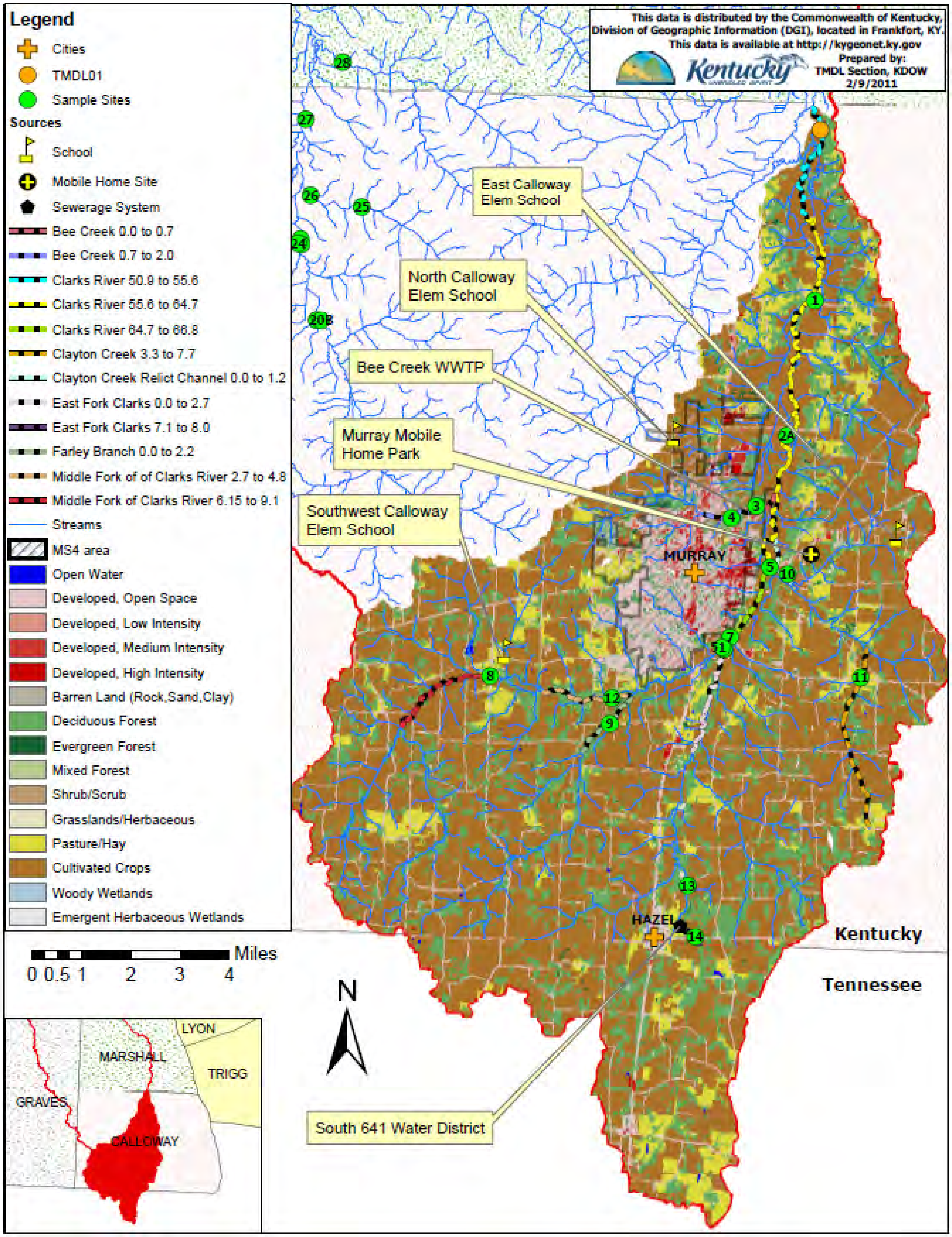

Figure 8.9 Clarks River RM 50.9 to 55.6 Subwatershed

Table 8.42 Clarks River RM 50.9 to 55.6 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Clarks River of Tennessee River	Clarks River RM 50.9 to 55.6	KY489552_07	Calloway	91,011	142	4th
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)	MS4 Developed Land (Acres)	% Developed MS4 in Watershed	
191.4	50.9	13.632	205.032	3654.48	4.1	

Table 8.43 Clarks River RM 50.9 to 55.6 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
TMDL01	TMDL01	52.45	36.742222	-88.273333

Table 8.44 Clarks River RM 50.9 to 55.6 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	10.67	9707.56	15.17	2
Agriculture (total)	63.54	57827.25	90.36	
Pasture	8.33	7580.09	11.84	
Row Crop	55.21	50247.16	78.51	
Forest	25.20	22937.17	35.84	
Natural Grassland	0.28	255.61	0.40	
Water	0.14	124.79	0.19	
Wetland	0.17	151.13	0.24	
Barren	0.01	7.37	0.01	
Total	100.00	91010.89	142.20	

Table 8.45 Clarks River RM 50.9 to 55.6 Data (Site TMDL01)

Sampling Date	Instantaneous Fecal Coliform colonies/100 mL
5/9/2000	30
7/13/2000	100
8/16/2000	30
9/12/2000	10
10/26/2000	10
11/16/2000	90
1/11/2001	40
2/13/2001	30
3/20/2001	60
5/21/2001	200

8.2.10 Clarks River RM 55.6 to 64.7

Clarks River at RM 55.6 is a fourth order stream in the south part of the Clarks River watershed in Calloway County (Figure 8.10). Information about Clarks River RM 55.6 to 64.7, including its WBID and MAF is shown in Table 8.46. Site information is presented in Table 8.47. The subwatershed for the impaired segment has a total drainage area of approximately 139 square miles. The landcover in this subwatershed is predominantly agriculture (63.8%, mostly row crop) followed by mixed forest (24.8%) while urban/suburban development represents about 11% of the land cover (Table 8.48).

There are six KPDES permitted SWS discharges within the subwatershed boundary. Most of the City of Murray MS4 also exists in this subwatershed along with the KYTC MS4. Sampling data from sites 1 and 2A are presented in Tables 8.49 and 8.50 and the TMDL allocations in Table 8.51.

Portions of this subwatershed exist in TN. While there are no WLA sources in the TN portion of the watershed, the LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).

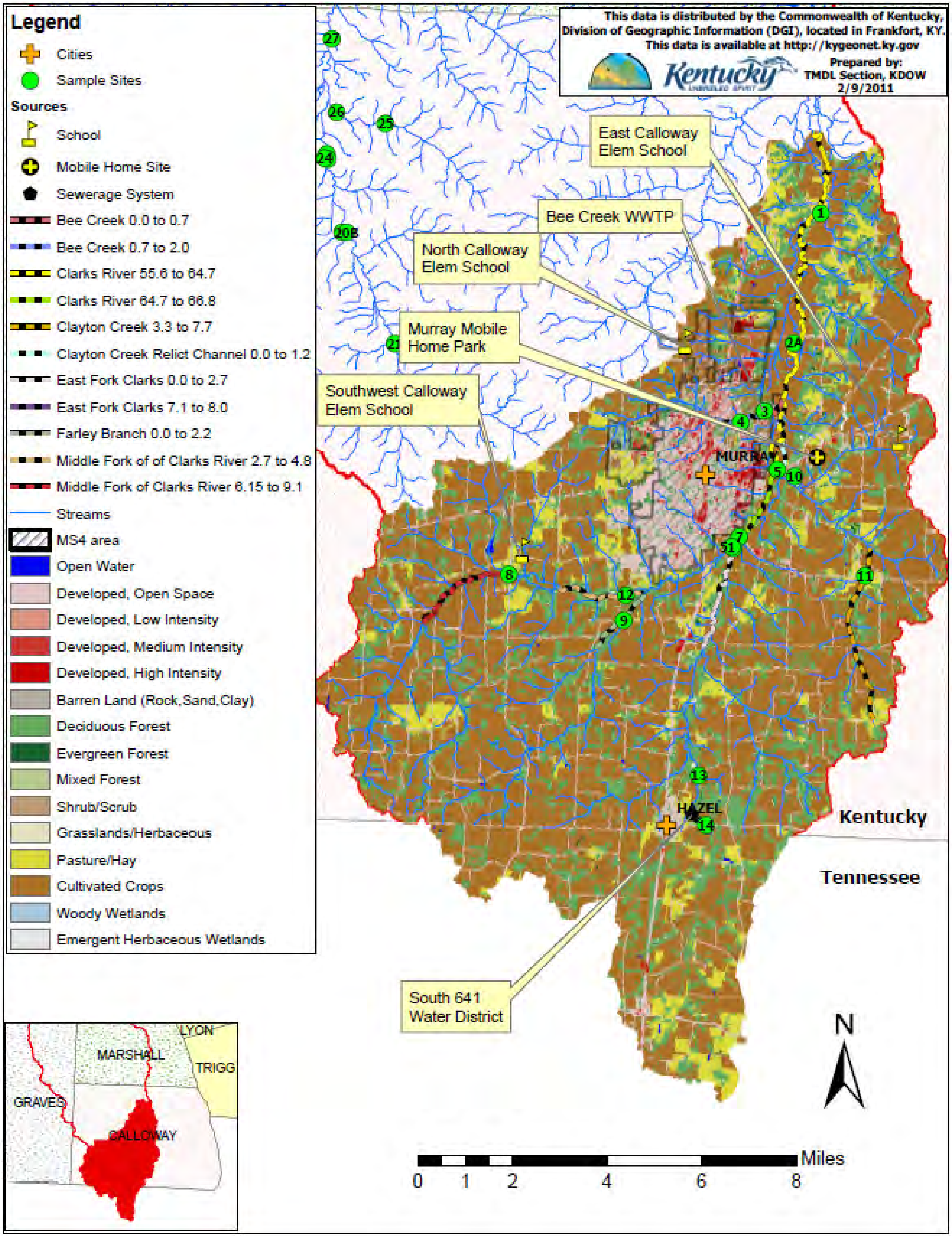

Figure 8.10 Clarks River RM 55.6 to 64.7 Subwatershed

Table 8.46 Clarks River RM 55.6 to 64.7 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Clarks River of Tennessee River	Clarks River RM 55.6 to 64.7	KY489552_08	Calloway	88,973	139	4th
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)	MS4 Developed Land (Acres)	% Developed MS4 in Watershed	
187.1	55.6	13.632	200.7	3654.48	4.1	

Table 8.47 Clarks River RM 55.6 to 64.7 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
1	1	57.4	36.691694	-88.273557
2A	2A	61.15	36.6516	-88.282533

Table 8.48 Clarks River RM 55.6 to 64.7 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	10.95	9738.46	15.22	2
Agriculture (total)	63.79	56752.33	88.68	
Pasture	8.37	7446.37	11.63	
Row Crop	55.42	49305.96	77.04	
Forest	24.75	22019.28	34.41	
Natural Grassland	0.26	229.14	0.36	
Water	0.14	125.13	0.20	
Wetland	0.11	101.35	0.16	
Barren	0.01	7.33	0.01	
Total	100.00	88973.03	139.02	

Table 8.49 Clarks River RM 55.6 to 64.7 Data (Site 1)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
6/1/2005	124	
6/8/2005	126	
6/15/2005	320	
6/22/2005	104	
7/12/2005	1090	
7/20/2005	126	
7/27/2005	82	
8/10/2005	426	
8/17/2005	7308	✓
8/24/2005	346	
8/31/2005	1248	
9/21/2005	194	
9/28/2005	82	
10/12/2005	126	
10/19/2005	20	
10/26/2005	82	

Table 8.50 Clarks River RM 55.6 to 64.7 Data (Site 2A)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/18/2005	432	376.6	✓
5/25/2005	150	270.1	
6/1/2005	292		
6/8/2005	886		
6/15/2005	452		
6/22/2005	82		
7/12/2005	196		
7/20/2005	20		
7/27/2005	82		
8/10/2005	104		
8/17/2005	342		
8/24/2005	124		
8/31/2005	1326		
9/14/2005	104		

Table 8.51 TMDL Calculations for Clarks River RM 55.6 to 64.7

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			3.59E+13	1.85E+12	Existing Load
			1.18E+12	**6.38E+11**	**Total TMDL**
			1.18E+11	**6.38E+10**	**MOS**
			1.06E+12	5.75E+11	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	97.0%	68.9%	% reduction
KY0072761	Bee Creek WWTP	13.538	**7.95E+10**	**4.31E+10**	**SWS WLA**
KY0086703	Murray Mobile Home & RV Park	0.011	**6.36E+07**	**3.44E+07**	**SWS WLA**
KY0028371	South 641 Water District	0.046	**2.73E+08**	**1.48E+08**	**SWS WLA**
KY0040711	North Calloway Elem School	0.012	**7.27E+07**	**3.94E+07**	**SWS WLA**
KY0040720	Southwest Calloway Elem School	0.012	**7.27E+07**	**3.94E+07**	**SWS WLA**
KY0040738	East Calloway Elem School	0.012	**7.27E+07**	**3.94E+07**	**SWS WLA**
	Addition to MAF (sum of cfs)	13.632	**8.00E+10**	**4.34E+10**	**Total SWS WLA**
			9.81E+11	5.31E+11	remainder
KYG200011 and KYS000003	Murray MS4 and KTC MS4	N/A[4]	**4.03E+10**	**2.18E+10**	**MS4 WLA**
			1.96E+10	**1.06E+10**	**Future Growth WLA[2]**
			9.21E+11	**4.99E+11**	**LA[3]**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
[3]The LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml.
[4]N/A indicates that the MS4 does not have a design capacity.

8.2.11 Clarks River RM 64.7 to 66.8

Clarks River at RM 64.7 is a fourth order stream in the south part of the Clarks River watershed in Calloway County (Figure 8.11). Information about Clarks River RM 64.7 to 66.8, including its WBID and MAF is shown in Table 8.52. Site information is presented in Table 8.53. The subwatershed for the impaired segment has a total drainage area of approximately 110 square miles. The landcover in this subwatershed is predominantly agriculture (65.9%, mostly row crop) followed by mixed forest (23.9%) while urban/suburban development represents about 9.9% of the land cover (Table 8.54).

There are four KPDES permitted SWS discharges within the subwatershed boundary. Portions of the City of Murray MS4 also exist in this subwatershed along with the KYTC MS4. Sampling data from sites 5, CR05, 7, and CR07 and 2A are presented in Table 8.55 through 8.58 and the TMDL allocations in Table 8.59.

Portions of this subwatershed exist in TN. While there are no WLA sources in the TN portion of the watershed, the LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).

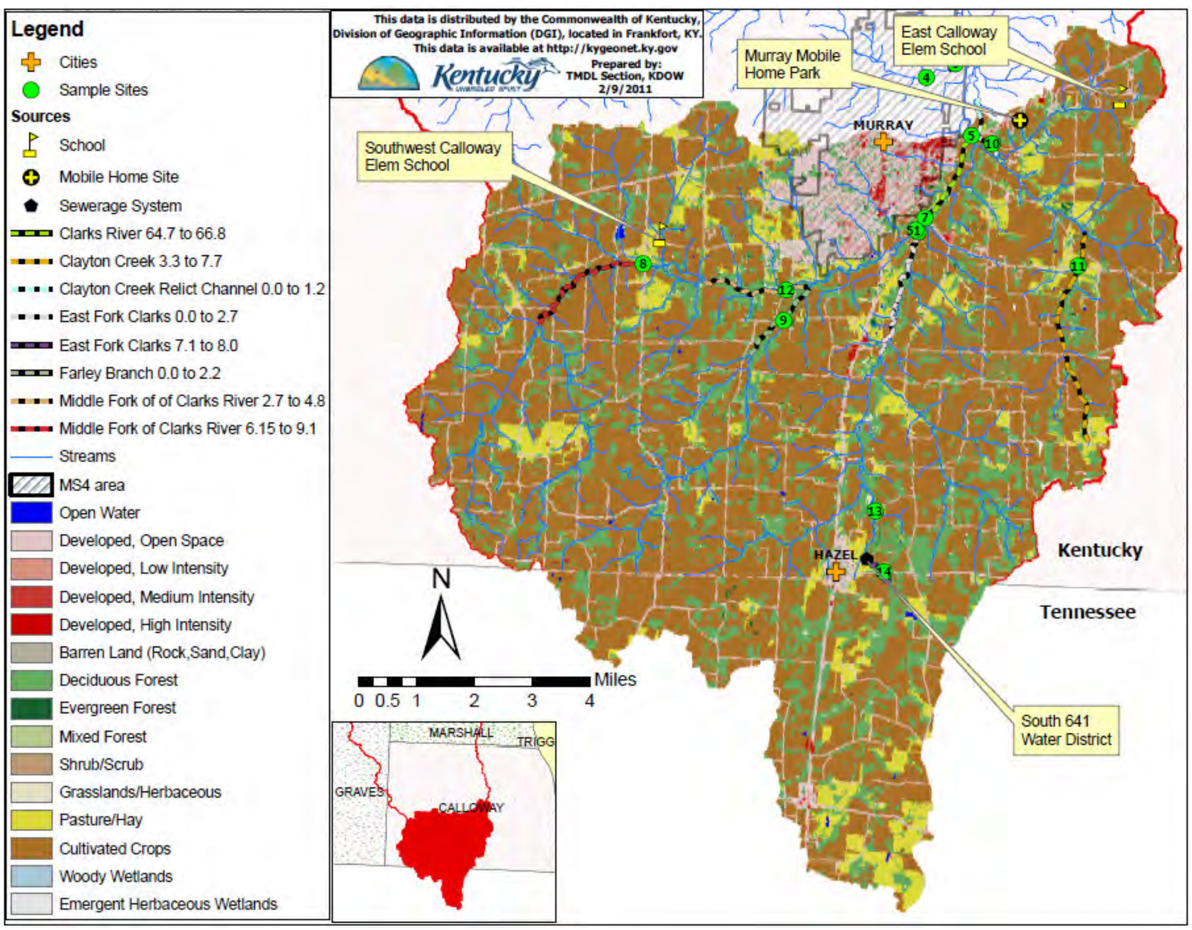

Figure 8.11 Clarks River RM 64.7 to 66.8 Subwatershed

Table 8.52 Clarks River RM 64.7 to 66.8 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Clarks River of Tennessee River	Clarks River RM 64.7 to 66.8	KY489552_09	Calloway	70,110	109.5	4th
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)	MS4 Developed Land (Acres)	% Developed MS4 in Watershed	
128.2	64.7	0.071	128.3	1896.37	2.7	

Table 8.53 Clarks River RM 64.7 to 66.8 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
5	5	64.8	36.612550	-88.287467
CR05	5	64.8	36.612550	-88.287467
7	7	66.6	36.591583	-88.301200
CR07	7	66.6	36.591583	-88.301200

Table 8.54 Clarks River RM 64.7 to 66.8 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	9.93	6959.55	10.87	1
Agriculture (total)	65.88	46184.98	72.16	
Pasture	7.55	5296.53	8.28	
Row Crop	58.32	40888.46	63.89	
Forest	23.85	16721.75	26.13	
Natural Grassland	0.18	128.63	0.20	
Water	0.14	99.75	0.16	
Wetland	0.02	12.44	0.02	
Barren	0.00	2.67	0.00	
Total	100.00	70109.76	109.55	

Table 8.55 Clarks River RM 64.7 to 66.8 Data (Site 5)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/18/2005	378	209.567	✓
5/25/2005	82	154.379	
6/1/2005	150		
6/8/2005	690		
6/15/2005	126		
6/22/2005	82		
7/12/2005	506		
7/20/2005	62		
7/27/2005	244		
8/10/2005	288		
8/17/2005	6152		
8/24/2005	20		
8/31/2005	320		
9/21/2005	82		
9/28/2005	20		
9/28/2005	126		
10/12/2005	172		
10/19/2005	20		
10/26/2005	20		

Table 8.56 Clarks River RM 64.7 to 66.8 Data (Site CR05)

Sampling Date	Instantaneous *E. coli* colonies/100 mL
10/25/2006	370

Table 8.57 Clarks River RM 64.7 to 66.8 Data (Site 7)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/25/2005	242	168.479	
6/1/2005	242		
6/8/2005	146		
6/15/2005	126		
6/22/2005	126		
7/12/2005	366		
7/20/2005	62		
7/27/2005	34658		✓
8/10/2005	194	195.745	
8/17/2005	718	142.739	
8/24/2005	148	104.08	
9/2/2005	170	114.837	
9/7/2005	82		
9/14/2005	40		
9/21/2005	148	84.4601	
9/28/2005	242	47.5893	
10/10/2005	150	34.3754	
10/17/2005	20		
10/19/2005	40		
10/24/2005	20		
10/27/2005	20		

Table 8.58 Clarks River RM 64.7 to 66.8 Data (Site CR07)

Sampling Date	Instantaneous *E. coli* colonies/100 mL
10/25/2006	63

Table 8.59 TMDL Calculations for Clarks River RM 64.7 to 66.8

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			1.09E+14	6.58E+11	Existing Load
			7.53E+11	**4.08E+11**	**Total TMDL**
			7.53E+10	**4.08E+10**	**MOS**
			6.78E+11	3.67E+11	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	99.4%	44.2%	% reduction
KY0028371	South 641 Water District	0.046	**2.73E+08**	**1.48E+08**	**SWS WLA**
KY0040720	Southwest Calloway Elem School	0.012	**7.27E+07**	**3.94E+07**	**SWS WLA**
KY0040738	East Calloway Elem School	0.012	**7.27E+07**	**3.94E+07**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.071	**4.18E+08**	**2.26E+08**	**Total SWS WLA**
			6.77E+11	3.67E+11	remainder
KYG200011 and KYS000003	Murray MS4 and KTC MS4	N/A[4]	**1.83E+10**	**9.93E+09**	**MS4 WLA**
			6.77E+09	**3.67E+09**	**Future Growth WLA**[2]
			6.52E+11	**3.53E+11**	**LA**[3]

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
[3]The LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml.
[4]N/A indicates that the MS4 does not have a design capacity.

8.2.12 Clayton Creek 3.3 to 7.7

Clayton Creek at RM 3.3 is a second order stream in the southeast part of the Clarks River watershed in Calloway County (Figure 8.12). Information about Clayton Creek RM 3.3 to 7.7, including its WBID and MAF is shown in Table 8.60. Site information is presented in Table 8.61. The subwatershed for the impaired segment has a total drainage area of approximately 6.5 square miles. The landcover in this subwatershed is predominantly agriculture (71.9%, mostly row crop) followed by mixed forest (22%) while urban/suburban development represents about 5.8% of the land cover (Table 8.62).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 11 are presented in Table 8.63 and the TMDL allocations in Table 8.64.

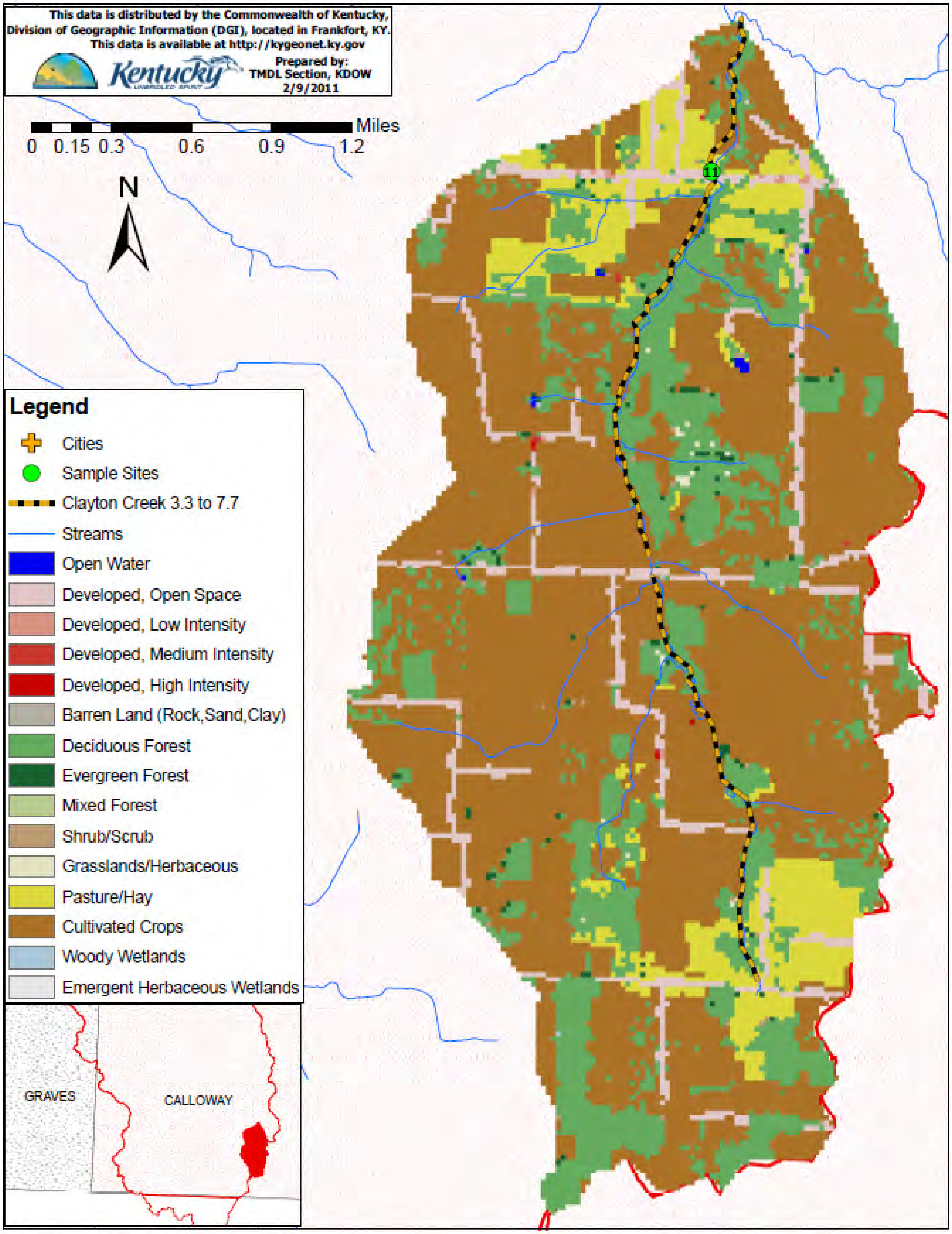

Figure 8.12 Clayton Creek RM 3.3 to 7.7 Subwatershed

Table 8.60 Clayton Creek RM 3.3 to 7.7 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Clayton Creek of Clarks River	Clayton Creek RM 3.3 to 7.7	KY489601_02	Calloway	4152	6.5	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
9.0	3.3	0.000	9.0			

Table 8.61 Clayton Creek RM 3.3 to 7.7 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
11	11	4.1	36.580647	-88.253117
CR11	11	4.1	36.580647	-88.253117

Note: No data from CR11 passed the data validation process

Table 8.62 Clayton Creek RM 3.3 to 7.7 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	5.80	240.75	0.38	1
Agriculture (total)	71.93	2986.23	4.67	
Pasture	8.61	357.34	0.56	
Row Crop	63.32	2628.89	4.11	
Forest	22.04	915.16	1.43	
Natural Grassland	0.13	5.34	0.01	
Water	0.08	3.34	0.01	
Wetland	0.02	0.67	0.00	
Barren	0.01	0.22	0.00	
Total	100.00	4151.71	6.49	

Table 8.63 Clayton Creek RM 3.3 to 7.7 Data (Site 11)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
6/15/2005	288	
7/20/2005	170	
8/31/2005	238	
5/4/2006	4978	
5/10/2006	3870	
5/31/2006	8704	
6/19/2006	2708	
7/5/2006	17328	✓
7/13/2006	576	
9/25/2006	268	

Table 8.64 TMDL Calculations for Clayton Creek RM 3.3 to 7.7

Instantaneous *E. coli* (colonies/day)	
3.82E+12	Existing Load
5.28E+10	**Total TMDL**
5.28E+09	**MOS**
4.76E+10	TMDL Target
98.8%	% reduction
4.76E+10	remainder
4.76E+08	**Future Growth WLA**[1]
4.71E+10	**LA**

Notes: [1]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.13 Clayton Creek Relict Channel RM 0.0 to 1.2

Clayton Creek Relict Channel at RM 0.0 is a third order stream in the southeast part of the Clarks River watershed in Calloway County (Figure 8.13). Information about Clayton Creek Relict Channel RM 0.0 to 1.2, including its WBID and MAF is shown in Table 8.65. Site information is presented in Table 8.66. The subwatershed for the impaired segment has a total drainage area of approximately 4.8 square miles. The landcover in this subwatershed is predominantly agriculture (67.3%, mostly row crop) followed by mixed forest (21.6%) while urban/suburban development represents about 10.6% of the land cover (Table 8.67).

There are two KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 10 are presented in Table 8.68 and the TMDL allocations in Table 8.69.

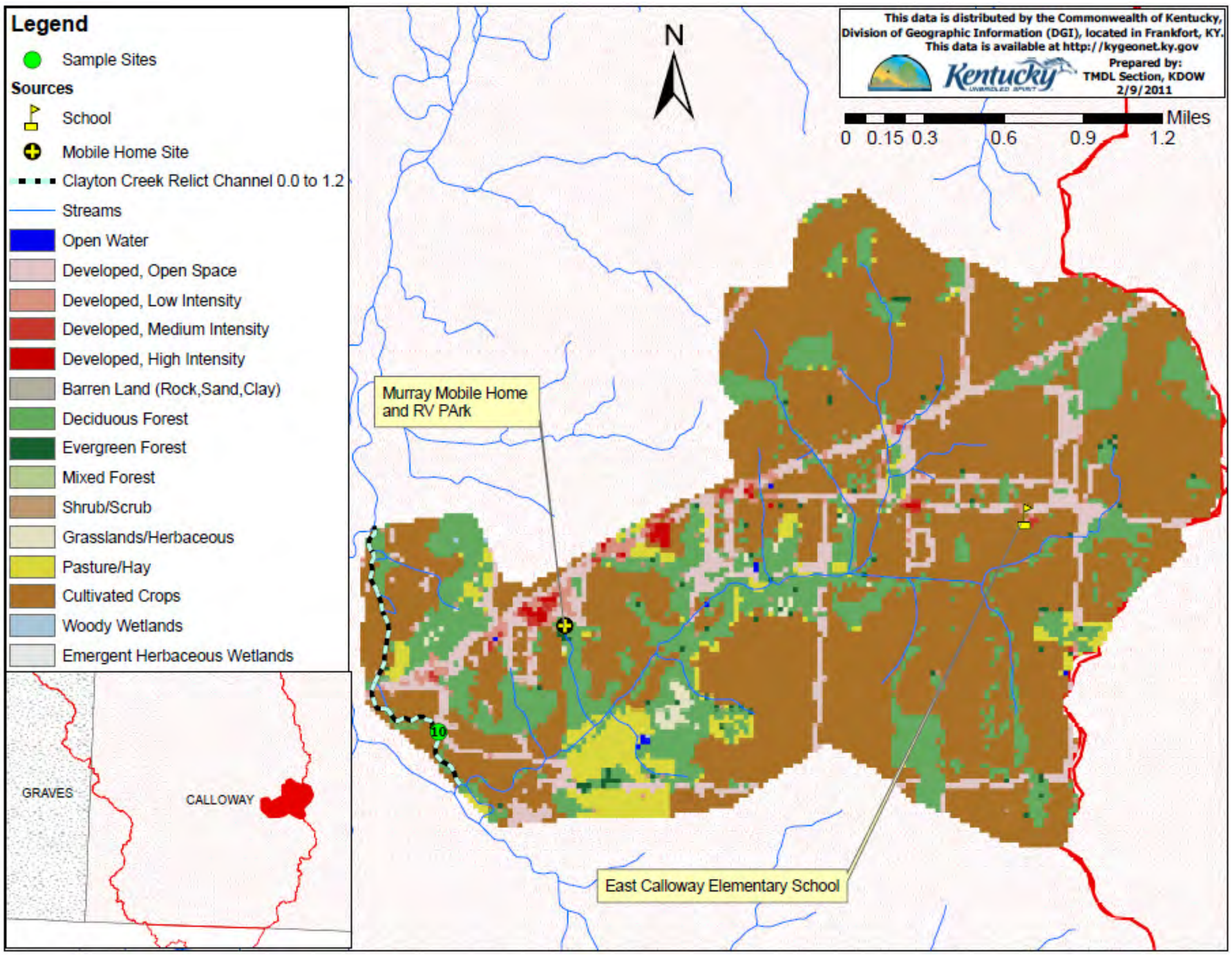

Figure 8.13 Clayton Creek Relict Channel RM 0.0 to 1.2 Subwatershed

Table 8.65 Clayton Creek Relict Channel RM 0.0 to 1.2 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Clayton Creek Relict Channel to Clarks River	Clayton Creek Relict Channel RM 0.0 to 1.2	KY489552-63.7_01	Calloway	3038	4.7	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
6.50	0	0.023	6.52			

Table 8.66 Clayton Creek Relict Channel RM 0.0 to 1.2 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
10	10	1.1	36.610650	-88.280867

Table 8.67 Clayton Creek Relict Channel RM 0.0 to 1.2 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	10.58	321.31	0.50	2
Agriculture (total)	67.26	2043.52	3.19	
Pasture	4.23	128.44	0.20	
Row Crop	63.03	1915.09	2.99	
Forest	21.55	654.75	1.02	
Natural Grassland	0.51	15.49	0.02	
Water	0.074	2.245	0.004	
Wetland	0.02	0.67	0.00	
Barren	0.01	0.22	0.00	
Total	100.00	3038.23	4.75	

Table 8.68 Clayton Creek Relict Channel RM 0.0 to 1.2 Data (Site 10)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/18/2005	20	76.8	
5/25/2005	20	76.8	
6/1/2005	242		
6/8/2005	82		
6/15/2005	336		
6/22/2005	20		
7/12/2005	62		
7/20/2005	20		
7/27/2005	104		
8/17/2005	3058		✓
8/24/2005	82		
8/31/2005	456		
9/21/2005	20		
9/28/2005	126		
10/12/2005	62		
10/19/2005	268		
10/26/2005	40		

Table 8.69 TMDL Calculations for Clayton Creek Relict Channel RM 0.0 to 1.2

			Instantaneous *E. coli* (colonies/day)	
			4.88E+11	Existing Load
			3.83E+10	**Total TMDL**
			3.83E+09	**MOS**
			3.45E+10	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	92.9%	% reduction
KY0086703	Murray Mobile Home & RV Park	0.011	**6.36E+07**	**SWS WLA**
KY0040738	East Calloway Elem School	0.012	**7.27E+07**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.023	**1.36E+08**	**Total SWS WLA**
			3.43E+10	remainder
			6.87E+08	**Future Growth WLA(1)**
			3.36E+10	**LA**

Notes: (1)Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.14 Damon Creek RM 0.0 to 1.8

Damon Creek at RM 0.0 is a first order stream in the middle part of the Clarks River watershed in Calloway County (Figure 8.14). Information about Damon Creek RM 0.0 to 1.8, including its WBID and MAF is shown in Table 8.70. Site information is presented in Table 8.71. The subwatershed for the impaired segment has a total drainage area of approximately 5.7 square miles. The landcover in this subwatershed is predominantly agriculture (62.4%, mostly row crop) followed by mixed forest (30.8%) while urban/suburban development represents about 4.5% of the land cover (Table 8.72).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from sites 25 and 26 are presented in Tables 8.73 and 8.74 and the TMDL allocations in Table 8.75.

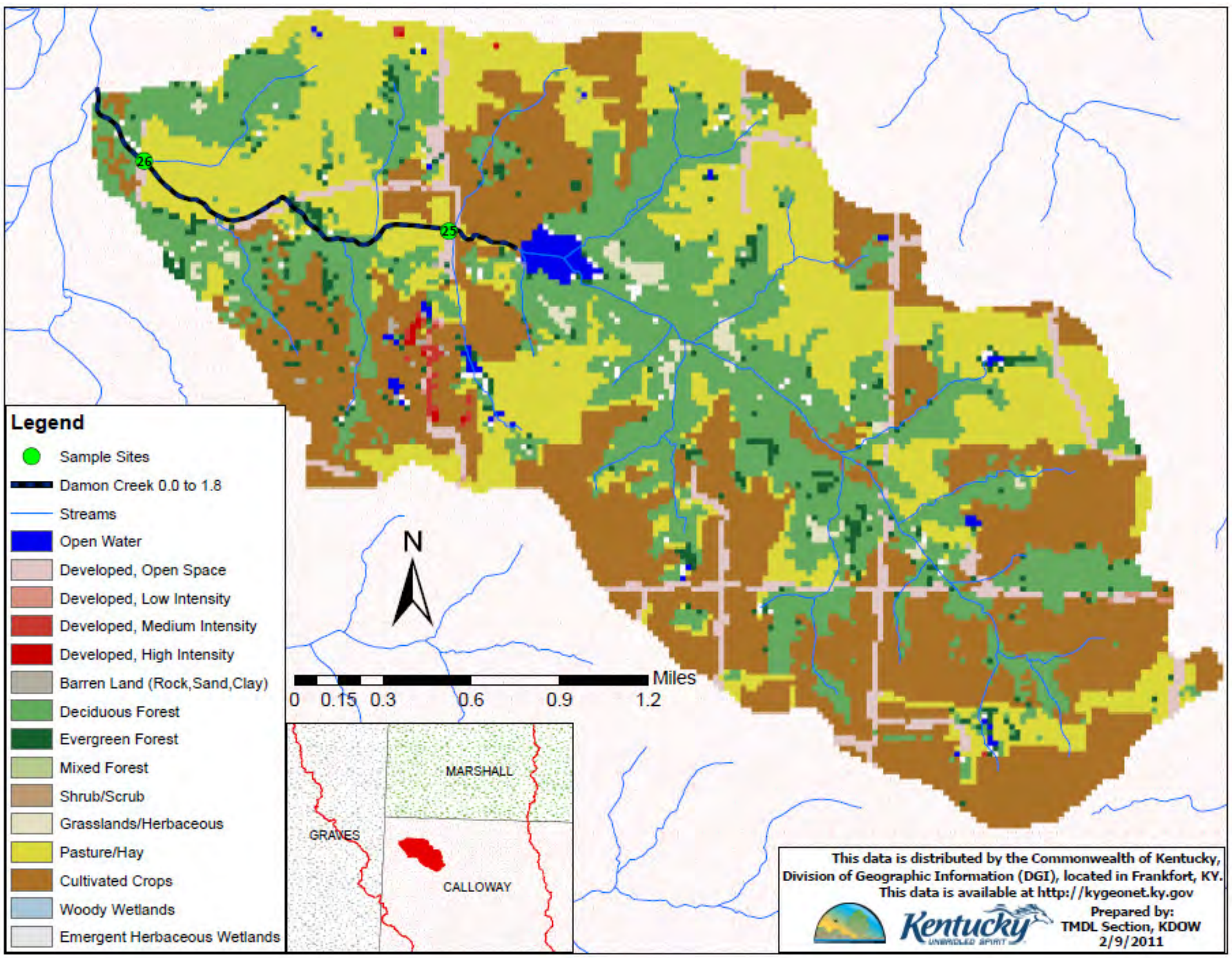

Figure 8.14 Damon Creek RM 0.0 to 1.8 Subwatershed

Table 8.70 Damon Creek RM 0.0 to 1.8 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Damon Creek of West Fork Clarks River	Damon Creek RM 0.0 to 1.8	KY490545_01	Calloway	3613	5.6	1st
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
7.5	0	0.000	7.5			

Table 8.71 Damon Creek RM 0.0 to 1.8 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
25	25	1.5	36.715600	-88.440341
26	26	0.3	36.718616	-88.459096

Table 8.72 Damon Creek RM 0.0 to 1.8 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	4.45	160.84	0.25	0.5
Agriculture (total)	62.44	2255.78	3.52	
Pasture	27.59	996.86	1.56	
Row Crop	34.85	1258.92	1.97	
Forest	30.84	1114.10	1.74	
Natural Grassland	1.06	38.26	0.06	
Water	0.88	31.81	0.05	
Wetland	0.21	7.56	0.01	
Barren	0.12	4.45	0.01	
Total	100.00	3612.80	5.65	

Table 8.73 Damon Creek RM 0.0 to 1.8 Data (Site 25)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/12/2005	456		
5/16/2005	62		
5/23/2005	216		
6/6/2005	40		
6/13/2005	682	410.0	
6/20/2005	482	645.6	
6/27/2005	104	792.8	
7/7/2005	3340		
7/11/2005	1040		
7/18/2005	610		
7/25/2005	2338		
8/8/2005	1300		
8/15/2005	2518		
8/22/2005	2038		
8/29/2005	1508		
9/12/2005	3232		
9/19/2005	2306		
9/26/2005	170		

Table 8.74 Damon Creek RM 0.0 to 1.8 Data (Site 26)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/12/2005	2628		
5/16/2005	12262		✓
5/23/2005	1374		
6/6/2005	1434		
6/13/2005	1446	1312.8	✓
6/20/2005	1204	1297.9	
6/27/2005	1476	1176.9	
7/7/2005	746		
7/11/2005	2034		
7/18/2005	1366		
7/25/2005	738		
8/8/2005	1428		
8/15/2005	1008		
8/22/2005	398		
8/29/2011	914		
9/12/2005	506		
9/19/2005	844		
9/26/2005	1416		

Table 8.75 TMDL Calculations for Damon Creek RM 0.0 to 1.8

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
2.25E+12	2.41E+11	Existing Load
4.40E+10	**2.39E+10**	**Total TMDL**
4.40E+09	**2.39E+09**	**MOS**
3.96E+10	2.15E+10	TMDL Target
98.2%	91.1%	% reduction
3.96E+10	2.15E+10	remainder
1.98E+08	**1.07E+08**	**Future Growth WLA[2]**
3.94E+10	**2.14E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.15 Duncan Creek RM 0.0 to 2.5

Duncan Creek at RM 0.0 is a second order stream in the middle part of the Clarks River watershed in Marshall County (Figure 8.15). Information about Duncan Creek RM 0.0 to 2.5, including its WBID and MAF is shown in Table 8.76. Site information is presented in Table 8.77. The subwatershed for the impaired segment has a total drainage area of approximately 11.3 square miles. The landcover in this subwatershed is predominantly agriculture (56.8%, mostly row crop) followed by mixed forest (37.2%) while urban/suburban development represents about 3.7% of the land cover (Table 8.78).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 28 are presented in Table 8.79 and the TMDL allocations in Table 8.80.

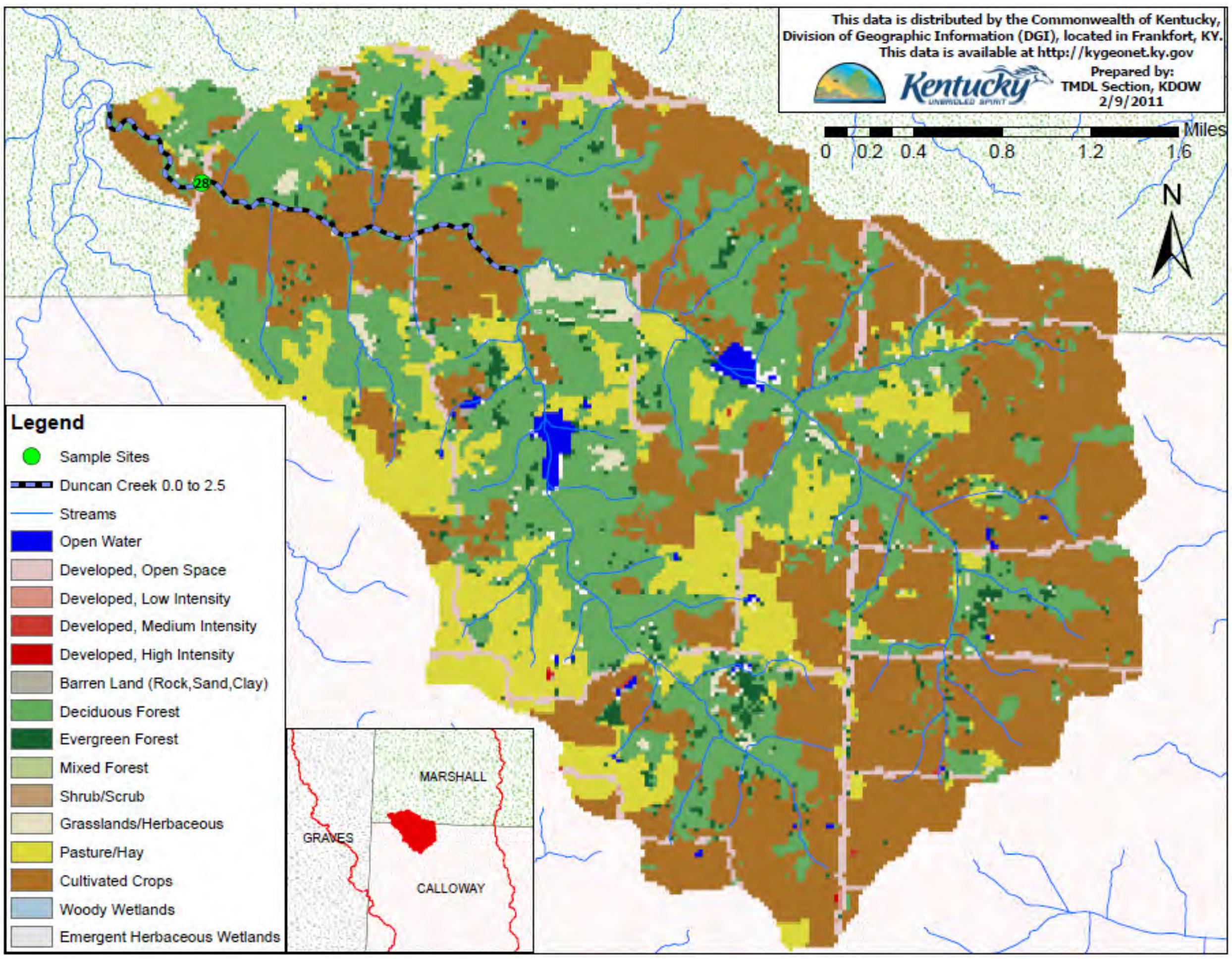

Figure 8.15 Duncan Creek RM 0.0 to 2.5 Subwatershed

Table 8.76 Duncan Creek RM 0.0 to 2.5 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Duncan Creek of West Fork Clarks River	Duncan Creek RM 0.0 to 2.5	KY491300_00	Marshall	7259	11.3	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
15.2	0	0.000	15.2			

Table 8.77 Duncan Creek RM 0.0 to 2.5 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
28	28	0.8	36.758170	-88.448791

Table 8.78 Duncan Creek RM 0.0 to 2.5 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.70	268.28	0.42	0.5
Agriculture (total)	56.78	4121.46	6.44	
Pasture	13.97	1014.40	1.59	
Row Crop	42.80	3107.06	4.85	
Forest	37.20	2700.63	4.22	
Natural Grassland	1.37	99.66	0.16	
Water	0.73	53.17	0.08	
Wetland	0.16	11.79	0.02	
Barren	0.06	4.23	0.01	
Total	100.00	7259.22	11.34	

Table 8.79 Duncan Creek RM 0.0 to 2.5 Data (Site 28)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/12/2005	82		
5/16/2005	62		
5/23/2005	82		
6/6/2005	148		
6/13/2005	3912	308.5	✓✓
6/20/2005	196	134.7	
6/27/2005	312	127.3	
7/7/2005	40		
7/11/2005	292		
7/18/2005	62		
7/25/2005	148		
8/8/2005	426		
8/15/2005	654		
8/22/2005	350		
8/29/2005	268		
9/12/2005	150		
9/19/2005	126		
9/26/2005	292		

Table 8.80 TMDL Calculations for Duncan Creek RM 0.0 to 2.5

Instantaneous(1) *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
1.45E+12	1.15E+11	Existing Load
8.93E+10	**4.83E+10**	**Total TMDL**
8.93E+09	**4.83E+09**	**MOS**
8.03E+10	4.35E+10	TMDL Target
94.5%	62.1%	% reduction
8.03E+10	4.35E+10	remainder
4.02E+08	**2.18E+08**	**Future Growth WLA(2)**
7.99E+10	**4.33E+10**	**LA**

Notes: (1)Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
(2)Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.16 East Fork Clarks River RM 0.0 to 2.7

East Fork Clarks River at RM 0.0 is a third order stream in the south part of the Clarks River watershed in Calloway County (Figure 8.16). Information about East Fork Clarks River RM 0.0 to 2.7, including its WBID and MAF is shown in Table 8.81. Site information is presented in Table 8.82. The subwatershed for the impaired segment has a total drainage area of approximately 39.4 square miles. The landcover in this subwatershed is predominantly agriculture (66.8%, mostly row crop) followed by mixed forest (25.6%) while urban/suburban development represents about 7.1% of the land cover (Table 8.83).

There is one KPDES permitted SWS discharge within the subwatershed boundary. Sampling data from site 50 are presented in Table 8.84 and the TMDL allocations in Table 8.85.

Portions of this subwatershed exist in TN. While there are no WLA sources in the TN portion of the watershed, the LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).

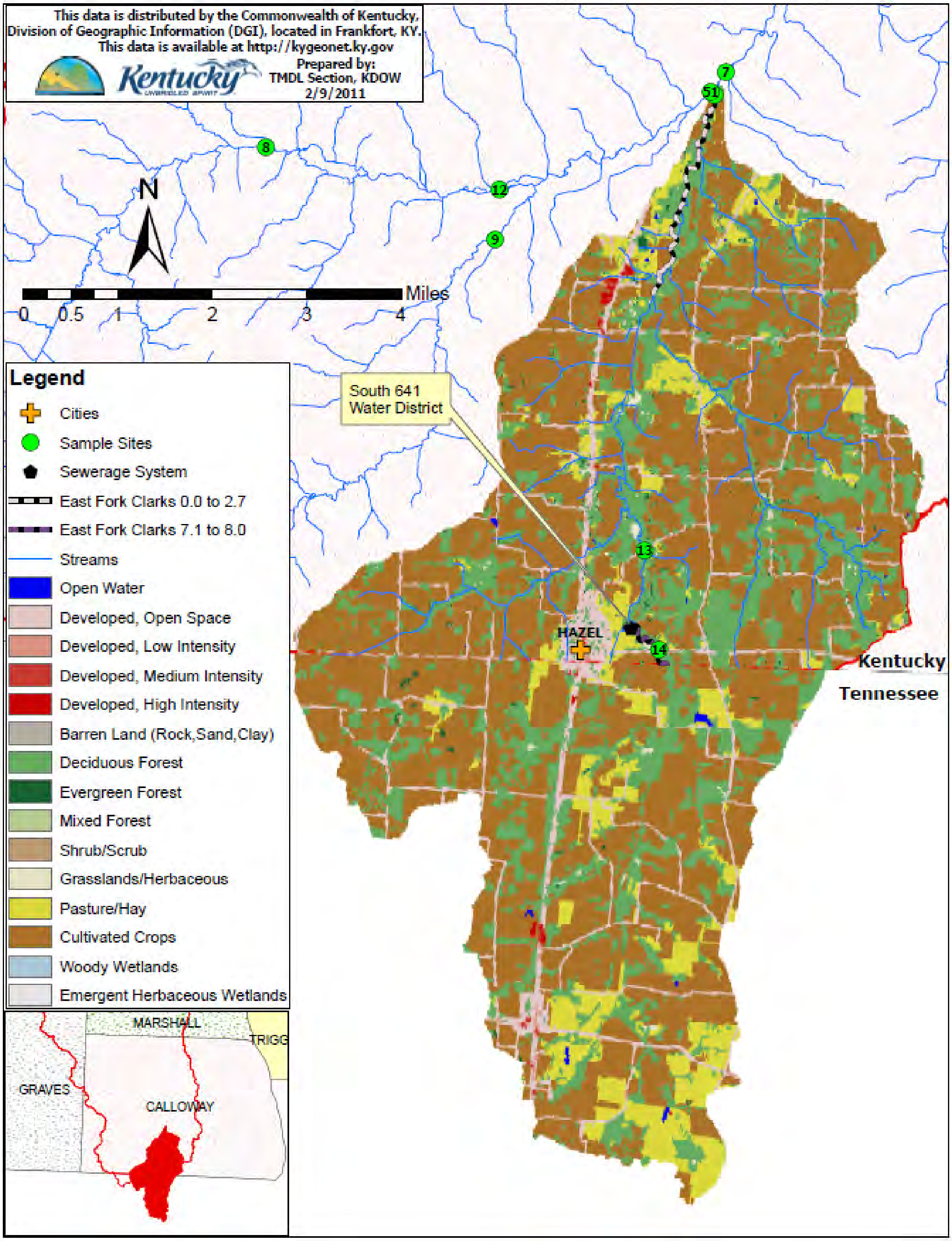

Figure 8.16 East Fork Clarks River RM 0.0 to 2.7 Subwatershed

Table 8.81 East Fork Clarks River RM 0.0 to 2.7 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
East Fork Clarks River of Clarks River	East Fork Clarks River RM 0.0 to 2.7	KY491450_01	Calloway	25,219	39.4	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
56	0	0.046	56.0			

Table 8.82 East Fork Clarks River RM 0.0 to 2.7 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
50	50	0.1	36.588050	-88.303250

Table 8.83 East Fork Clarks River RM 0.0 to 2.7 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	7.13	1798.40	2.81	1
Agriculture (total)	66.80	16845.46	26.32	
Pasture	9.26	2334.12	3.65	
Row Crop	57.54	14511.35	22.67	
Forest	25.63	6464.62	10.10	
Natural Grassland	0.29	72.47	0.11	
Water	0.14	36.46	0.06	
Wetland	0.01	1.34	0.00	
Barren	0.00	0.45	0.00	
Total	100.00	25219.21	39.40	

Table 8.84 East Fork Clarks River RM 0.0 to 2.7 Data (Site 50)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
08/24/05	104	159.1	
09/02/05	196	165.3	
09/07/05	126		
09/14/05	148		
09/21/05	268	179.7	✓
09/28/05	126	132.6	
10/10/05	126	133.9	
10/17/05	126		
10/19/05	350		✓
10/24/05	194		
10/27/05	40		

Table 8.85 TMDL Calculations for East Fork Clarks River RM 0.0 to 2.7

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			4.80E+11	2.46E+11	Existing Load
			3.29E+11	**1.78E+11**	**Total TMDL**
			3.29E+10	**1.78E+10**	**MOS**
			2.96E+11	1.60E+11	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	**38.3%**	34.9%	% reduction
KY0028371	South 641 Water District	0.046	**2.73E+08**	**1.48E+08**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.046	2.96E+11	1.60E+11	remainder
			2.96E+09	**1.60E+09**	**Future Growth WLA[2]**
			2.93E+11	**1.59E+11**	**LA[3]**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
[3]The LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml.

8.2.17 East Fork Clarks River RM 7.1 to 8.0

East Fork Clarks River at RM 7.1 is a second order stream in the south part of the Clarks River watershed in Calloway County (Figure 8.17). Information about East Fork Clarks River RM 7.1 to 8.0, including its WBID and MAF is shown in Table 8.86. Site information is presented in Table 8.87. The subwatershed for the impaired segment has a total drainage area of approximately 12.8 square miles. The landcover in this subwatershed is predominantly agriculture (68.7%, mostly row crop) followed by mixed forest (23%) while urban/suburban development represents about 7.8% of the land cover (Table 8.88).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from sites 14 and CR14 are presented in Tables 8.89 and 8.90 and the TMDL allocations in Table 8.91.

Portions of this subwatershed exist in TN. While there are no WLA sources in the TN portion of the watershed, the LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).

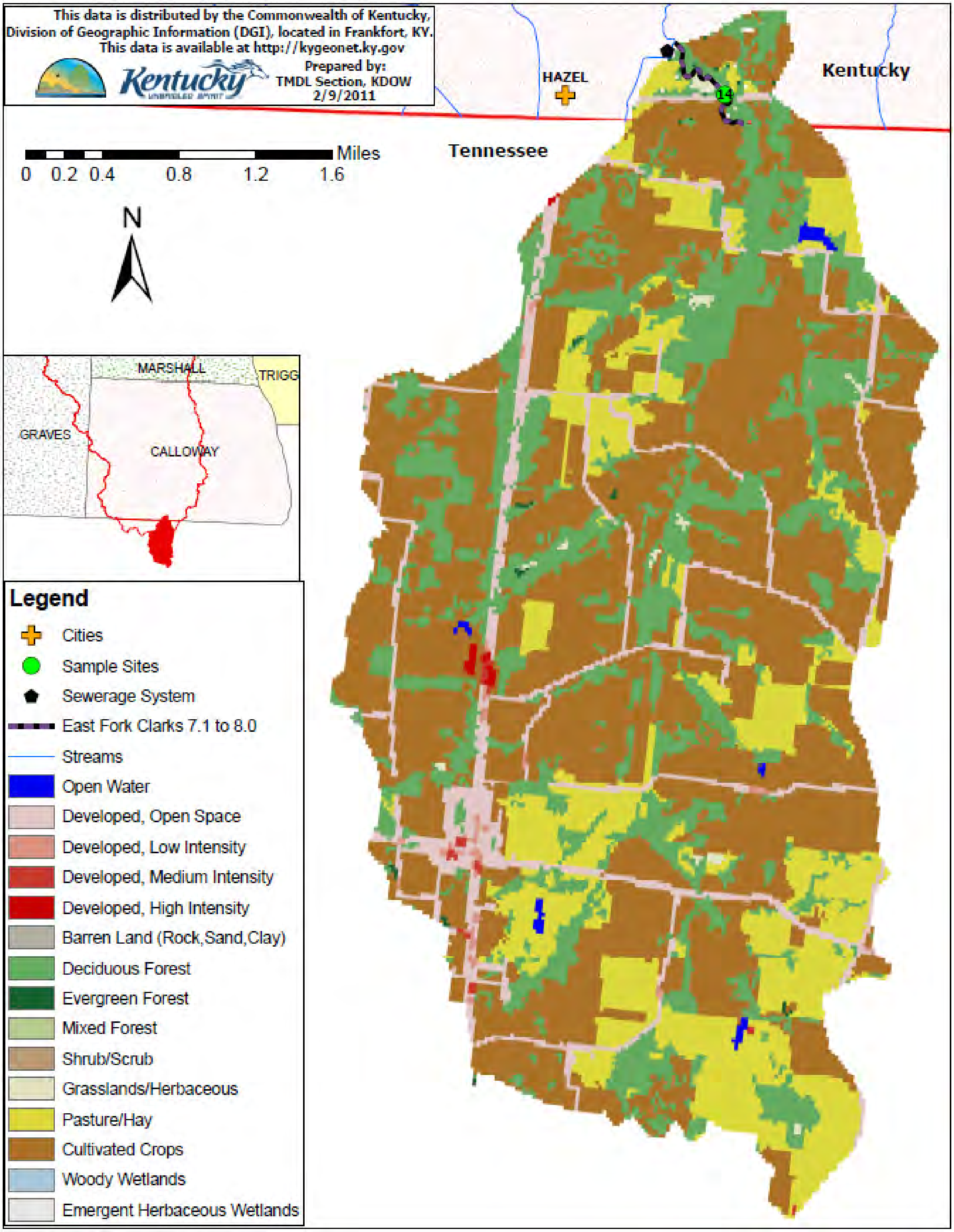

Figure 8.17 East Fork Clarks River RM 7.1 to 8.0 Subwatershed

Table 8.86 East Fork Clarks River RM 7.1 to 8.0 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
East Fork Clarks River of Clarks River	East Fork Clarks River RM 7.1 to 8.0	KY491450_03	Calloway	8212	12.8	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
18	7.1	0.000	18.0			

Table 8.87 East Fork Clarks River RM 7.1 to 8.0 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
14	14	7.7	36.502667	-88.310917
CR14	14	7.7	36.502667	-88.310917

Table 8.88 East Fork Clarks River RM 7.1 to 8.0 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	7.78	638.55	1.00	1
Agriculture (total)	68.71	5642.92	8.82	
Pasture	16.89	1387.14	2.17	
Row Crop	51.82	4255.78	6.65	
Forest	22.95	1884.93	2.95	
Natural Grassland	0.29	24.21	0.04	
Water	0.26	21.74	0.03	
Wetland	0.00	0.00	0.00	
Barren	0.00	0.00	0.00	
Total	100.00	8212.35	12.83	

Table 8.89 East Fork Clarks River RM 7.1 to 8.0 Data (Site 14)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
6/1/2005	220	
6/8/2005	370	
6/15/2005	148	
6/22/2005	126	
7/12/2005	728	
7/20/2005	492	
7/27/2005	168	
8/10/2005	1162	✓
8/17/2005	40	
8/24/2005	82	
8/31/2005	656	
9/21/2005	948	
9/28/2005	218	
10/12/2005	322	
10/19/2005	126	
10/26/2005	126	

Table 8.90 East Fork Clarks River RM 7.1 to 8.0 Data (Site CR14)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
10/25/2006	211	

Table 8.91 TMDL Calculations for East Fork Clarks River RM 7.1 to 8.0

Instantaneous *E. coli* (colonies/day)	
5.12E+11	Existing Load
1.06E+11	**Total TMDL**
1.06E+10	**MOS**
9.51E+10	TMDL Target
81.4%	% reduction
9.51E+10	remainder
9.51E+08	**Future Growth WLA**[1]
9.42E+10	**LA**[2]

Notes: [1]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
[2]The LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml.

8.2.18 Farley Branch RM 0.0 to 2.2

Farley Branch at RM 0.0 is a second order stream in the south part of the Clarks River watershed in Calloway County (Figure 8.18). Information about Farley Branch RM 0.0 to 2.2, including its WBID and MAF is shown in Table 8.92. Site information is presented in Table 8.93. The subwatershed for the impaired segment has a total drainage area of approximately 13.3 square miles. The landcover in this subwatershed is predominantly agriculture (71.2%, mostly row crop) followed by mixed forest (23.1%) while urban/suburban development represents about 5.5% of the land cover (Table 8.94).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 9 are presented in Tables 8.95 and the TMDL allocations in Table 8.96.

Portions of this subwatershed exist in TN. While there are no WLA sources in the TN portion of the watershed, the LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).

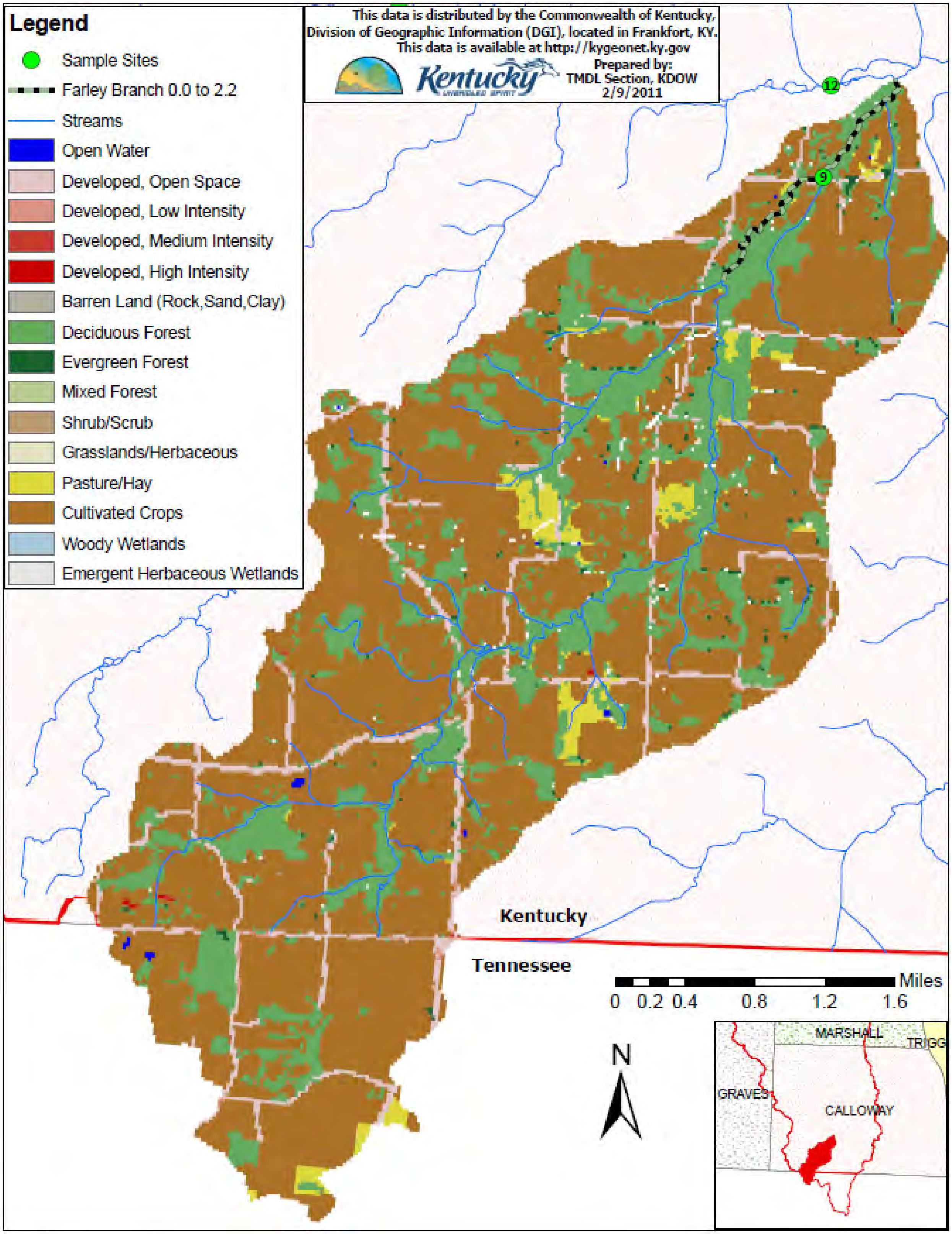

Figure 8.18 Farley Branch RM 0.0 to 2.2 Subwatershed

Table 8.92 Farley Branch RM 0.0 to 2.2 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Farley Branch of Middle Fork Clarks River	Farley Branch RM 0.0 to 2.2	KY494983_01	Calloway	8519	13.3	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
18.8	0	0.000	18.8			

Table 8.93 Farley Branch RM 0.0 to 2.2 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
9	9	0.8	36.564933	-88.344283
CR09	9	0.8	36.564933	-88.344283

Note: No data from site CR09 passed the data validation process.

Table 8.94 Farley Branch RM 0.0 to 2.2 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	5.48	467.08	0.73	1
Agriculture (total)	71.23	6068.25	9.48	
Pasture	2.25	191.53	0.30	
Row Crop	68.98	5876.72	9.18	
Forest	23.13	1970.73	3.08	
Natural Grassland	0.05	4.43	0.01	
Water	0.09	7.54	0.01	
Wetland	0.01	0.89	0.00	
Barren	0.01	0.44	0.00	
Total	100.00	8519.36	13.31	

Table 8.95 Farley Branch RM 0.0 to 2.2 Data (Site 9)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/18/2005	264	203.9	✓
5/25/2005	126	196.6	
6/1/2005	244		
6/8/2005	62		
6/15/2005	700		✓
6/22/2005	220		
7/20/2005	40		
7/27/2005	244		
8/31/2005	362		
9/28/2005	322		

Table 8.96 TMDL Calculations for Farley Branch RM 0.0 to 2.2

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
3.22E+11	9.38E+10	Existing Load
1.10E+11	**5.98E+10**	**Total TMDL**
1.10E+10	**5.98E+09**	**MOS**
9.94E+10	5.38E+10	TMDL Target
69.1%	42.6%	% reduction
9.94E+10	5.38E+10	remainder
9.94E+08	**5.38E+08**	**Future Growth WLA**[2]
9.84E+10	**5.33E+10**	**LA**[3]

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
[3]The LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml.

8.2.19 Haskell Branch RM 1.2 to 4.5

Haskell Branch at RM 1.2 is a second order stream in the middle west part of the Clarks River watershed in Graves County (Figure 8.19). Information about Haskell Branch RM 1.2 to 4.5, including its WBID and MAF is shown in Table 8.97. Site information is presented in Table 8.98. The subwatershed for the impaired segment has a total drainage area of approximately 2.9 square miles. The landcover in this subwatershed is predominantly agriculture (62.7%, mostly row crop) followed by mixed forest (32.3%) while urban/suburban development represents about 3.9% of the land cover (Table 8.99).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 38 are presented in Tables 8.100 and the TMDL allocations in Table 8.101.

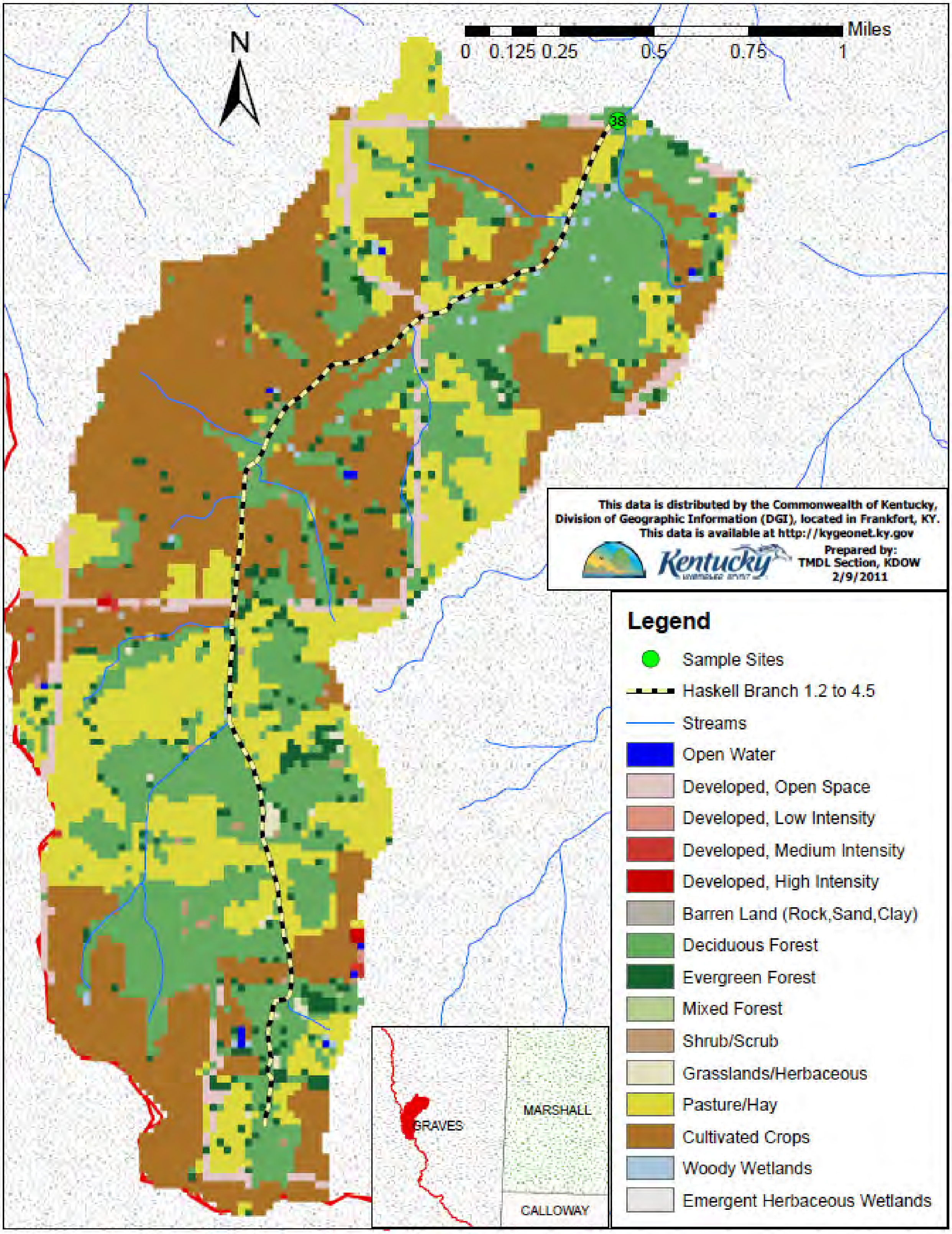

Figure 8.19 Haskell Branch RM 1.2 to 4.5 Subwatershed

Table 8.97 Haskell Branch RM 1.2 to 4.5 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Haskell Branch of Spring Creek	Haskell Branch RM 1.2 to 4.5	KY493854_01	Graves	1860	2.9	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
3.7	1.2	0.000	3.7			

Table 8.98 Haskell Branch RM 1.2 to 4.5 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
38	38	1.2	36.843900	-88.585800

Table 8.99 Haskell Branch RM 1.2 to 4.5 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.93	73.19	0.11	0.5
Agriculture (total)	62.67	1165.91	1.82	
Pasture	23.88	444.25	0.69	
Row Crop	38.79	721.66	1.13	
Forest	32.25	599.97	0.94	
Natural Grassland	0.42	7.79	0.01	
Water	0.16	2.89	0.00	
Wetland	0.54	10.01	0.02	
Barren	0.04	0.67	0.00	
Total	100.00	1860.43	2.91	

Table 8.100 Haskell Branch RM 1.2 to 4.5 Data (Site 38)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/26/2005	20	
6/16/2005	268	
6/23/2006	350	✓

Table 8.101 TMDL Calculations for Haskell Branch RM 1.2 to 4.5

Instantaneous *E. coli* (colonies/day)	
3.17E+10	Existing Load
2.17E+10	**Total TMDL**
2.17E+09	**MOS**
1.96E+10	TMDL Target
38.3%	% reduction
1.96E+10	remainder
9.78E+07	**Future Growth WLA**(1)
1.95E+10	**LA**

Notes: (1)Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.20 Middle Fork Creek RM 0.2 to 6.0

Middle Fork Creek at RM 0.2 is a third order stream in the middle part of the Clarks River watershed in Marshall County (Figure 8.20). Information about Middle Fork Creek RM 0.2 to 6.0, including its WBID and MAF is shown in Table 8.102. Site information is presented in Table 8.103. The subwatershed for the impaired segment has a total drainage area of approximately 22.9 square miles. The landcover in this subwatershed is predominantly agriculture (53.4%, mostly row crop) followed by mixed forest (36.9%) while urban/suburban development represents about 5.5% of the land cover (Table 8.104).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from sites 18 and 19 are presented in Tables 8.105 and 8.106 and the TMDL allocations in Table 8.107.

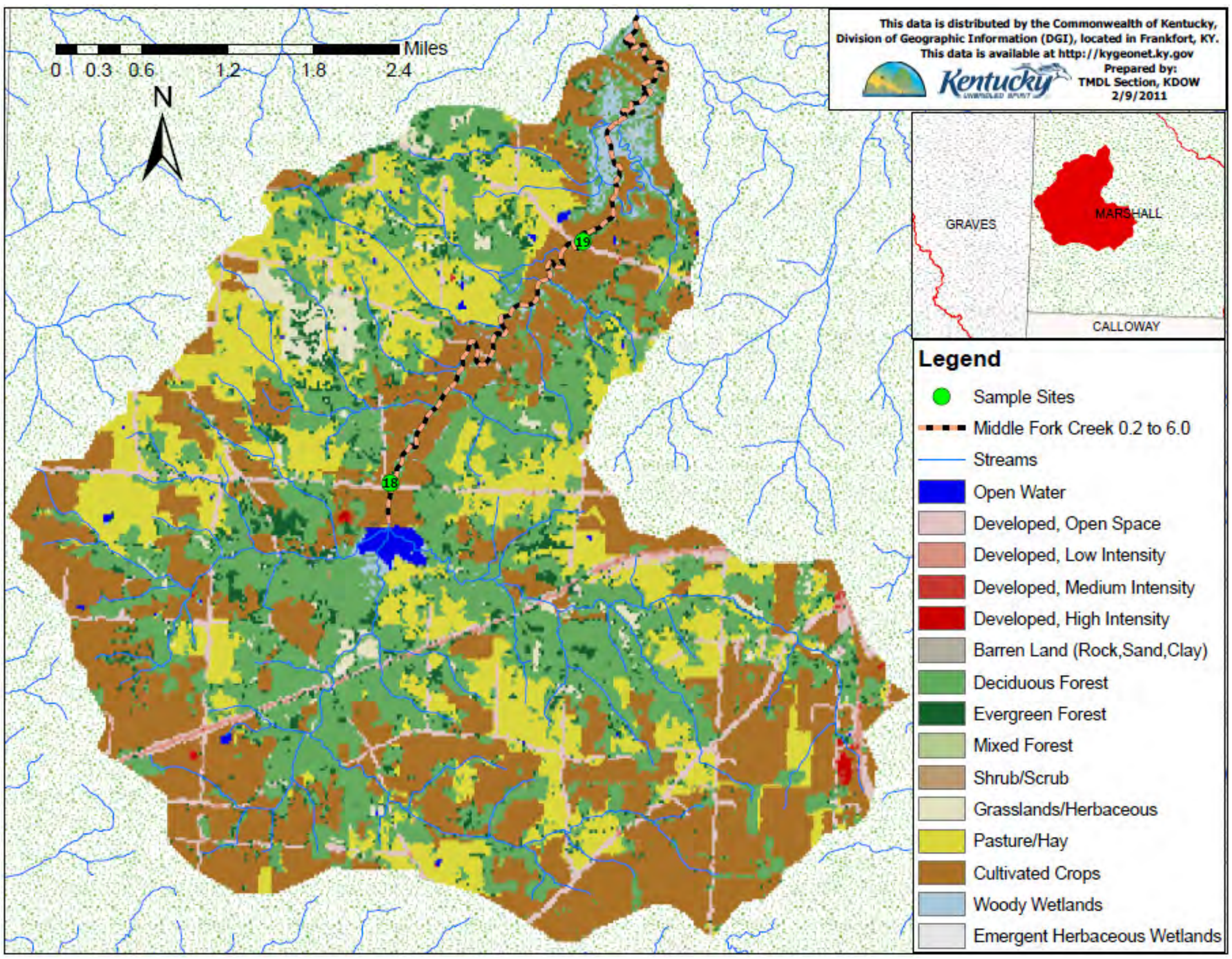

Figure 8.20 Middle Fork Creek RM 0.2 to 6.0 Subwatershed

Table 8.102 Middle Fork Creek RM 0.2 to 6.0 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Middle Fork Creek of Clarks River	Middle Fork Creek RM 0.2 to 6.0	KY498118_00	Marshall	14,643	22.9	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
29.2	0.2	0.000	29.2			

Table 8.103 Middle Fork Creek RM 0.2 to 6.0 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
18	18	5.7	36.852800	-88.434800
19	19	2.75	36.877800	-88.411400

Table 8.104 Middle Fork Creek RM 0.2 to 6.0 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	5.45	798.22	1.25	1
Agriculture (total)	53.35	7811.79	12.21	
Pasture	19.88	2911.01	4.55	
Row Crop	33.47	4900.78	7.66	
Forest	36.86	5397.11	8.43	
Natural Grassland	2.26	331.26	0.52	
Water	0.54	79.64	0.12	
Wetland	1.52	223.14	0.35	
Barren	0.01	1.56	0.00	
Total	100.00	14642.72	22.88	

Table 8.105 Middle Fork Creek RM 0.2 to 6.0 Data (Site 18)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
05/17/05	104.0	167.4	✓
05/24/05	104.0	120.4	
05/31/05	194		
06/07/05	150		
06/14/05	418		
06/21/05	20		
07/14/05	60		
07/19/05	172		
07/26/05	20		
08/23/05	62		
08/30/05	4718		
09/27/05	170		

Table 8.106 Middle Fork Creek RM 0.2 to 6.0 Data (Site 19)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/17/2005	126	117.1	
5/24/2005	40	93.1	
5/31/2005	82		
6/7/2005	104		
6/14/2005	512		
6/21/2005	40		
7/14/2005	170		
7/19/2005	9768		✓
7/26/2005	20		
8/30/2005	5818		
9/27/2005	456		

Table 8.107 TMDL Calculations for Middle Fork Creek RM 0.2 to 6.0

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
6.98E+12	1.20E+11	Existing Load
1.71E+11	**9.29E+10**	**Total TMDL**
1.71E+10	**9.29E+09**	**MOS**
1.54E+11	8.36E+10	TMDL Target
97.8%	30.1%	% reduction
1.54E+11	8.36E+10	remainder
1.54E+09	**8.36E+08**	**Future Growth WLA[2]**
1.53E+11	**8.27E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.21 Middle Fork Clarks River RM 2.7 to 4.8

Middle Fork Clarks River at RM 2.7 is a third order stream in the southwest part of the Clarks River watershed in Calloway County (Figure 8.21). Information about Middle Fork Clarks River RM 2.7 to 4.8, including its WBID and MAF is shown in Table 8.108. Site information is presented in Table 8.109. The subwatershed for the impaired segment has a total drainage area of approximately 29.2 square miles. The landcover in this subwatershed is predominantly agriculture (69.8%, mostly row crop) followed by mixed forest (23.7%) while urban/suburban development represents about 6.2% of the land cover (Table 8.110).

There is one KPDES permitted SWS discharge within the subwatershed boundary. Sampling data from site 12 are presented in Table 8.111 and the TMDL allocations in Table 8.112.

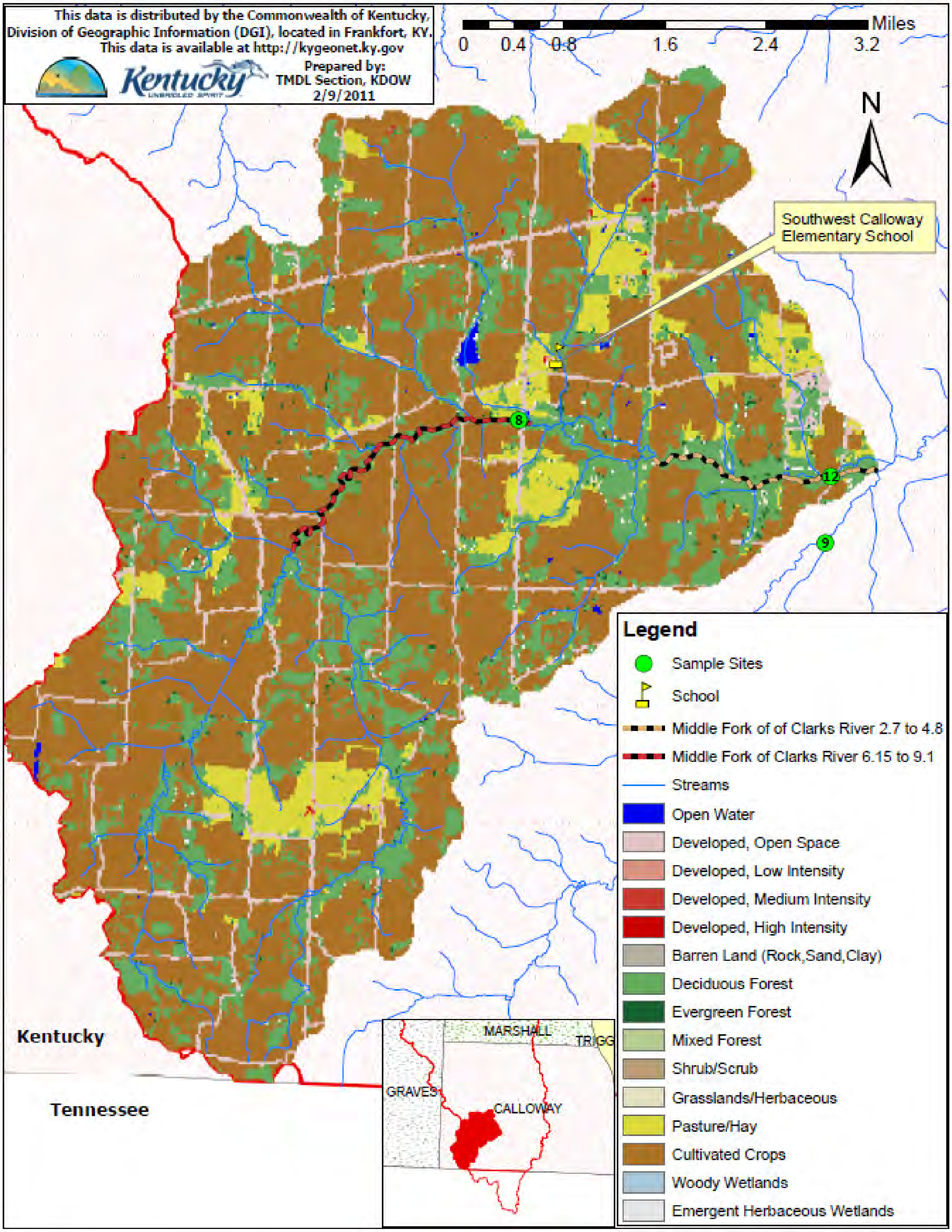

Figure 8.21 Middle Fork Clarks River RM 2.7 to 4.8 Subwatershed

Table 8.108 Middle Fork Clarks River RM 2.7 to 4.8 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Middle Fork Clarks River of Clarks River	Middle Fork Clarks River RM 2.7 to 4.8	KY498115_02	Calloway	18663	29.2	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
40.8	2.7	0.012	40.8			

Table 8.109 Middle Fork Clarks River RM 2.7 to 4.8 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
12	12	3.0	36.572600	-88.343750

Table 8.110 Middle Fork Clarks River RM 2.7 to 4.8 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	6.16	1148.95	1.80	1
Agriculture (total)	69.80	13027.57	20.36	
Pasture	7.47	1393.61	2.18	
Row Crop	62.34	11633.96	18.18	
Forest	23.69	4421.70	6.91	
Natural Grassland	0.10	18.92	0.03	
Water	0.21	40.07	0.06	
Wetland	0.03	5.12	0.01	
Barren	0.00	0.89	0.00	
Total	100.00	18663.22	29.16	

Table 8.111 Middle Fork Clarks River RM 2.7 to 4.8 Data (Site 12)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/18/2005	104	142.6	✓
5/25/2005	126	117.8	
6/1/2005	148		
6/8/2005	104		
6/15/2005	292		
6/22/2005	40		
7/12/2005	844		✓
7/20/2005	172		
7/27/2005	220		
8/10/2005	62		
8/17/2005	710		
8/24/2005	544		
8/31/2005	172		
9/21/2005	316		
9/28/2005	290		
10/12/2005	168		
10/19/2005	40		
10/26/2005	20		

Table 8.112 TMDL Calculations for Middle Fork Clarks River RM 2.7 to 4.8

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			8.43E+11	1.42E+11	Existing Load
			2.40E+11	**1.30E+11**	**Total TMDL**
			2.40E+10	**1.30E+10**	**MOS**
			2.16E+11	1.17E+11	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	74.4%	17.9%	% reduction
KY0040720	Southwest Calloway Elementary School	0.012	**7.27E+07**	**3.94E+07**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.012	2.16E+11	1.17E+11	remainder
			2.16E+09	**1.17E+09**	**Future Growth WLA[2]**
			2.13E+11	**1.16E+11**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.22 Middle Fork Clarks River RM 6.15 to 9.1

Middle Fork Clarks River at RM 6.15 is a second order stream in the southwest part of the Clarks River watershed in Calloway County (Figure 8.22). Information about Middle Fork Clarks River RM 6.15 to 9.1, including its WBID and MAF is shown in Table 8.113. Site information is presented in Table 8.114. The subwatershed for the impaired segment has a total drainage area of approximately 19.9 square miles. The landcover in this subwatershed is predominantly agriculture (71.3%, mostly row crop) followed by mixed forest (22.2%) while urban/suburban development represents about 6.2% of the land cover (Table 8.115).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 8 are presented in Table 8.116 and the TMDL allocations in Table 8.117.

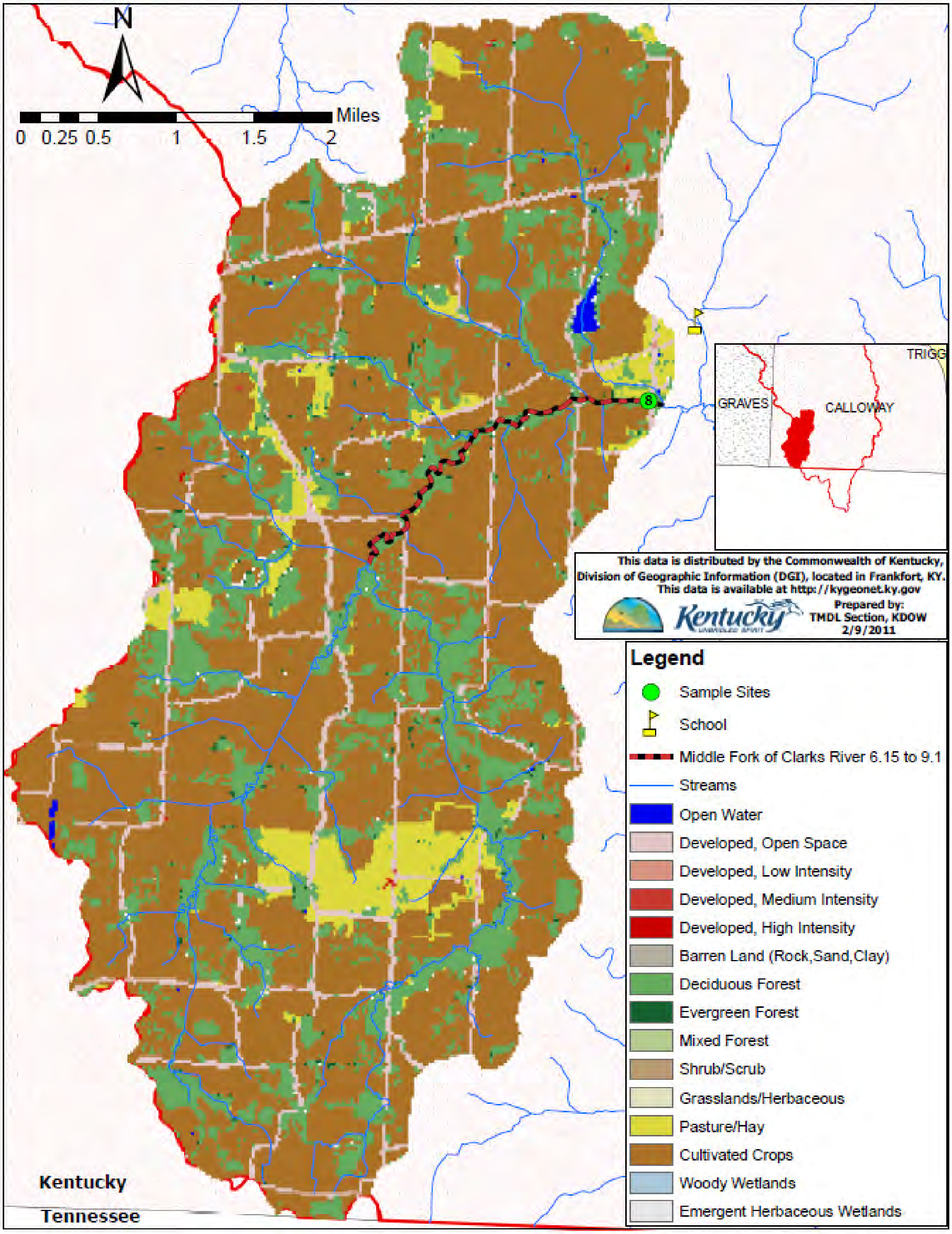

Figure 8.22 Middle Fork Clarks River RM 6.15 to 9.1 Subwatershed

Table 8.113 Middle Fork Clarks River RM 6.15 to 9.1 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Middle Fork Clarks River of Clarks River	Middle Fork Clarks River RM 6.15 to 9.1	KY498115_03	Calloway	12,722	19.9	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
24.0	6.15	0	24.0			

Table 8.114 Middle Fork Clarks River RM 6.15 to 9.1 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
8	8	6.2	36.578117	-88.388450
CR08	8	6.2	36.578117	-88.388450

Note: No data from Site CR08 passed the data validation process.

Table 8.115 Middle Fork Clarks River RM 6.15 to 9.1 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	6.23	792.27	1.24	1
Agriculture (total)	71.30	9070.74	14.17	
Pasture	5.56	706.88	1.10	
Row Crop	65.74	8363.86	13.07	
Forest	22.18	2821.75	4.41	
Natural Grassland	0.02	2.45	0.00	
Water	0.24	30.46	0.05	
Wetland	0.03	3.56	0.01	
Barren	0.01	0.89	0.00	
Total	100.00	12722.12	19.88	

Table 8.116 Middle Fork Clarks River RM 6.15 to 9.1 Data (Site 8)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/18/2005	406	476.1	✓
5/25/2005	462	451.7	
6/1/2005	882		
6/8/2005	320		
6/15/2005	462		
6/22/2005	312		
7/12/2005	718		
7/20/2005	242		
7/27/2005	196		
8/17/2005	3248		✓
8/31/2005	558		

Table 8.117 TMDL Calculations for Middle Fork Clarks River RM 6.15 to 9.1

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
1.91E+12	2.80E+11	Existing Load
1.41E+11	**7.63E+10**	**Total TMDL**
1.41E+10	**7.63E+09**	**MOS**
1.27E+11	6.87E+10	TMDL Target
93.3%	75.4%	% reduction
1.27E+11	6.87E+10	remainder
1.27E+09	**6.87E+08**	**Future Growth WLA**[2]
1.26E+11	**6.80E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.23 Panther Creek RM 0.0 to 3.0

Panther Creek at RM 0.0 is a third order stream in the middle west part of the Clarks River watershed in Graves County (Figure 8.23). Information about Panther Creek RM 0.0 to 3.0, including its WBID and MAF is shown in Table 8.118. Site information is presented in Table 8.119. The subwatershed for the impaired segment has a total drainage area of approximately 22.2 square miles. The landcover in this subwatershed is predominantly agriculture (50.1%, mostly pasture) followed by mixed forest (43.4%) while urban/suburban development represents about 3.8% of the land cover (Table 8.120).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 31 are presented in Table 8.121 and the TMDL allocations in Table 8.122.

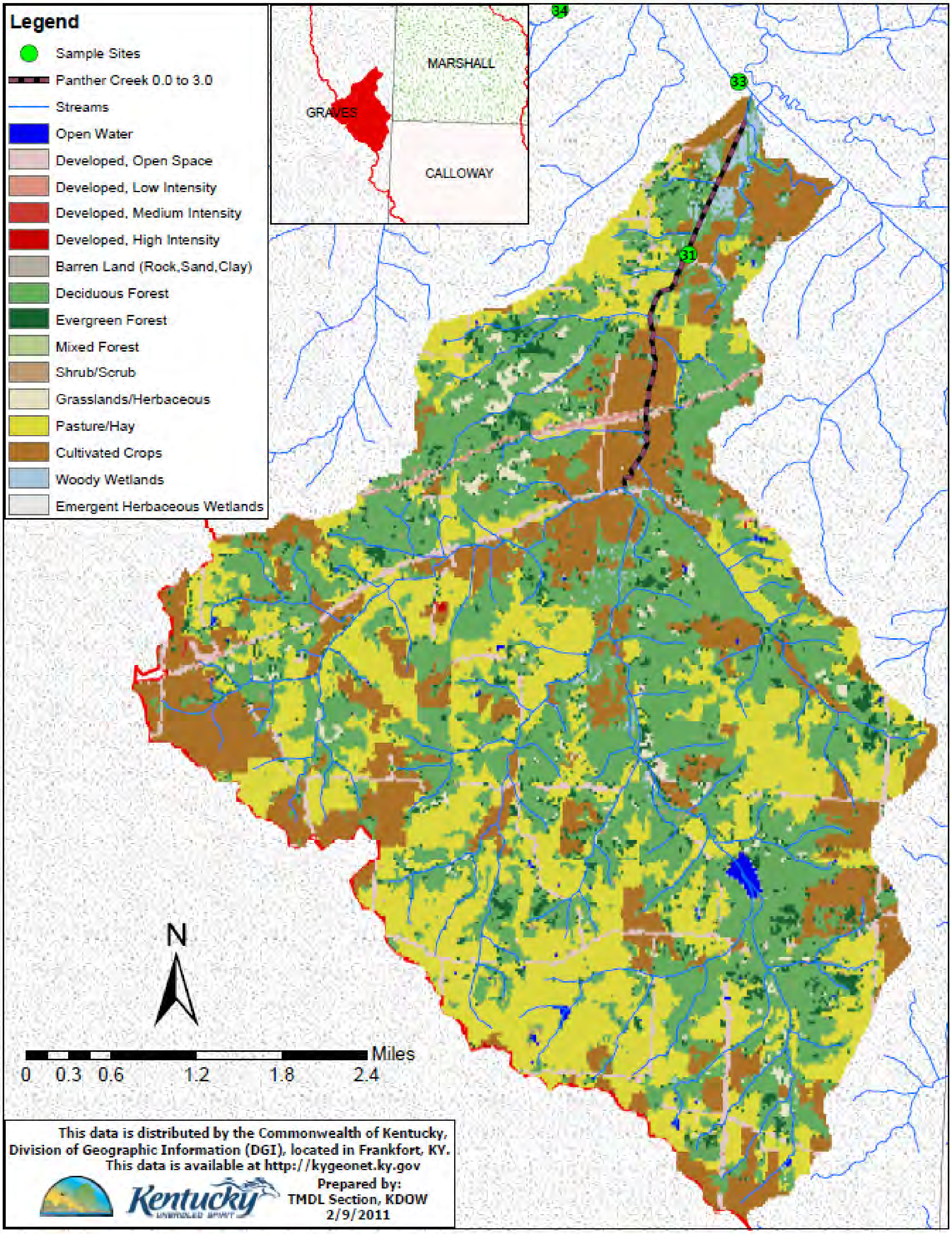

Figure 8.23 Panther Creek RM 0.0 to 3.0 Subwatershed

Table 8.118 Panther Creek RM 0.0 to 3.0 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Panther Creek of West Fork Clarks River	Panther Creek RM 0.0 to 3.0	KY500155_01	Graves	14,185	22.2	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
28.0	0.0	0.0	28.0			

Table 8.119 Panther Creek RM 0.0 to 3.0 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
31	31	1.3	36.796753	-88.457499

Table 8.120 Panther Creek RM 0.0 to 3.0 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.79	537.74	0.84	0.5
Agriculture (total)	50.08	7103.61	11.10	
Pasture	30.14	4275.47	6.68	
Row Crop	19.94	2828.15	4.42	
Forest	43.43	6161.34	9.63	
Natural Grassland	1.45	205.49	0.32	
Water	0.35	49.15	0.08	
Wetland	0.89	126.54	0.20	
Barren	0.01	1.56	0.00	
Total	100.00	14185.43	22.16	

Table 8.121 Panther Creek RM 0.0 to 3.0 Data (Site 31)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	558	292.8	✓
5/26/2005	172	261.3	
6/2/2005	170		
6/9/2005	390		
6/16/2005	338		
6/23/2005	316		
7/13/2005	370		
7/21/2005	60		
7/28/2005	60		
8/11/2005	700		
8/25/2005	546		
9/1/2005	646		
9/16/2005	196		
9/22/2005	148		
9/29/2005	1146		✓
10/11/2005	270		
10/18/2005	126		
10/25/2005	82		

Table 8.122 TMDL Calculations for Panther Creek RM 0.0 to 3.0

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
7.85E+11	2.01E+11	Existing Load
1.64E+11	**8.91E+10**	**Total TMDL**
1.64E+10	**8.91E+09**	**MOS**
1.48E+11	8.01E+10	TMDL Target
81.2%	60.0%	% reduction
1.48E+11	8.01E+10	remainder
7.40E+08	**4.01E+08**	**Future Growth WLA**[2]
1.47E+11	**7.97E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.24 Sand Lick Branch RM 0.0 to 1.2

Sand Lick Branch at RM 0.0 is a second order stream in the southwest part of the Clarks River watershed in Calloway County (Figure 8.24). Information about Sand Lick Branch RM 0.0 to 1.2, including its WBID and MAF is shown in Table 8.123. Site information is presented in Table 8.124. The subwatershed for the impaired segment has a total drainage area of approximately 3.1 square miles. The landcover in this subwatershed is predominantly agriculture (61.9%, mostly pasture) followed by mixed forest (28.7%) while urban/suburban development represents about 6.8% of the land cover (Table 8.125).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 20A are presented in Table 8.126 and the TMDL allocations in Table 8.127.

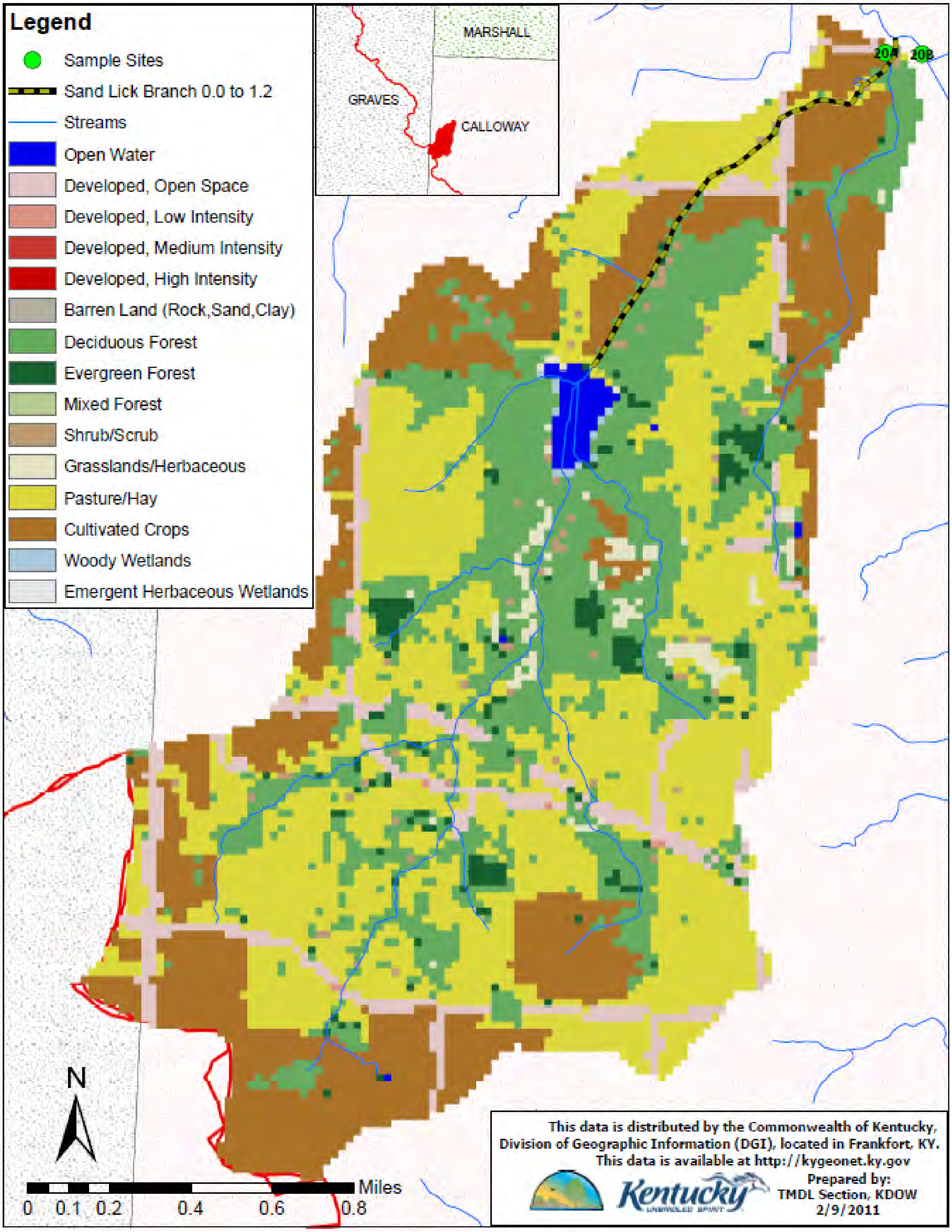

Figure 8.24 Sand Lick Branch RM 0.0 to 1.2 Subwatershed

Table 8.123 Sand Lick Branch RM 0.0 to 1.2 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Sand Lick Branch of West Fork Clarks River	Sand Lick Branch RM 0.0 to 1.2	KY502926_01	Calloway	1957	3.1	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
4.1	0.0	0.0	4.1			

Table 8.124 Sand Lick Branch RM 0.0 to 1.2 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
20A	20A	0.05	36.682257	-88.455465

Table 8.125 Sand Lick Branch RM 0.0 to 1.2 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	6.76	132.40	0.21	1
Agriculture (total)	61.93	1212.05	1.89	
Pasture	37.87	741.20	1.16	
Row Crop	24.06	470.84	0.74	
Forest	28.66	560.96	0.88	
Natural Grassland	1.55	30.26	0.05	
Water	0.95	18.69	0.03	
Wetland	0.14	2.67	0.00	
Barren	0.01	0.22	0.00	
Total	100.00	1957.25	3.06	

Table 8.126 Sand Lick Branch RM 0.0 to 1.2 Data (Site 20A)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/12/2005	350		
5/16/2005	220		
5/23/2005	62		
6/6/2005	82		
6/13/2005	928	240.3	✓
6/20/2005	20	176.1	
6/27/2005	570	233.5	
7/7/2005	104		
7/11/2005	728		
7/18/2005	196		
7/25/2005	82		
8/8/2005	242		
8/15/2005	662		
8/22/2005	2100		✓
8/29/2005	292		

Table 8.127 TMDL Calculations for Sand Lick Branch RM 0.0 to 1.2

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
2.11E+11	2.41E+10	Existing Load
2.41E+10	**1.30E+10**	**Total TMDL**
2.41E+09	**1.30E+09**	**MOS**
2.17E+10	1.17E+10	TMDL Target
89.7%	51.3%	% reduction
2.17E+10	1.17E+10	remainder
2.17E+08	**1.17E+08**	**Future Growth WLA**[2]
2.15E+10	**1.16E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.25 Soldier Creek RM 0.0 to 5.7

Soldier Creek at RM 0.0 is a third order stream in the mid part of the Clarks River watershed in Marshall County (Figure 8.25). Information about Soldier Creek RM 0.0 to 5.7, including its WBID and MAF is shown in Table 8.128. Site information is presented in Table 8.129. The subwatershed for the impaired segment has a total drainage area of approximately 19.6 square miles. The landcover in this subwatershed is predominantly agriculture (56%, mostly row crop) followed by mixed forest (38.6%) while urban/suburban development represents about 3.8% of the land cover (Table 8.130).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 30 are presented in Table 8.131 and the TMDL allocations in Table 8.132.

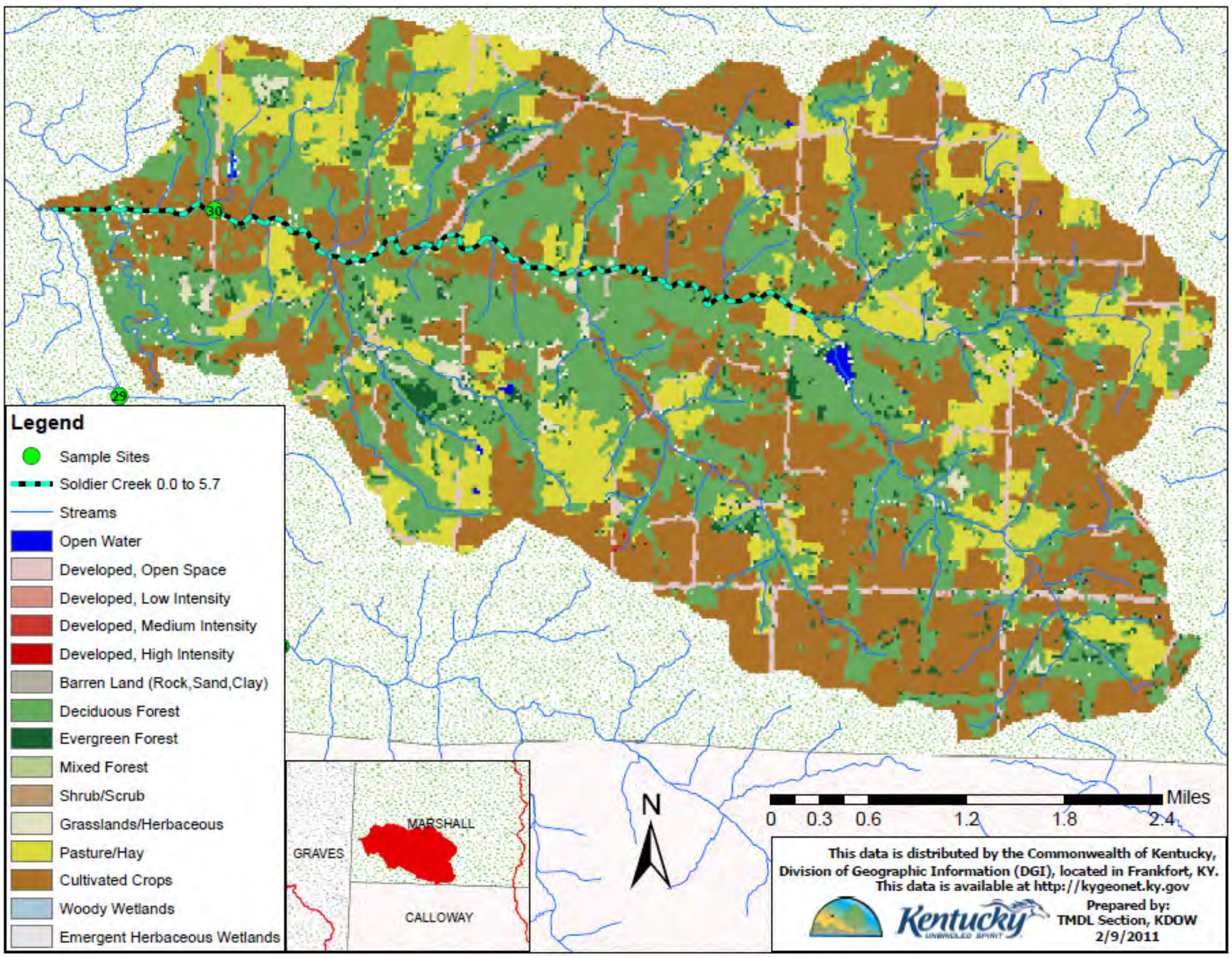

Figure 8.25 Soldier Creek RM 0.0 to 5.7 Subwatershed

Table 8.128 Soldier Creek RM 0.0 to 5.7 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Soldier Creek of West Fork Clarks River	Soldier Creek RM 0.0 to 5.7	KY503868_01	Marshall	12,565	19.61	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
25.9	0.0	0.0	25.9			

Table 8.129 Soldier Creek RM 0.0 to 5.7 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
30	30	1.05	36.796753	-88.457499

Table 8.130 Soldier Creek RM 0.0 to 5.7 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.80	477.70	0.75	0.5
Agriculture (total)	56.04	7041.13	11.00	
Pasture	15.42	1937.03	3.03	
Row Crop	40.62	5104.10	7.98	
Forest	38.59	4849.24	7.58	
Natural Grassland	1.04	130.54	0.20	
Water	0.18	22.46	0.04	
Wetland	0.33	41.14	0.06	
Barren	0.02	3.11	0.00	
Total	100.00	12565.32	19.63	

Table 8.131 Soldier Creek RM 0.0 to 5.7 Data (Site 30)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	296	146.3	✓
5/26/2005	82	98.1	
6/2/2005	82		
6/9/2005	172		
6/16/2005	196		
6/23/2005	40		
7/13/2005	82		
7/21/2005	104		
7/28/2005	104		
8/25/2005	292		
9/1/2005	126		
9/16/2005	362		
9/22/2005	296		
9/29/2005	1326		✓
10/11/2005	124		
10/18/2005	942		
10/25/2005	126		

Table 8.132 TMDL Calculations for Soldier Creek RM 0.0 to 5.7

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
8.40E+11	9.27E+10	Existing Load
1.52E+11	**8.24E+10**	**Total TMDL**
1.52E+10	**8.24E+09**	**MOS**
1.37E+11	7.41E+10	TMDL Target
83.7%	20.0%	% reduction
1.37E+11	7.41E+10	remainder
6.84E+08	**3.71E+08**	**Future Growth WLA**[2]
1.36E+11	**7.38E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.26 South Fork Camp Creek RM 0.0 to 1.3

South Fork Camp Creek at RM 0.0 is a third order stream in the northwest part of the Clarks River watershed in Graves County (Figure 8.26). Information about South Fork Camp Creek RM 0.0 to 1.3, including its WBID and MAF is shown in Table 8.133. Site information is presented in Table 8.134. The subwatershed for the impaired segment has a total drainage area of approximately 6.2 square miles. The landcover in this subwatershed is predominantly mixed forest (47.1%) followed by agriculture (44.6%, mostly row crop) while urban/suburban development represents about 3.2% of the land cover (Table 8.135).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 44 are presented in Table 8.136 and the TMDL allocations in Table 8.137.

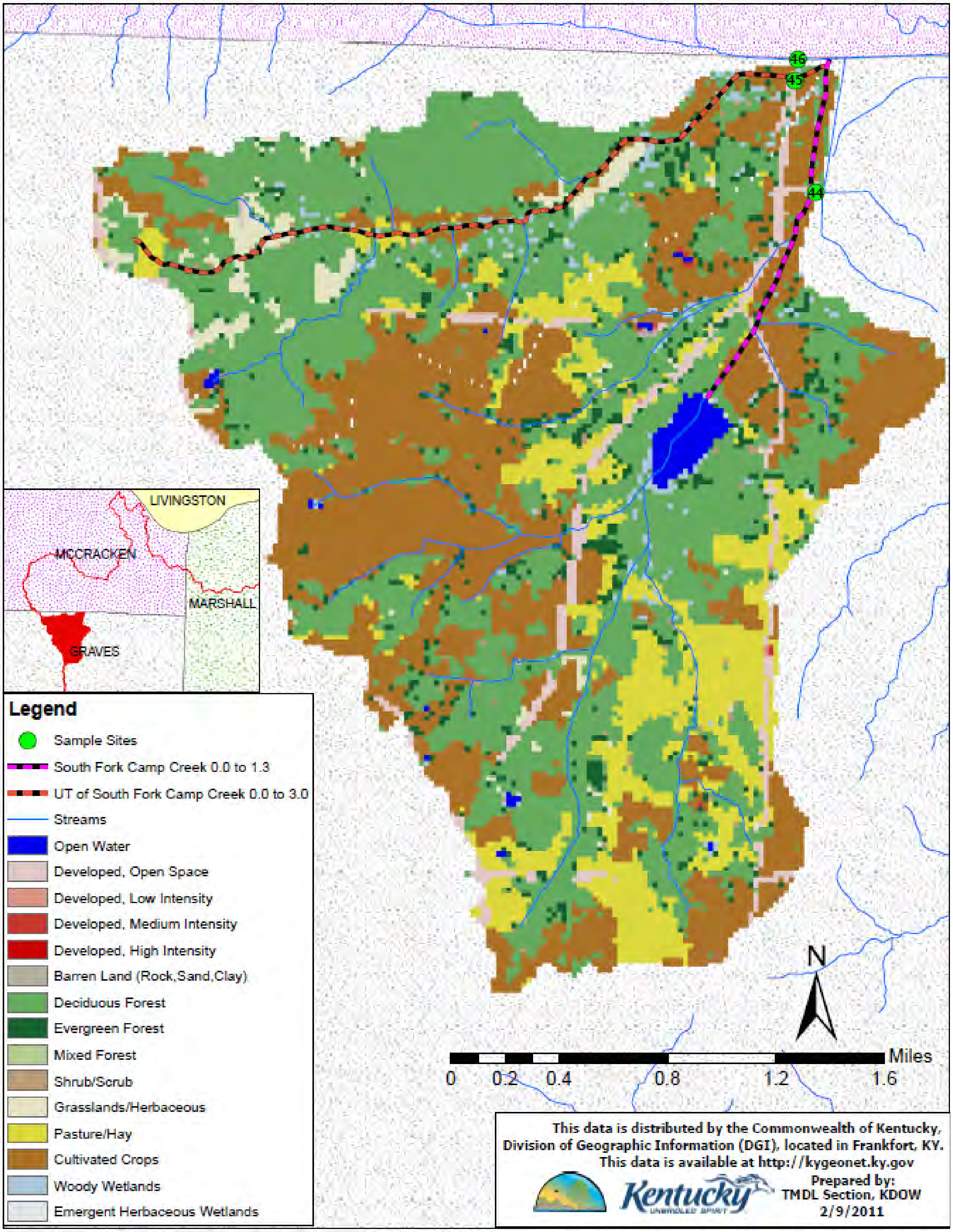

Figure 8.26 South Fork Camp Creek RM 0.0 to 1.3 Subwatershed

Table 8.133 South Fork Camp Creek RM 0.0 to 1.3 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
South Fork Camp Creek of Camp Creek	South Fork Camp Creek RM 0.0 to 1.3	KY503908_01	Graves	3943	6.2	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
7.8	0.0	0.0	7.8			

Table 8.134 South Fork Camp Creek RM 0.0 to 1.3 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
44	44	0.5	36.935442	-88.606696

Table 8.135 South Fork Camp Creek RM 0.0 to 1.3 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.23	127.23	0.20	0.5
Agriculture (total)	44.59	1758.37	2.75	
Pasture	12.58	496.04	0.78	
Row Crop	32.01	1262.33	1.97	
Forest	47.11	1857.80	2.90	
Natural Grassland	2.48	97.87	0.15	
Water	1.11	43.82	0.07	
Wetland	1.44	56.72	0.09	
Barren	0.03	1.33	0.00	
Total	100.00	3943.15	6.16	

Table 8.136 South Fork Camp Creek RM 0.0 to 1.3 Data (Site 44)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
05/19/05	104	489.8	
05/26/05	192	649.4	✓
06/02/05	2086	591.2	
06/09/05	6510		✓
06/16/05	104		
06/23/05	426		
06/29/05	120		
07/21/05	40		
09/01/05	1456		
09/29/05	402		
10/06/05	40		
10/20/05	40		

Table 8.137 TMDL Calculations for South Fork Camp Creek RM 0.0 to 1.3

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
1.24E+12	1.24E+11	Existing Load
4.58E+10	**2.48E+10**	**Total TMDL**
4.58E+09	**2.48E+09**	**MOS**
4.12E+10	2.23E+10	TMDL Target
96.7%	82.0%	% reduction
4.12E+10	2.23E+10	remainder
2.06E+08	**1.12E+08**	**Future Growth WLA**[2]
4.10E+10	**2.22E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.27 Spring Creek RM 0.0 to 2.0

Spring Creek at RM 0.0 is a third order stream in the middle west part of the Clarks River watershed in Graves County (Figure 8.27). Information about Spring Creek RM 0.0 to 2.0, including its WBID and MAF is shown in Table 8.138. Site information is presented in Table 8.139. The subwatershed for the impaired segment has a total drainage area of approximately 16.4 square miles. The landcover in this subwatershed is predominantly agriculture (51.5%, mostly row crop) followed by mixed forest (39.3%) while urban/suburban development represents about 4% of the land cover (Table 8.140).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 35 are presented in Table 8.141 and the TMDL allocations in Table 8.142.

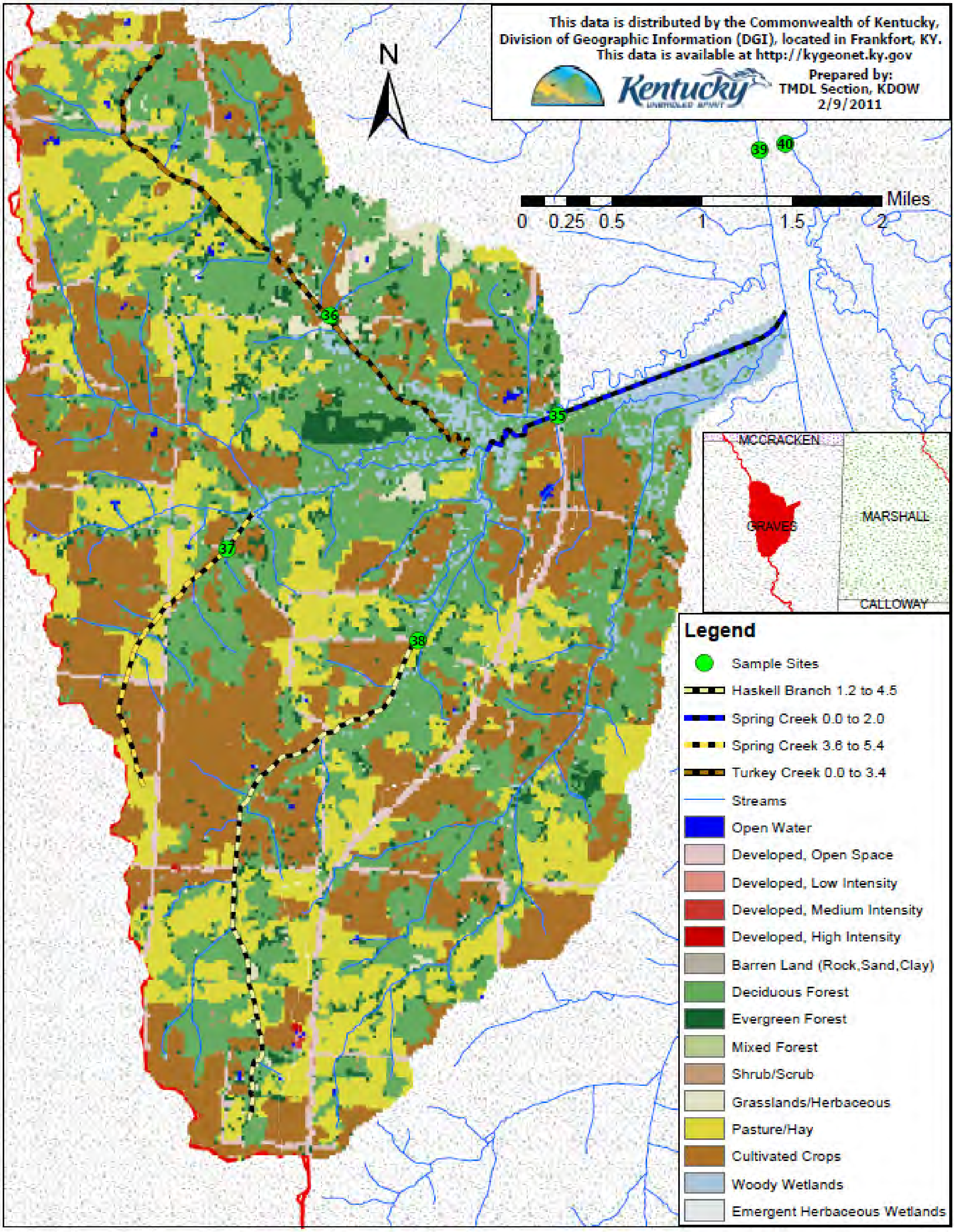

Figure 8.27 Spring Creek RM 0.0 to 2.0 Subwatershed

Table 8.138 Spring Creek RM 0.0 to 2.0 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Spring Creek of West Fork Clarks River	Spring Creek 0.0 to 2.0	KY504124_01	Calloway	10,472	16.4	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
21.2	0.0	0.0	21.2			

Table 8.139 Spring Creek RM 0.0 to 2.0 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
35	35	1.4	36.862380	-88.572497

Table 8.140 Spring Creek RM 0.0 to 2.0 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	4.00	419.01	0.65	0.5
Agriculture (total)	51.48	5390.75	8.42	
Pasture	21.56	2257.56	3.53	
Row Crop	29.92	3133.19	4.90	
Forest	39.25	4110.80	6.42	
Natural Grassland	1.45	151.39	0.24	
Water	0.19	19.59	0.03	
Wetland	3.61	378.26	0.59	
Barren	0.02	2.45	0.00	
Total	100.00	10472.25	16.36	

Table 8.141 Spring Creek RM 0.0 to 2.0 Data (Site 35)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
6/2/2005	518	
6/9/2005	49000	✓
7/13/2005	700	
7/21/2005	816	
7/28/2005	240	
8/18/2005	220	

Table 8.142 TMDL Calculations for Spring Creek RM 0.0 to 2.0

Instantaneous *E. coli* (colonies/day)	
2.54E+13	Existing Load
1.24E+11	**Total TMDL**
1.24E+10	**MOS**
1.12E+11	TMDL Target
99.6%	% reduction
1.12E+11	remainder
5.60E+08	**Future Growth WLA[(1)]**
1.11E+11	**LA**

Notes: [(1)]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.28 Spring Creek RM 3.6 to 5.4

Spring Creek at RM 3.6 is a first order stream in the middle west part of the Clarks River watershed in Graves County (Figure 8.28). Information about Spring Creek RM 3.6 to 5.4, including its WBID and MAF is shown in Table 8.143. Site information is presented in Table 8.144. The subwatershed for the impaired segment has a total drainage area of approximately 1.2 square miles. The landcover in this subwatershed is predominantly agriculture (68.4%, mostly row crop) followed by mixed forest (26.2%) while urban/suburban development represents about 4.6% of the land cover (Table 8.145).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 37 are presented in Table 8.146 and the TMDL allocations in Table 8.147.

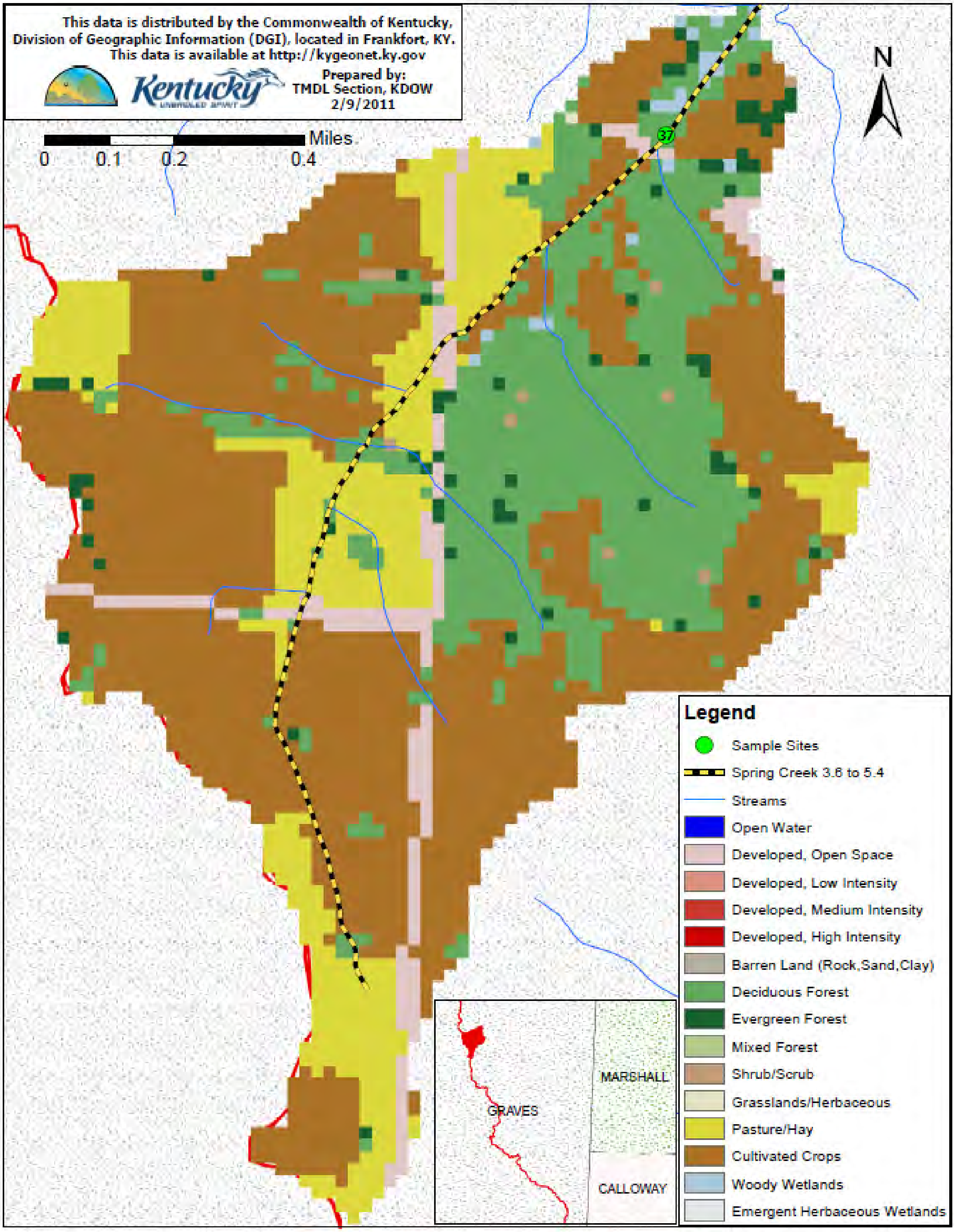

Figure 8.28 Spring Creek RM 3.6 to 5.4 Subwatershed

Table 8.143 Spring Creek RM 3.6 to 5.4 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Spring Creek of West Fork Clarks River	Spring Creek RM 3.6 to 5.4	KY504124_02	Calloway	771	1.2	1st
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
1.5	3.6	0.0	1.5			

Table 8.144 Spring Creek RM 3.6 to 5.4 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
37	37	3.8	36.850800	-88.605183

Table 8.145 Spring Creek RM 3.6 to 5.4 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	4.64	35.75	0.06	0.5
Agriculture (total)	68.44	527.80	0.82	
Pasture	15.66	120.79	0.19	
Row Crop	52.78	407.01	0.64	
Forest	26.23	202.28	0.32	
Natural Grassland	0.03	0.22	0.00	
Water	0.00	0.00	0.00	
Wetland	0.66	5.11	0.01	
Barren	0.00	0.00	0.00	
Total	100.00	771.16	1.20	

Table 8.146 Spring Creek RM 3.6 to 5.4 Data (Site 37)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
6/16/2005	104	
6/27/2005	82	
7/7/2005	398	
9/1/2005	264	
9/16/2005	432	✓
9/22/2005	126	
10/18/2005	62	
10/25/2005	40	

Table 8.147 TMDL Calculations for Spring Creek RM 3.6 to 5.4

Instantaneous *E. coli* (colonies/day)	
1.59E+10	Existing Load
8.81E+09	**Total TMDL**
8.81E+08	**MOS**
7.93E+09	TMDL Target
50.0%	% reduction
7.93E+09	remainder
3.96E+07	**Future Growth WLA**[(1)]
7.89E+09	**LA**

Notes: [(1)]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.29 Trace Creek RM 0.95 to 5.9

Trace Creek at RM 0.95 is a third order stream in the middle west part of the Clarks River watershed in Graves County (Figure 8.29). Information about Trace Creek RM 0.95 to 5.9, including its WBID and MAF is shown in Table 8.148. Site information is presented in Table 8.149. The subwatershed for the impaired segment has a total drainage area of approximately 6.4 square miles. The landcover in this subwatershed is predominantly mixed forest (46.8%) and agriculture (45.2%, mostly row crop) while urban/suburban development represents about 3.6% of the land cover (Table 8.150).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 34 are presented in Table 8.151 and the TMDL allocations in Table 8.152.

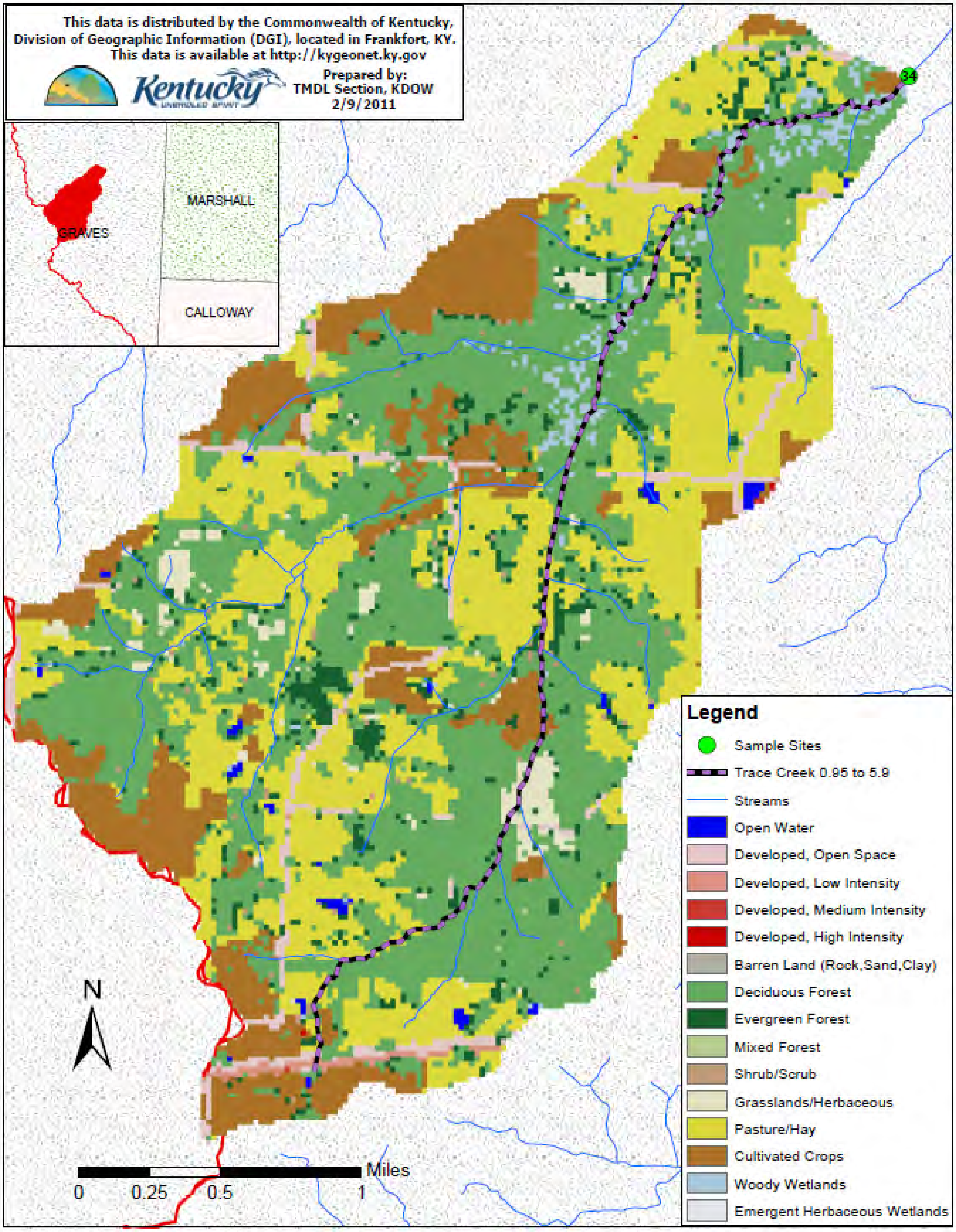

Figure 8.29 Trace Creek RM 0.95 to 5.9 Subwatershed

Table 8.148 Trace Creek RM 0.95 to 5.9 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Trace Creek of West Fork Clarks River	Trace Creek 0.95 to 5.9	KY505419_01	Graves	4068	6.4	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
8.4	0.95	0.0	8.4			

Table 8.149 Trace Creek RM 0.95 to 5.9 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
34	34	1.1	36.830248	-88.539121

Table 8.150 Trace Creek RM 0.95 to 5.9 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.57	145.36	0.23	0.5
Agriculture (total)	45.23	1839.91	2.87	
Pasture	30.34	1234.07	1.93	
Row Crop	14.89	605.84	0.95	
Forest	46.86	1905.98	2.98	
Natural Grassland	2.17	88.24	0.14	
Water	0.47	19.04	0.03	
Wetland	1.70	68.98	0.11	
Barren	0.00	0.00	0.00	
Total	100.00	4067.51	6.36	

Table 8.151 Trace Creek RM 0.95 to 5.9 Data (Site 34)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	196	213.5	
5/26/2005	62	155.4	
6/2/2005	170	194.8	
6/9/2005	976	213.7	✓✓
6/16/2005	220	185.8	
6/23/2005	40	152.6	
6/27/2005	192		
7/7/2005	270		
7/13/2005	486		
7/21/2005	82		
7/28/2005	126		
8/11/2005	40		
8/25/2005	244		
9/1/2005	220		
9/16/2005	104		
9/22/2005	126		
9/29/2005	150		
10/11/2005	150		
10/25/2005	62		

Table 8.152 TMDL Calculations for Trace Creek RM 0.95 to 5.9

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
2.01E+11	4.39E+10	Existing Load
4.93E+10	**2.67E+10**	**Total TMDL**
4.93E+09	**2.67E+09**	**MOS**
4.44E+10	2.40E+10	TMDL Target
77.9%	45.2%	% reduction
4.44E+10	2.40E+10	remainder
2.22E+08	**1.20E+08**	**Future Growth WLA[2]**
4.42E+10	**2.39E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.30 Turkey Creek RM 0.0 to 3.4

Turkey Creek at RM 0.0 is a second order stream in the middle west part of the Clarks River watershed in Graves County (Figure 8.30). Information about Turkey Creek RM 0.0 to 3.4, including its WBID and MAF is shown in Table 8.153. Site information is presented in Table 8.154. The subwatershed for the impaired segment has a total drainage area of approximately 3 square miles. The landcover in this subwatershed is predominantly mixed forest (55%) followed by agriculture (34.2%, mostly pasture) while urban/suburban development represents about 3.2% of the land cover (Table 8.155).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 36 are presented in Table 8.156 and the TMDL allocations in Table 8.157.

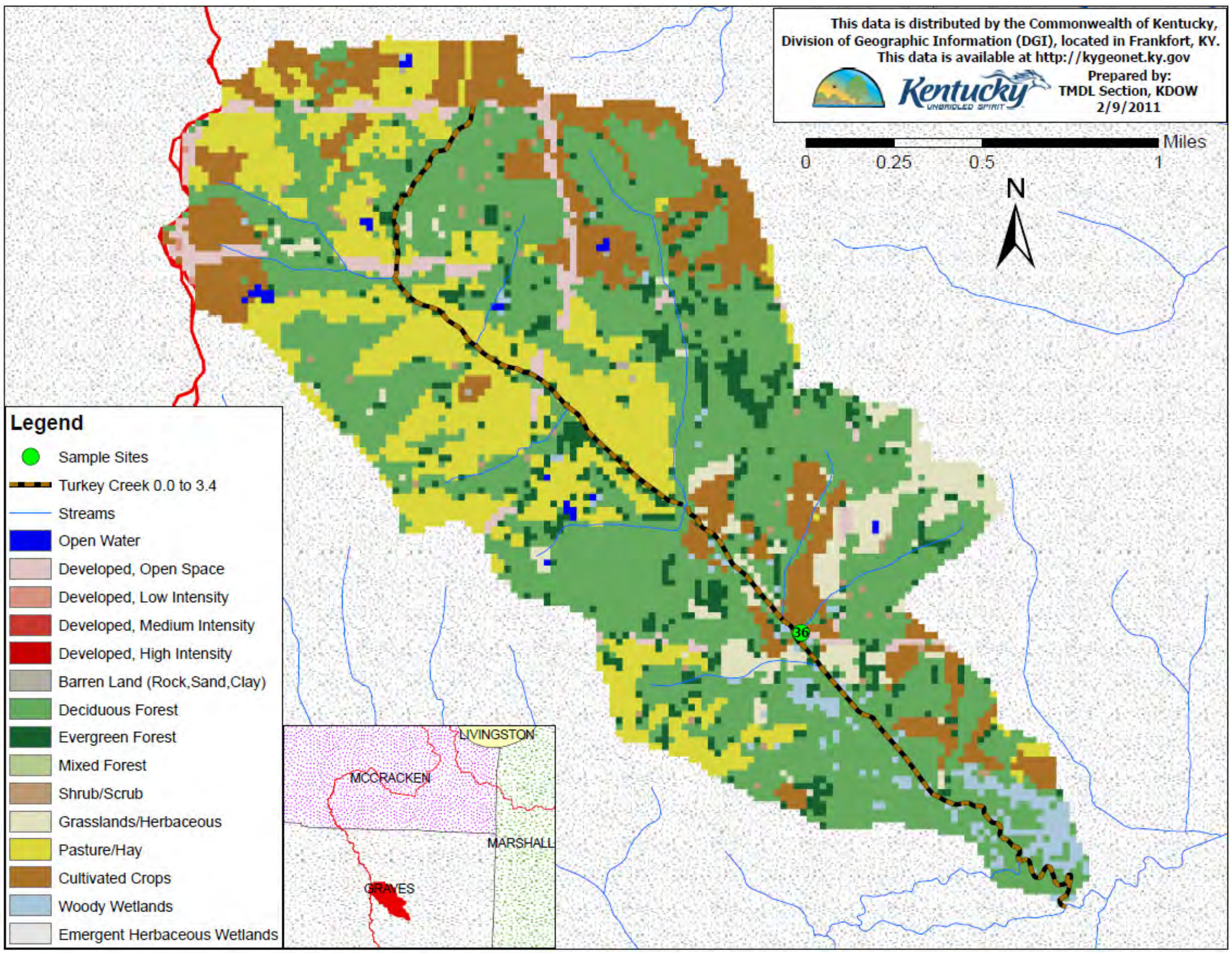

Figure 8.30 Turkey Creek RM 0.0 to 3.4 Subwatershed

Table 8.153 Turkey Creek RM 0.0 to 3.4 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Turkey Creek of Spring Creek	Turkey Creek RM 0.0 to 3.4	KY505595_01	Graves	1938	3.0	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
4.0	0.0	0.0	4.0			

Table 8.154 Turkey Creek RM 0.0 to 3.4 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
36	36	1.2	36.869883	-88.595579

Table 8.155 Turkey Creek RM 0.0 to 3.4 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	3.21	62.29	0.10	0.5
Agriculture (total)	34.26	664.01	1.04	
Pasture	20.03	388.17	0.61	
Row Crop	14.23	275.84	0.43	
Forest	55.02	1066.19	1.67	
Natural Grassland	4.78	92.54	0.14	
Water	0.32	6.23	0.01	
Wetland	2.34	45.38	0.07	
Barren	0.07	1.33	0.00	
Total	100.00	1937.97	3.03	

Table 8.156 Turkey Creek RM 0.0 to 3.4 Data (Site 36)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	492	
6/16/2005	290	
9/1/2005	718	✓

Table 8.157 TMDL Calculations for Turkey Creek RM 0.0 to 3.4

Instantaneous *E. coli* (colonies/day)	
7.03E+10	Existing Load
2.35E+10	**Total TMDL**
2.35E+09	**MOS**
2.11E+10	TMDL Target
69.9%	% reduction
2.11E+10	remainder
1.06E+08	**Future Growth WLA**[(1)]
2.10E+10	**LA**

Notes:[(1)]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.31 UT Blizzard Pond Drainage Canal RM 0.0 to 4.2

UT Blizzard Pond Drainage Canal at RM 0.0 is a second order stream in the northwest part of the Clarks River watershed in McCracken County (Figure 8.31). Information about UT Blizzard Pond Drainage Canal RM 0.0 to 4.2, including its WBID and MAF is shown in Table 8.158. Site information is presented in Table 8.159. The subwatershed for the impaired segment has a total drainage area of approximately 5.2 square miles. The landcover in this subwatershed is predominantly agriculture (45.6%) and mixed forest (44.2%) while urban/suburban development represents about 5.7% of the land cover (Table 8.160).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 49 are presented in Table 8.161 and the TMDL allocations in Table 8.162.

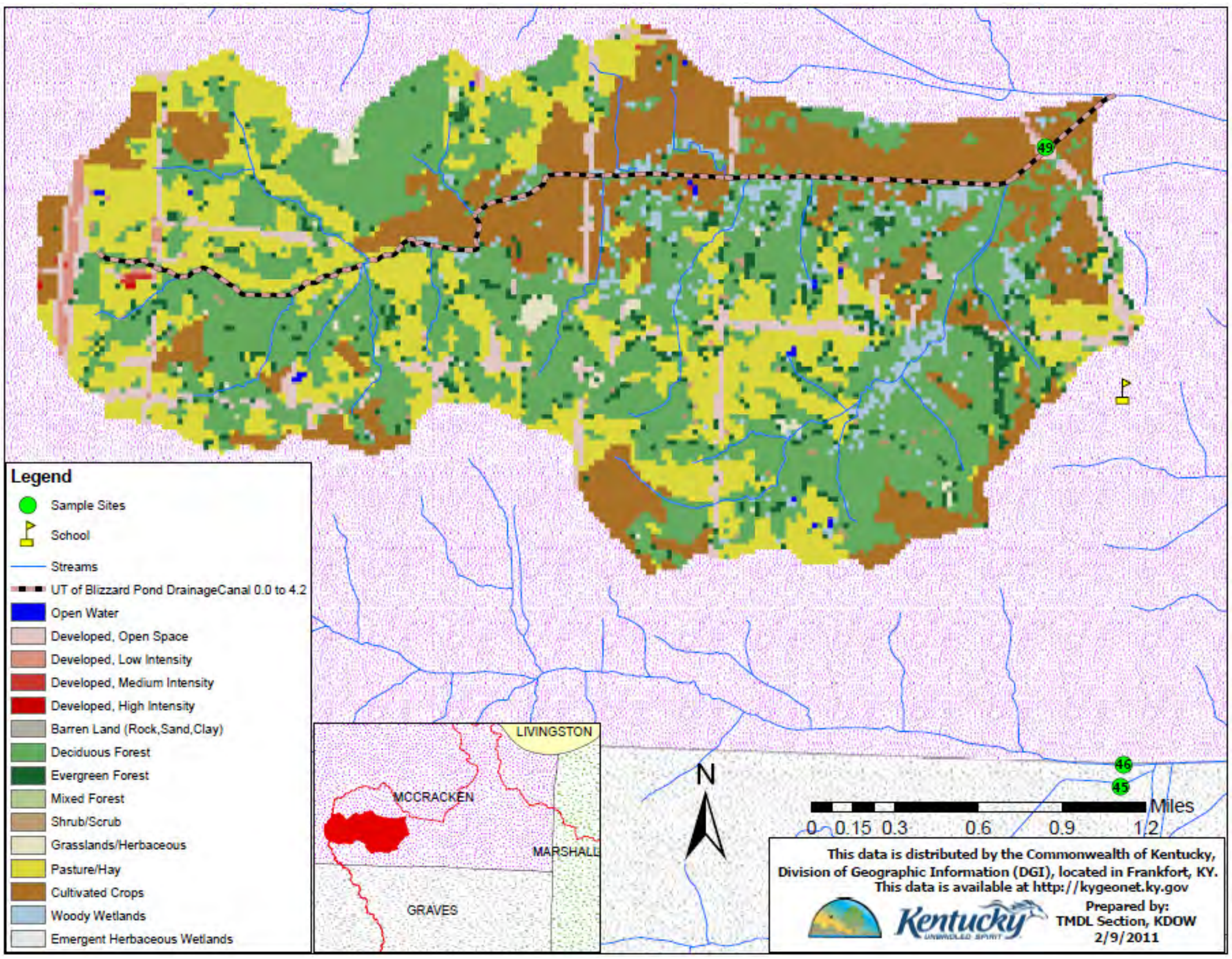

Figure 8.31 UT Blizzard Pond Drainage Canal RM 0.0 to 4.2 Subwatershed

Table 8.158 UT Blizzard Pond Drainage Canal RM 0.0 to 4.2 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Unnamed Tributary of Blizzard Pond Drainage Canal at RM 1.3	UT Blizzard Pond Drainage Canal RM 0.0 to 4.2	KY487484-1.3_01	McCracken	3346	5.2	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
6.5	0.0	0.0	6.5			

Table 8.159 UT Blizzard Pond Drainage Canal RM 0.0 to 4.2 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
49	49	0.3	36.974513	-88.614451

Table 8.160 UT Blizzard Pond Drainage Canal RM 0.0 to 4.2 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	5.73	191.55	0.30	1
Agriculture (total)	45.61	1525.98	2.38	
Pasture	23.28	778.90	1.22	
Row Crop	22.33	747.08	1.17	
Forest	44.23	1479.71	2.31	
Natural Grassland	0.75	25.14	0.04	
Water	0.15	4.89	0.01	
Wetland	3.54	118.36	0.18	
Barren	0.01	0.22	0.00	
Total	100.00	3345.86	5.23	

Table 8.161 UT Blizzard Pond Drainage Canal RM 0.0 to 4.2 Data (Site 49)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	62	178.9	
5/26/2005	40	178.9	
6/2/2005	378	206.5	✓
6/9/2005	9768		✓
6/16/2005	20		
6/23/2005	62		
6/29/2005	82		
7/13/2005	62		
7/21/2005	288		
7/28/2005	104		
8/11/2005	2666		
8/25/2005	126		
9/1/2005	172		
9/16/2005	62	28.8	
9/22/2005	20	23.0	
9/29/2005	40		
10/6/2005	20		
10/13/2005	20		
10/20/2005	20		

Table 8.162 TMDL Calculations for UT Blizzard Pond Drainage Canal RM 0.0 to 4.2

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
1.55E+12	3.28E+10	Existing Load
3.82E+10	**2.07E+10**	**Total TMDL**
3.82E+09	**2.07E+09**	**MOS**
3.43E+10	1.86E+10	TMDL Target
97.8%	43.3%	% reduction
3.43E+10	1.86E+10	remainder
3.43E+08	**1.86E+08**	**Future Growth WLA[2]**
3.40E+10	**1.84E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.32 UT Chestnut Creek RM 0.0 to 0.7

UT Chestnut Creek at RM 0.0 is a first order stream in the northeast part of the Clarks River watershed in Marshall County (Figure 8.32). Information about UT Chestnut Creek RM 0.0 to 0.7 including its WBID and MAF is shown in Table 8.163. Site information is presented in Table 8.164. The subwatershed for the impaired segment has a total drainage area of approximately 0.2 square miles. The landcover in this subwatershed is predominantly mixed forest (39.5%) followed by agriculture (36.9%, mostly row crops) while urban/suburban development represents about 22.4% of the land cover (Table 8.165).

There is one KPDES permitted SWS discharge within the subwatershed boundary. Sampling data from site 16 are presented in Table 8.166 and the TMDL allocations in Table 8.167.

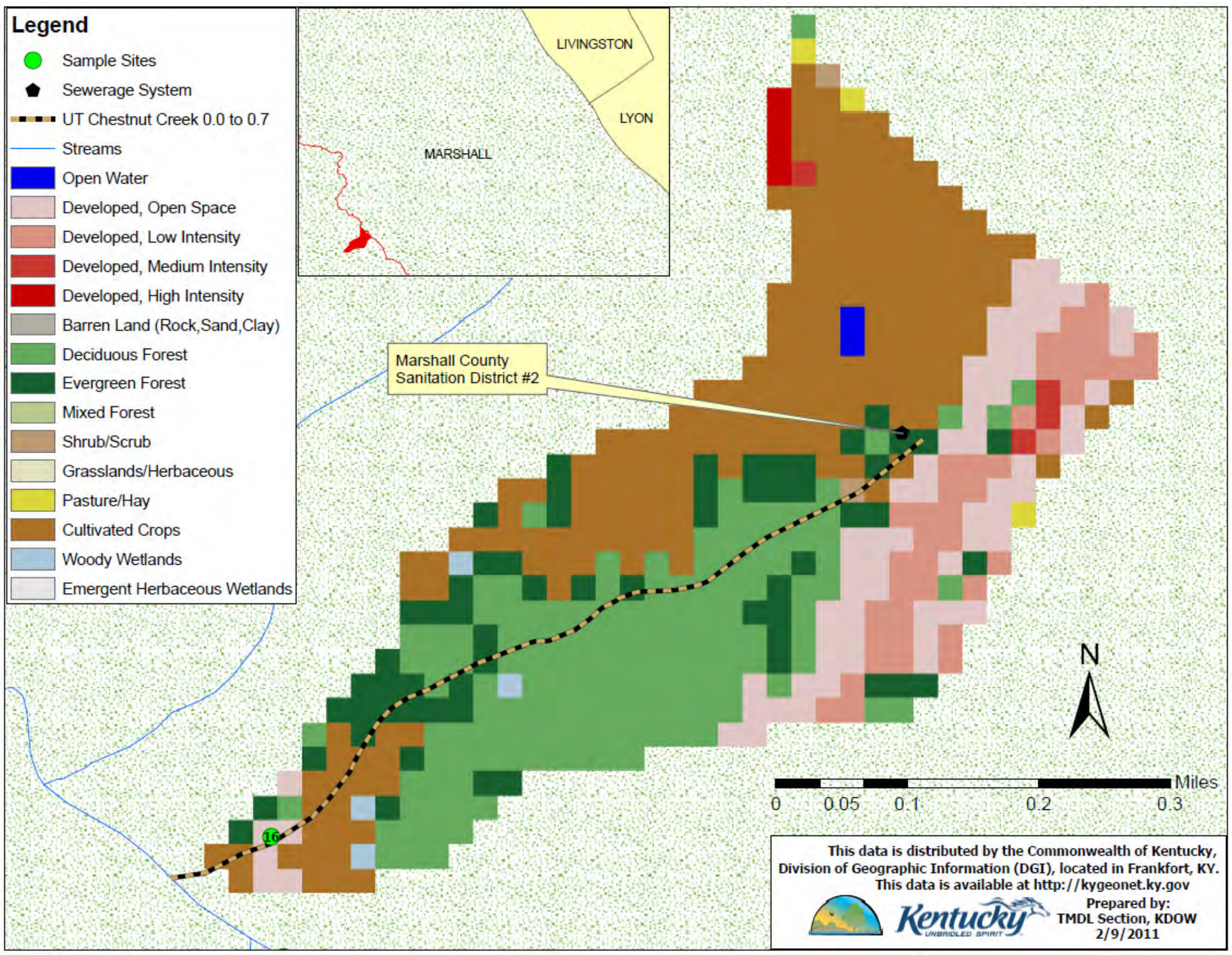

Figure 8.32 UT Chestnut Creek RM 0.0 to 0.7 Subwatershed

Table 8.163 UT Chestnut Creek RM 0.0 to 0.7 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Unnamed Tributary of Chestnut Creek at RM 2.8	UT Chestnut Creek RM 0.0 to 0.7	KY489424-2.8_00	Marshall	116	0.2	1st
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
0.3	0.0	0.232	0.5			

Table 8.164 UT Chestnut Creek RM 0.0 to 0.7 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
16	16	0.1	36.920927	-88.358109

Table 8.165 South UT Chestnut Creek RM 0.0 to 0.7 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	22.44	26.06	0.04	4
Agriculture (total)	36.94	42.91	0.07	
Pasture	0.58	0.67	0.00	
Row Crop	36.36	42.24	0.07	
Forest	39.46	45.83	0.07	
Natural Grassland	0.00	0.00	0.00	
Water	0.39	0.45	0.00	
Wetland	0.77	0.90	0.00	
Barren	0.00	0.00	0.00	
Total	100.00	116.15	0.18	

Table 8.166 UT Chestnut Creek RM 0.0 to 0.7 Data (Site 16)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/17/2005	264	163.7	✓
5/24/2005	82	112.2	
5/31/2005	194		
6/7/2005	40		
6/14/2005	700		
6/21/2005	40		
7/14/2005	214		
7/19/2005	2668		
8/16/2005	2034		
8/30/2005	15402		✓
9/20/2005	6510		
9/27/2005	150		
10/11/2005	20		

Table 8.167 TMDL Calculations for UT Chestnut Creek RM 0.0 to 0.7

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			2.01E+11	2.13E+09	Existing Load
			3.12E+09	**1.69E+09**	**Total TMDL**
			3.12E+08	**1.69E+08**	**MOS**
			2.81E+09	1.52E+09	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	98.6%	28.5%	% reduction
KY0044181	Marshall County Sanitation District #2	0.232	**1.36E+09**	**7.38E+08**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.232	1.45E+09	7.85E+08	remainder
			5.80E+07	**3.14E+07**	**Future Growth WLA**[2]
			1.39E+09	**7.54E+08**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.33 UT South Fork Camp Creek RM 0.0 to 3.0

UT South Fork Camp Creek at RM 0.0 is a second order stream in the northwest part of the Clarks River watershed in McCracken County (Figure 8.33). Information about UT South Fork Camp Creek RM 0.0 to 3.0 including its WBID and MAF is shown in Table 8.168. Site information is presented in Table 8.169. The subwatershed for the impaired segment has a total drainage area of approximately 2 square miles. The landcover in this subwatershed is predominantly mixed forest (65%) followed by agriculture (24.2%, mostly row crops) while urban/suburban development represents about 1.8% of the land cover (Table 8.170).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 45 are presented in Table 8.171 and the TMDL allocations in Table 8.172.

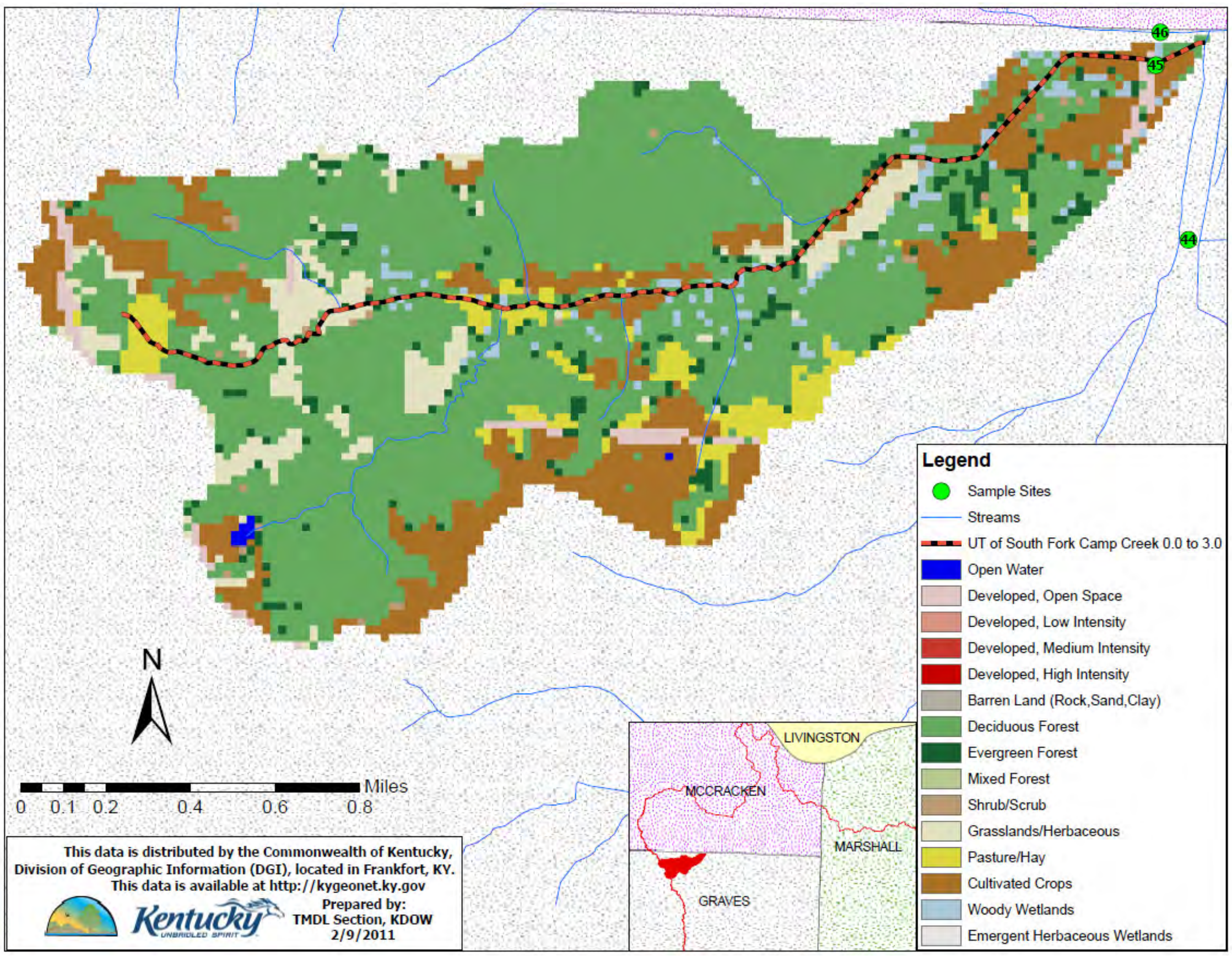

Figure 8.33 UT South Fork Camp Creek RM 0.0 to 3.0 Subwatershed

Table 8.168 UT South Fork Camp Creek RM 0.0 to 3.0 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
Unnamed Tributary to South Fork Camp Creek at RM 0.05	UT South Fork Camp Creek RM 0.0 to 3.0	KY503908-0.05_01	Graves	1273	2.0	2nd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
2.5	0.0	0.0	2.5			

Table 8.169 UT South Fork Camp Creek RM 0.0 to 3.0 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
45	45	0.1	36.941388	-88.608314

Table 8.170 UT South Fork Camp Creek RM 0.0 to 3.0 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	1.82	23.12	0.04	0.5
Agriculture (total)	24.21	308.29	0.48	
Pasture	4.75	60.46	0.09	
Row Crop	19.47	247.83	0.39	
Forest	65.03	827.96	1.29	
Natural Grassland	6.55	83.35	0.13	
Water	0.16	2.00	0.00	
Wetland	2.23	28.45	0.04	
Barren	0.00	0.00	0.00	
Total	100.00	1273.17	1.99	

Table 8.171 UT South Fork Camp Creek RM 0.0 to 3.0 Data (Site 45)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/26/2005	290		
6/2/2005	482		
6/9/2005	9222		✓
6/16/2005	602		
6/29/2005	172		
7/13/2005	2752		
7/21/2005	126		
8/25/2005	126		
9/1/2005	244		
9/16/2005	212	66.5	
9/22/2005	62	41.5	
9/29/2005	124		
10/6/2005	40		
10/11/2005	20		
10/25/2005	20		

Table 8.172 TMDL Calculations for UT South Fork Camp Creek RM 0.0 to 3.0

Instantaneous *E. coli* (colonies/day)	
5.64E+11	Existing Load
1.47E+10	**Total TMDL**
1.47E+09	**MOS**
1.32E+10	TMDL Target
97.7%	% reduction
1.32E+10	remainder
6.61E+07	**Future Growth WLA[1]**
1.31E+10	**LA**

Notes: [1]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.34 West Fork Clarks River RM 0.0 to 10.4

West Fork Clarks River at RM 0.0 is a fifth order stream in the northwest part of the Clarks River watershed in McCracken County (Figure 8.34). Information about West Fork Clarks River RM 0.0 to 10.4 including its WBID and MAF is shown in Table 8.173. Site information is presented in Table 8.174. The subwatershed for the impaired segment has a total drainage area of approximately 223 square miles. The landcover in this subwatershed is predominantly agriculture (49.8%, mostly row crops) followed by mixed forest (40.6%) while urban/suburban development represents about 4.1% of the land cover (Table 8.175).

There are three KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from sites 41 and PRI107 are presented in Tables 8.176 and 8.177 and the TMDL allocations in Table 8.178.

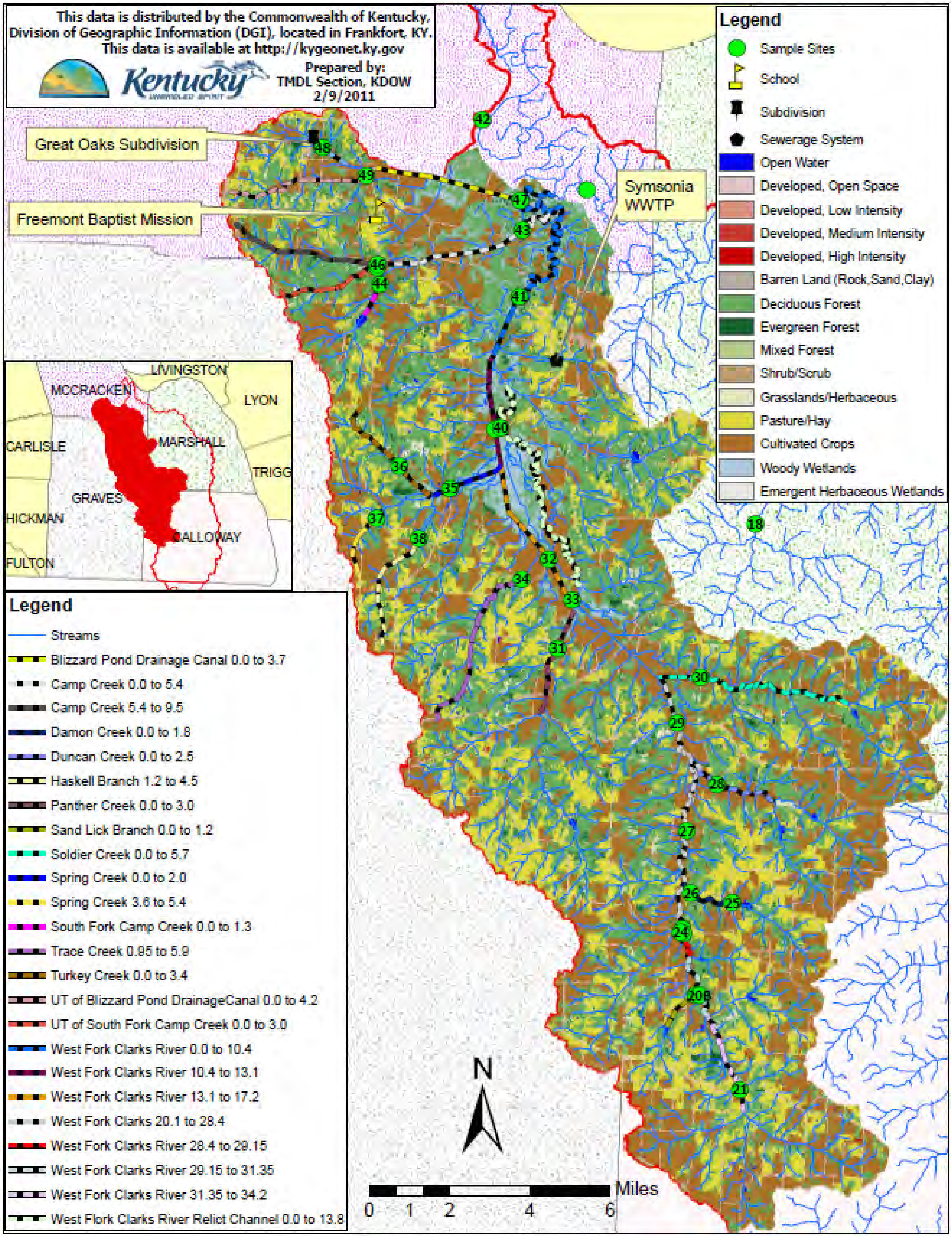

Figure 8.34 West Fork Clarks River RM 0.0 to 10.4 Subwatershed

Table 8.173 West Fork Clarks River RM 0.0 to 10.4 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
West Fork Clarks River of Clarks River	West Fork Clarks River RM 0.0 to 10.4	KY506426_01	McCracken	142,515	222.7	5th
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
282.6	0.0	0.268	282.9			

Table 8.174 West Fork Clarks River RM 0.0 to 10.4 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
41	41	8.6	36.932511	-88.543938
PRI107	41	8.6	36.932511	-88.543938

Table 8.175 West Fork Clarks River RM 0.0 to 10.4 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	4.07	5796.95	9.06	0.5
Agriculture (total)	49.79	70963.32	110.88	
Pasture	19.12	27255.78	42.59	
Row Crop	30.67	43707.54	68.29	
Forest	40.61	57873.25	90.43	
Natural Grassland	1.23	1757.90	2.75	
Water	0.33	475.22	0.74	
Wetland	3.94	5615.94	8.77	
Barren	0.02	32.02	0.05	
Total	100.00	142514.61	222.68	

Table 8.176 West Fork Clarks River RM 0.0 to 10.4 Data (Site 41)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
6/2/2005	346	325	✓
6/9/2005	840		
6/16/2005	374		
6/23/2005	194		
6/29/2005	172		
7/13/2005	1526		□
7/21/2005	172		
8/11/2005	216		
8/25/2005	62		
9/1/2005	808		
9/16/2005	292	194.5	
9/22/2005	242	267.8	
9/29/2005	374		
10/6/2005	402		
10/13/2005	220		
10/20/2005	172		

Table 8.177 West Fork Clarks River RM 0.0 to 10.4 Data (Site PRI107)

Sampling Date	Instantaneous Fecal coliform colonies/100 mL	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/10/2000	180		
6/13/2000	60		
7/12/2000	130		
8/17/2000	30		
9/13/2000	220		
10/26/2000	10		
11/15/2000	530		
1/11/2001	10		
2/14/2001	260		
3/12/2001	30		
5/17/2001	40		
6/14/2001	80		

Sampling Date	Instantaneous Fecal coliform colonies/100 mL	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
7/18/2001	510		
8/22/2001	130		
9/18/2001	180		
10/17/2001	280		
5/22/2002	250		
6/20/2002	10		
7/18/2002	380		
8/20/2002	540		
9/17/2002	400		
10/22/2002	140		
5/21/2003	390		
6/12/2003	600		
8/18/2003	440		
9/16/2003	350		
10/20/2003	120		
5/20/2004	270		
6/17/2004	*Present < QL		
8/11/2004	430		
10/13/2004	1100		
5/18/2005	380		
6/15/2005	440		
7/13/2005	1450		
8/10/2005	750		
9/20/2005	1800		
10/18/2005	120		
5/11/2006	570		
6/14/2006	100		
7/18/2006	80		
8/16/2006	400		
9/12/2006	800		
10/10/2006	80		
6/12/2007		50	
9/11/2007		225	
5/12/2008		402	
6/12/2008		228	
7/14/2008		1260	
10/21/2008		230	
6/15/2009		436	
8/18/2009		96	

Sampling Date	Instantaneous Fecal coliform colonies/100 mL	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
10/20/2009		361	
5/19/2010		214	
6/10/2010		>2420	✓
7/15/2010		123	
8/19/2010		44	

Note: QL indicates Quantitation Limit.

Table 8.178 TMDL Calculations for West Fork Clarks River RM 0.0 to 10.4

			Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
			1.67E+13	2.25E+12	Existing Load
			1.66E+12	**9.00E+11**	**Total TMDL**
			1.66E+11	**9.00E+10**	**MOS**
			1.49E+12	8.10E+11	TMDL Target
KPDES #	Discharger Facility Name	Design Capacity (cfs)	91.1%	64.0%	% reduction
KY0055271	Symsonia Water & Sewer	0.155	**9.08E+08**	**4.92E+08**	**SWS WLA**
KY0040428	Freemont Baptist Mission	0.005	**2.73E+07**	**1.48E+07**	**SWS WLA**
KY0080845	Great Oaks Subdivision	0.108	**6.36E+08**	**3.44E+08**	**SWS WLA**
	Addition to MAF (sum of cfs)	0.268	**1.57E+09**	**8.51E+08**	**Total SWS WLA**
			1.49E+12	8.09E+11	remainder
			7.47E+09	**4.04E+09**	**Future Growth WLA[2]**
			1.49E+12	**8.05E+11**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.35 West Fork Clarks River RM 10.4 to 13.1

West Fork Clarks River at RM 10.4 is a fourth order stream in the northwest part of the Clarks River watershed in Graves County (Figure 8.35). Information about West Fork Clarks River RM 10.4 to 13.1 including its WBID and MAF is shown in Table 8.179. Site information is presented in Table 8.180. The subwatershed for the impaired segment has a total drainage area of approximately 154.6 square miles. The landcover in this subwatershed is predominantly agriculture (54.7%, mostly row crops) followed by mixed forest (38.5%) while urban/suburban development represents about 4.1% of the land cover (Table 8.181).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 39 are presented in Table 8.182 and the TMDL allocations in Table 8.183.

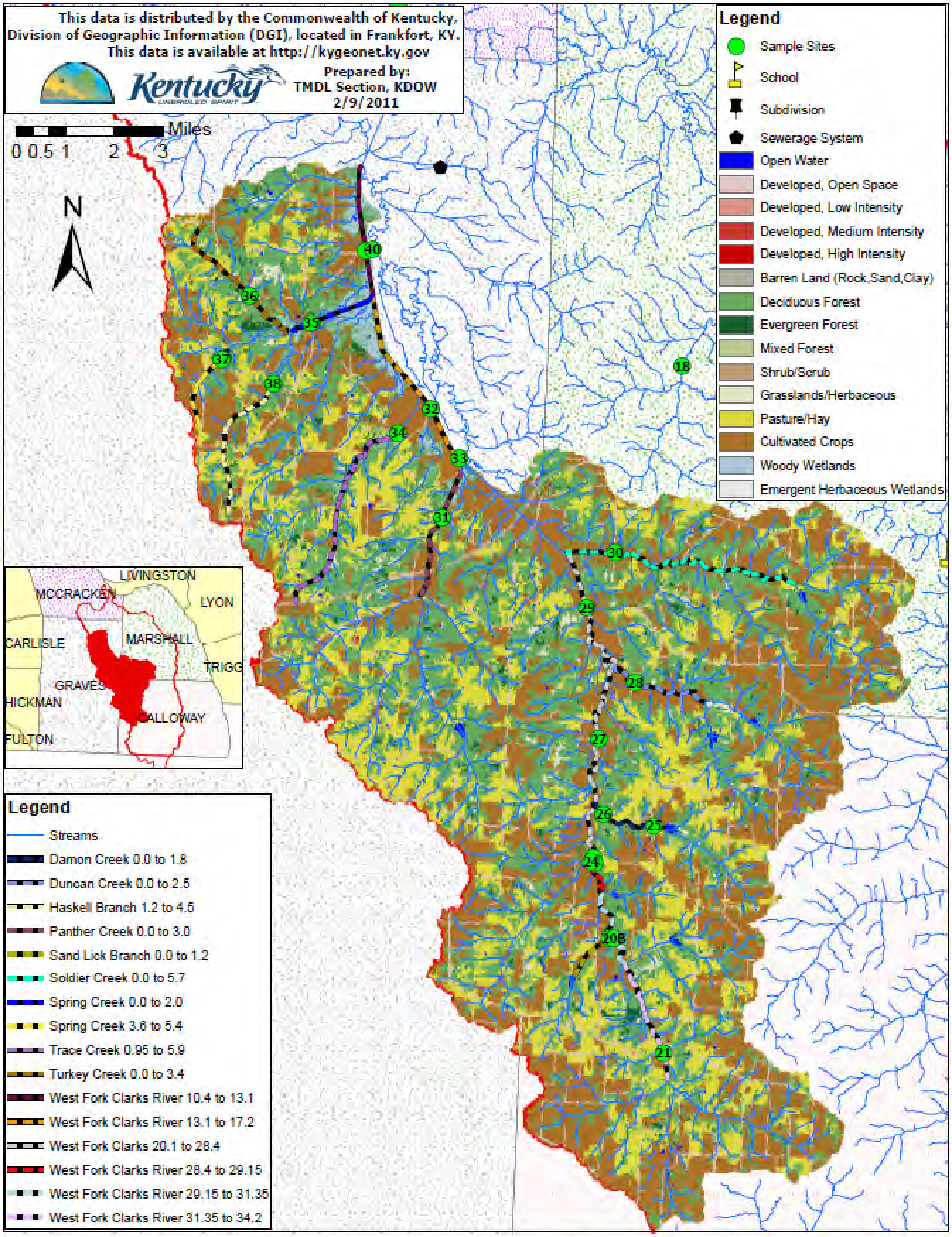

Figure 8.35 West Fork Clarks River RM 10.4 to 13.1 Subwatershed

Table 8.179 West Fork Clarks River RM 10.4 to 13.1 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
West Fork Clarks River of Clarks River	West Fork Clarks RM 10.4 to 13.1	KY506426_02	Graves	98,932	154.5	4th
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
200.4	10.4	0.0	200.4			

Table 8.180 West Fork Clarks River RM 10.4 to 13.1 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
39	39	12.2	36.884262	-88.553082

Table 8.181 West Fork Clarks River RM 10.4 to 13.1 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	4.12	4074.85	6.37	0.5
Agriculture (total)	54.07	53491.09	83.58	
Pasture	21.44	21213.21	33.15	
Row Crop	32.63	32277.88	50.43	
Forest	38.50	38088.01	59.51	
Natural Grassland	1.31	1296.68	2.03	
Water	0.35	341.85	0.53	
Wetland	1.63	1612.06	2.52	
Barren	0.03	27.58	0.04	
Total	100.00	98932.11	154.58	

Table 8.182 West Fork Clarks River RM 10.4 to 13.1 Data (Site 39)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/17/2005	336	125.3	
5/24/2005	196	94.5	
5/31/2005	62		
6/7/2005	20		
6/14/2005	378		
6/21/2005	82		
7/14/2005	218		
7/19/2005	7568		✓
7/26/2005	126		
8/9/2005	264		
8/16/2005	432		
8/23/2005	210		
8/30/2005	4092		
9/13/2005	124		
9/20/2005	636		
9/27/2005	1042		
10/11/2005	124		
10/18/2005	82		

Table 8.183 TMDL Calculations for West Fork Clarks River RM 10.4 to 13.1

Instantaneous *E. coli* (colonies/day)	
3.71E+13	Existing Load
1.18E+12	**Total TMDL**
1.18E+11	**MOS**
1.06E+12	TMDL Target
97.1%	% reduction
1.06E+12	remainder
5.30E+09	**Future Growth WLA[(1)]**
1.05E+12	**LA**

Notes: [(1)] Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.36 West Fork Clarks River RM 13.1 to 17.2

West Fork Clarks River at RM 13.1 is a third order stream in the middle west part of the Clarks River watershed in Graves County (Figure 8.36). Information about West Fork Clarks River RM 13.1 to 17.2 including its WBID and MAF is shown in Table 8.184. Site information is presented in Table 8.185. The subwatershed for the impaired segment has a total drainage area of approximately 131.4 square miles. The landcover in this subwatershed is predominantly agriculture (55.2%, mostly row crops) followed by mixed forest (38%) while urban/suburban development represents about 4.2% of the land cover (Table 8.186).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from sites 32 and 33 are presented in Tables 8.187 and Table 8.188 and the TMDL allocations in Table 8.189.

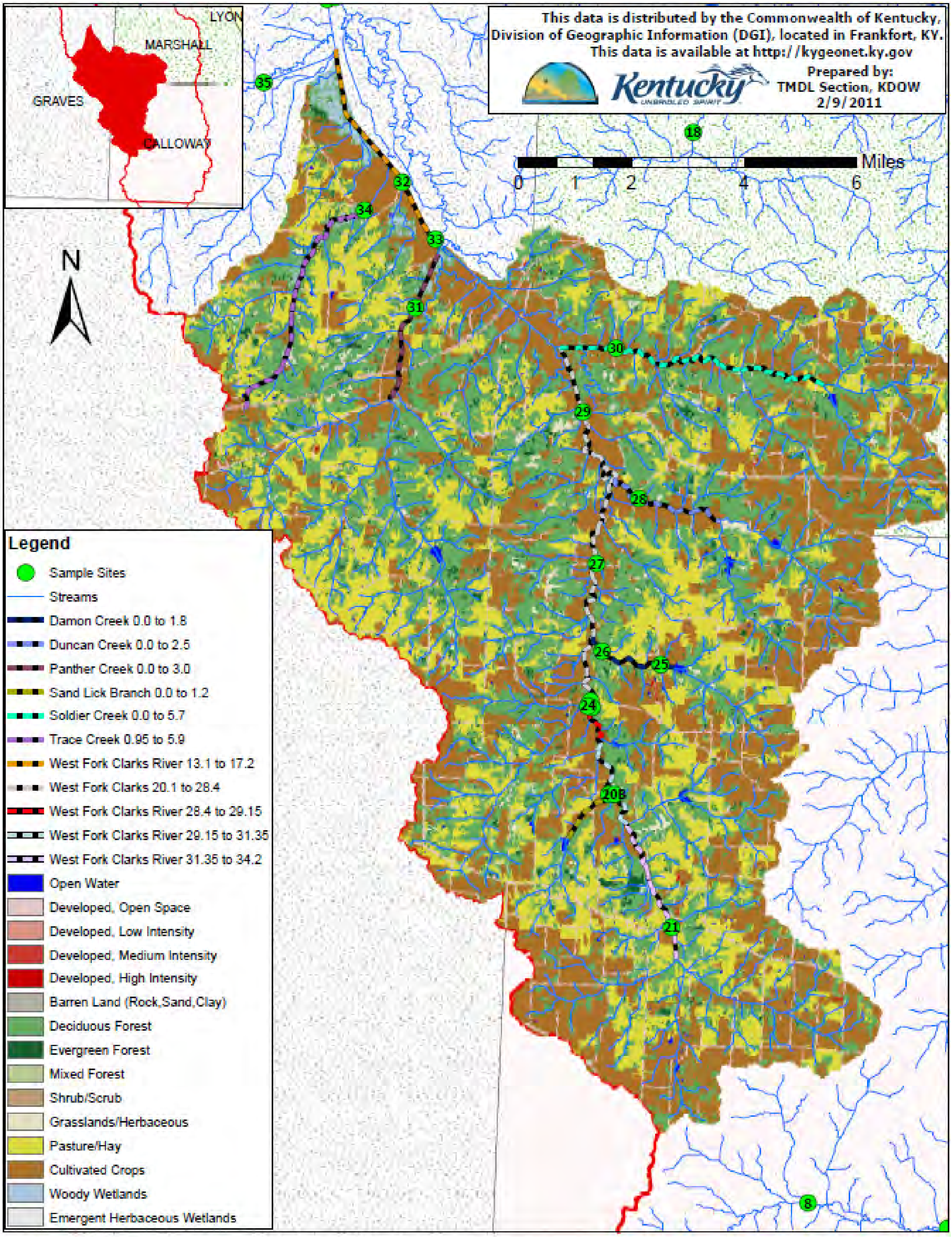

Figure 8.36 West Fork Clarks River RM 13.1 to 17.2 Subwatershed

Table 8.184 West Fork Clarks River RM 13.1 to 17.2 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
West Fork Clarks River of Clarks River	West Fork Clarks River RM 13.1 to 17.2	KY506426_03	Graves	84,116	131.4	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
172.1	13.1	0.0	172.1			

Table 8.185 West Fork Clarks River RM 13.1 to 17.2 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
32	32	15.9	36.837811	-88.527267
33	33	17.1	36.823384	-88.516169

Table 8.186 West Fork Clarks River RM 13.1 to 17.2 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	4.18	3514.88	5.49	0.5
Agriculture (total)	55.25	46470.09	72.61	
Pasture	21.82	18356.79	28.68	
Row Crop	33.42	28113.30	43.93	
Forest	37.97	31936.41	49.90	
Natural Grassland	1.26	1061.47	1.66	
Water	0.36	306.23	0.48	
Wetland	0.95	802.39	1.25	
Barren	0.03	24.46	0.04	
Total	100.00	84115.94	131.43	

Table 8.187 West Fork Clarks River RM 13.1 to 17.2 Data (Site 32)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	168	211.6	
5/26/2005	104	192.3	
6/2/2005	218		
6/9/2005	346		
6/16/2005	322		
6/23/2005	104		
7/13/2005	1918		✓
7/21/2005	102		
7/28/2005	170		
8/11/2005	148		
8/25/2005	82		

Table 8.188 West Fork Clarks River RM 13.1 to 17.2 Data (Site 33)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	768	259.1	✓
5/26/2005	62	165.7	
6/2/2005	492		
6/9/2005	172		
6/16/2005	290		
6/23/2005	82		
7/13/2005	1096		
7/21/2005	104		
7/28/2005	124		
8/11/2005	170		
8/25/2005	102		

Table 8.189 TMDL Calculations for West Fork Clarks River RM 13.1 to 17.2

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
8.08E+12	1.09E+12	Existing Load
1.01E+12	**5.47E+11**	**Total TMDL**
1.01E+11	**5.47E+10**	**MOS**
9.09E+11	4.93E+11	TMDL Target
88.7%	54.9%	% reduction
9.09E+11	4.93E+11	remainder
4.55E+09	**2.46E+09**	**Future Growth WLA[2]**
9.05E+11	**4.90E+11**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.37 West Fork Clarks River RM 20.1 to 28.4

West Fork Clarks River at RM 20.1 is a third order stream in the middle west part of the Clarks River watershed in Marshall County (Figure 8.37). Information about West Fork Clarks River RM 20.1 to 28.4 including its WBID and MAF is shown in Table 8.190. Site information is presented in Table 8.191. The subwatershed for the impaired segment has a total drainage area of approximately 70.2 square miles. The landcover in this subwatershed is predominantly agriculture (58.1%, mostly row crops) followed by mixed forest (35.5%) while urban/suburban development represents about 4.4% of the land cover (Table 8.192).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from sites 22, 27 and 29 are presented in Tables 8.193, 8.194 and 8.195 and the TMDL allocations in Table 8.196.

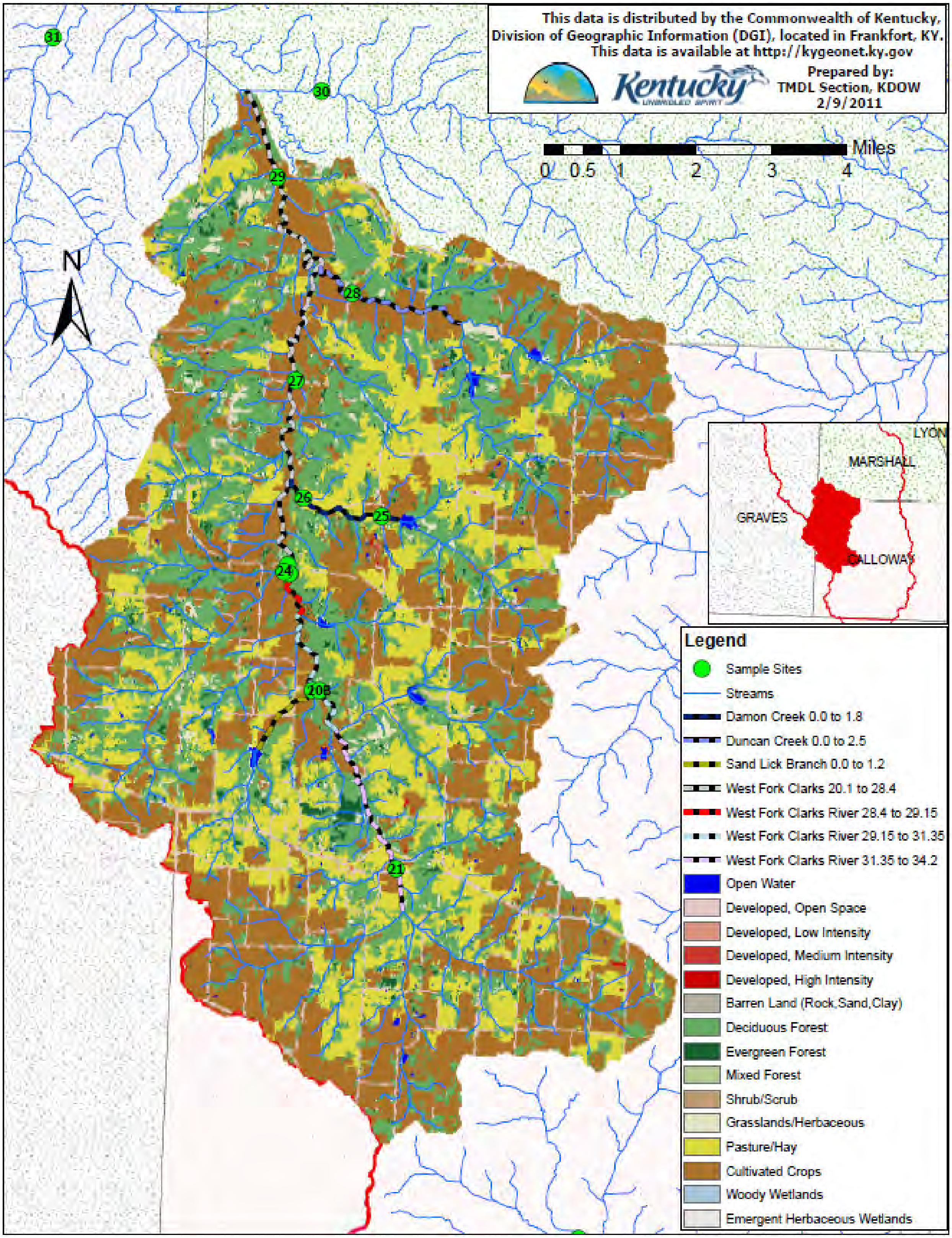

Figure 8.37 West Fork Clarks River RM 20.1 to 28.4 Subwatershed

Table 8.190 West Fork Clarks River RM 20.1 to 28.4 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
West Fork Clarks River of Clarks River	West Fork Clarks River RM 20.1 to 28.4	KY506426_04	Marshall	44,950	70.2	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
92.6	20.1	0.0	92.6			

Table 8.191 West Fork Clarks River RM 20.1 to 28.4 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
22	22	28.2	36.705713	-88.462338
27	27	25.3	36.741120	-88.461690
29	29	21.4	36.779998	-88.467427

Table 8.192 West Fork Clarks River RM 20.1 to 28.4 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	4.35	1954.52	3.05	0.5
Agriculture (total)	58.11	26119.29	40.81	
Pasture	21.23	9543.72	14.91	
Row Crop	36.88	16575.57	25.90	
Forest	35.54	15976.18	24.96	
Natural Grassland	1.31	588.71	0.92	
Water	0.45	201.50	0.31	
Wetland	0.20	90.30	0.14	
Barren	0.04	19.13	0.03	
Total	100.00	44949.62	70.23	

Table 8.193 West Fork Clarks River RM 20.1 to 28.4 Data (Site 22)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/23/2005	40		
6/6/2005	104		
6/13/2005	5974	255.0	✓
6/20/2005	82	150.8	
6/27/2005	172	164.3	
7/7/2005	40		
7/11/2005	320		
7/18/2005	432		
7/25/2005	126		
8/8/2005	320		
8/15/2005	168		
8/22/2005	918		
8/29/2005	268		
9/13/2005	126		
9/19/2005	82		
9/26/2005	462		

Table 8.194 West Fork Clarks River RM 20.1 to 28.4 Data (Site 27)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/12/2005	316		
5/16/2005	220		
5/23/2005	126		
6/6/2005	104		
6/13/2005	5510	256.5	
6/20/2005	104	222.6	
6/27/2005	148	291.8	✓
7/7/2005	62		
7/11/2005	402		

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
7/18/2005	544		
7/25/2005	40		
8/8/2005	374		
8/15/2005	808		
8/22/2005	194		
8/29/2005	350		
9/12/2005	262		
9/19/2005	322		
9/26/2005	682		

Table 8.195 West Fork Clarks River RM 20.1 to 28.4 Data (Site 29)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/19/2005	82	103.0	
5/26/2005	40	97.4	
6/2/2005	342		
6/9/2005	126		
6/16/2005	82		
6/23/2005	62		
7/13/2005	194		
7/21/2005	214		
7/28/2005	62		
8/11/2005	262		
8/18/2005	262		
8/25/2005	218		
9/1/2005	288		
9/16/2005	786		
9/22/2005	20		
9/29/2005	148		
10/11/2005	126		
10/18/2005	124		
10/25/1950	20		

Table 8.196 TMDL Calculations for West Fork Clarks River RM 20.1 to 28.4

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
1.35E+13	6.61E+11	Existing Load
5.44E+11	**2.95E+11**	**Total TMDL**
5.44E+10	**2.95E+10**	**MOS**
4.89E+11	2.65E+11	TMDL Target
96.4%	59.9%	% reduction
4.89E+11	2.65E+11	remainder
2.45E+09	**1.33E+09**	**Future Growth WLA**[(2]
4.87E+11	**2.64E+11**	**LA**

Notes: [(1)]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[(2)]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.38 West Fork Clarks River RM 28.4 to 29.15

West Fork Clarks River at RM 28.4 is a third order stream in the middle west part of the Clarks River watershed in Calloway County (Figure 8.38). Information about West Fork Clarks River RM 28.4 to 29.15 including its WBID and MAF is shown in Table 8.197. Site information is presented in Table 8.198. The subwatershed for the impaired segment has a total drainage area of approximately 30.8 square miles. The landcover in this subwatershed is predominantly agriculture (63.3%, mostly row crops) followed by mixed forest (30.1%) while urban/suburban development represents about 5% of the land cover (Table 8.199).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 23 are presented in Table 8.200 and the TMDL allocations in Table 8.201.

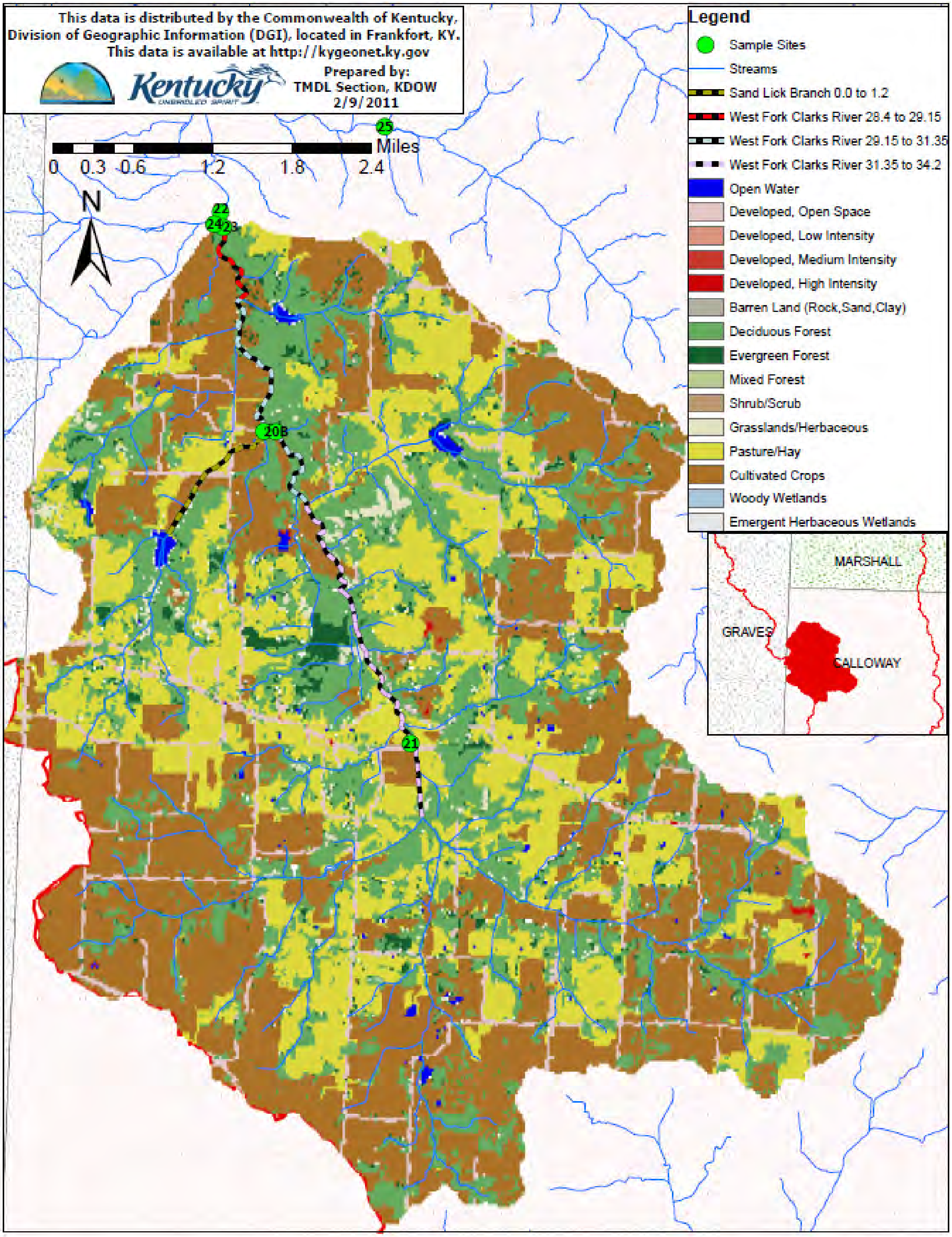

Figure 8.38 West Fork Clarks River RM 28.4 to 29.15 Subwatershed

Table 8.197 West Fork Clarks River RM 28.4 to 29.15 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
West Fork Clarks River of Clarks River	West Fork Clarks River RM 28.4 to 29.15	KY506426_05	Calloway	19,713	30.8	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
42.0	28.4	0.0	42.0			

Table 8.198 West Fork Clarks River RM 28.4 to 29.15 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
23	23	28.4	36.704089	-88.461922

Table 8.199 West Fork Clarks River RM 28.4 to 29.15 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	5.01	987.25	1.54	1
Agriculture (total)	63.33	12485.06	19.51	
Pasture	24.90	4908.67	7.67	
Row Crop	38.43	7576.39	11.84	
Forest	30.12	5938.39	9.28	
Natural Grassland	0.96	188.38	0.29	
Water	0.50	98.30	0.15	
Wetland	0.06	10.90	0.02	
Barren	0.02	4.89	0.01	
Total	100.00	19713.17	30.80	

Table 8.200 West Fork Clarks River RM 28.4 to 29.15 Data (Site 23)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/23/2005	82		
6/6/2005	82		
6/13/2005	3030	201.6	✓✓
6/20/2005	150	136.1	
6/27/2005	150	120.7	
7/7/2005	20		
7/11/2005	244		
7/18/2005	426		
7/25/2005	82		
8/8/2005	320		
8/15/2005	150		
8/22/2005	738		
8/29/2005	370		
9/12/2005	40		
9/19/2005	20		
9/26/2005	530		
10/10/2005	126		
10/17/2005	124		

Table 8.201 TMDL Calculations for West Fork Clarks River RM 28.4 to 29.15

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
3.11E+12	2.07E+11	Existing Load
2.47E+11	**1.34E+11**	**Total TMDL**
2.47E+10	**1.34E+10**	**MOS**
2.22E+11	1.20E+11	TMDL Target
92.9%	42.0%	% reduction
2.22E+11	1.20E+11	remainder
2.22E+09	**1.20E+09**	**Future Growth WLA**[2]
2.20E+11	**1.19E+11**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.39 West Fork Clarks River RM 29.15 to 31.35

West Fork Clarks River at RM 29.15 is a third order stream in the middle west part of the Clarks River watershed in Calloway County (Figure 8.39). Information about West Fork Clarks River RM 29.15 to 31.35 including its WBID and MAF is shown in Table 8.202. Site information is presented in Table 8.203. The subwatershed for the impaired segment has a total drainage area of approximately 28.8 square miles. The landcover in this subwatershed is predominantly agriculture (63.5%, mostly row crops) followed by mixed forest (29.8%) while urban/suburban development represents about 5.1% of the land cover (Table 8.204).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 20B are presented in Table 8.205 and the TMDL allocations in Table 8.206.

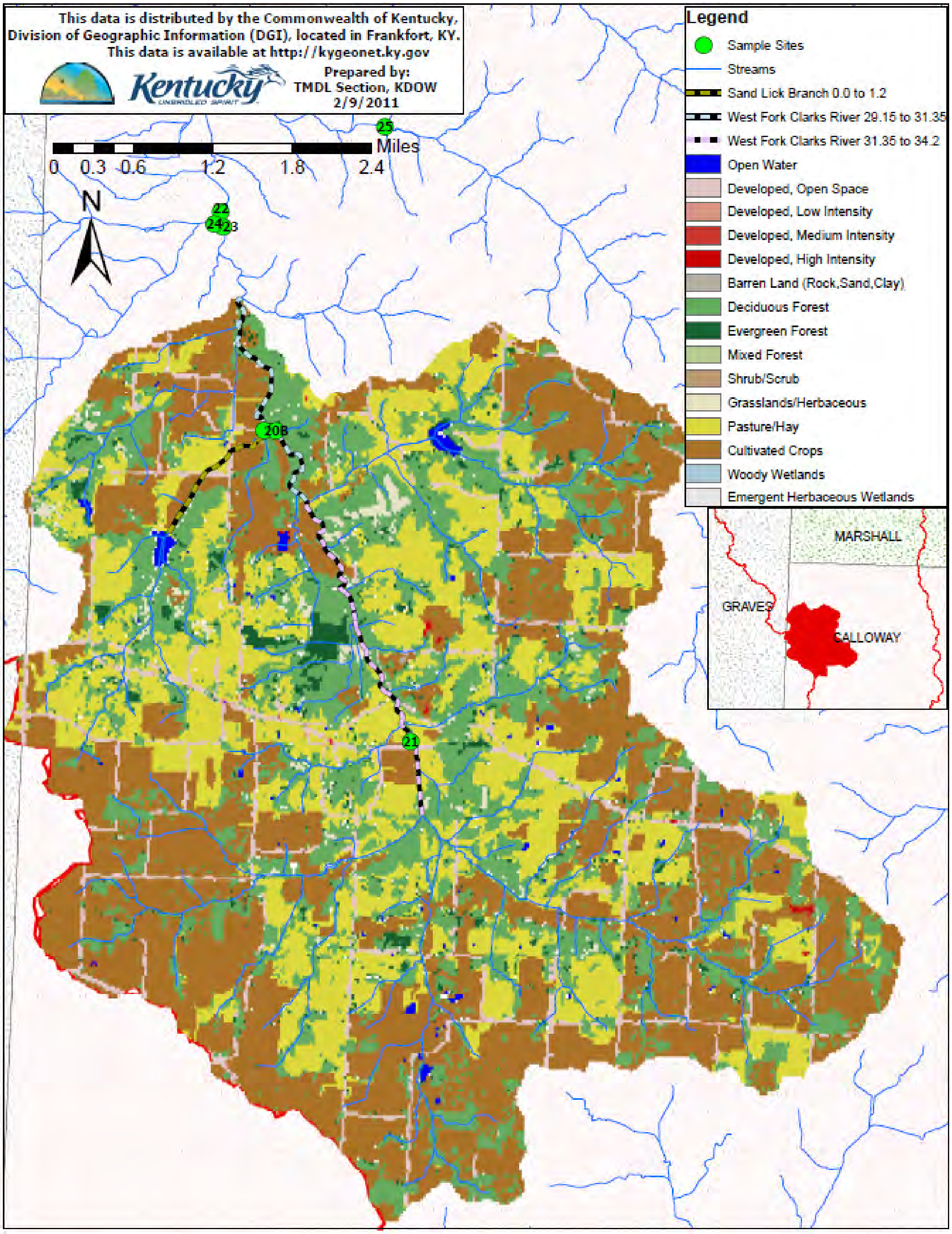

Figure 8.39 West Fork Clarks River RM 29.15 to 31.35 Subwatershed

Table 8.202 West Fork Clarks River RM 29.15 to 31.35 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
West Fork Clarks River of Clarks River	Clarks River RM 29.15 to 31.35	KY506426_06	Calloway	18,447	28.8	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
39.3	29.15	0.0	39.3			

Table 8.203 West Fork Clarks River RM 29.15 to 31.35 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
20B	20B	30.4	36.681800	-88.453950

Table 8.204 West Fork Clarks River RM 29.15 to 31.35 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	5.12	944.71	1.48	1
Agriculture (total)	63.53	11718.64	18.31	
Pasture	25.13	4635.23	7.24	
Row Crop	38.40	7083.41	11.07	
Forest	29.81	5498.52	8.59	
Natural Grassland	1.01	185.96	0.29	
Water	0.47	86.97	0.14	
Wetland	0.04	7.79	0.01	
Barren	0.02	4.00	0.01	
Total	100.00	18446.59	28.82	

Table 8.205 West Fork Clarks River RM 29.15 to 31.35 Data (Site 20B)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
9/12/2005	196	223.4	✓
9/14/2005	466		
9/19/2005	126		
9/26/2005	322		
10/10/2005	150		
10/17/2005	462		
10/24/2005	126		
10/27/2005	1210		✓

Table 8.206 TMDL Calculations for West Fork Clarks River RM 29.15 to 31.35

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
1.16E+12	2.15E+11	Existing Load
2.31E+11	**1.25E+11**	**Total TMDL**
2.31E+10	**1.25E+10**	**MOS**
2.08E+11	1.12E+11	TMDL Target
82.1%	47.6%	% reduction
2.08E+11	1.12E+11	remainder
2.08E+09	**1.12E+09**	**Future Growth WLA**[2]
2.06E+11	**1.11E+11**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.40 West Fork Clarks River RM 31.35 to 34.2

West Fork Clarks River at RM 31.35 is a third order stream in the middle west part of the Clarks River watershed in Calloway County (Figure 8.40). Information about West Fork Clarks River RM 31.35 to 34.2 including its WBID and MAF is shown in Table 8.207. Site information is presented in Table 8.208. The subwatershed for the impaired segment has a total drainage area of approximately 18.6 square miles. The landcover in this subwatershed is predominantly agriculture (65.6%, mostly row crops) followed by mixed forest (28.3%) while urban/suburban development represents about 5.1% of the land cover (Table 8.209).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 21 are presented in Table 8.210 and the TMDL allocations in Table 8.211.

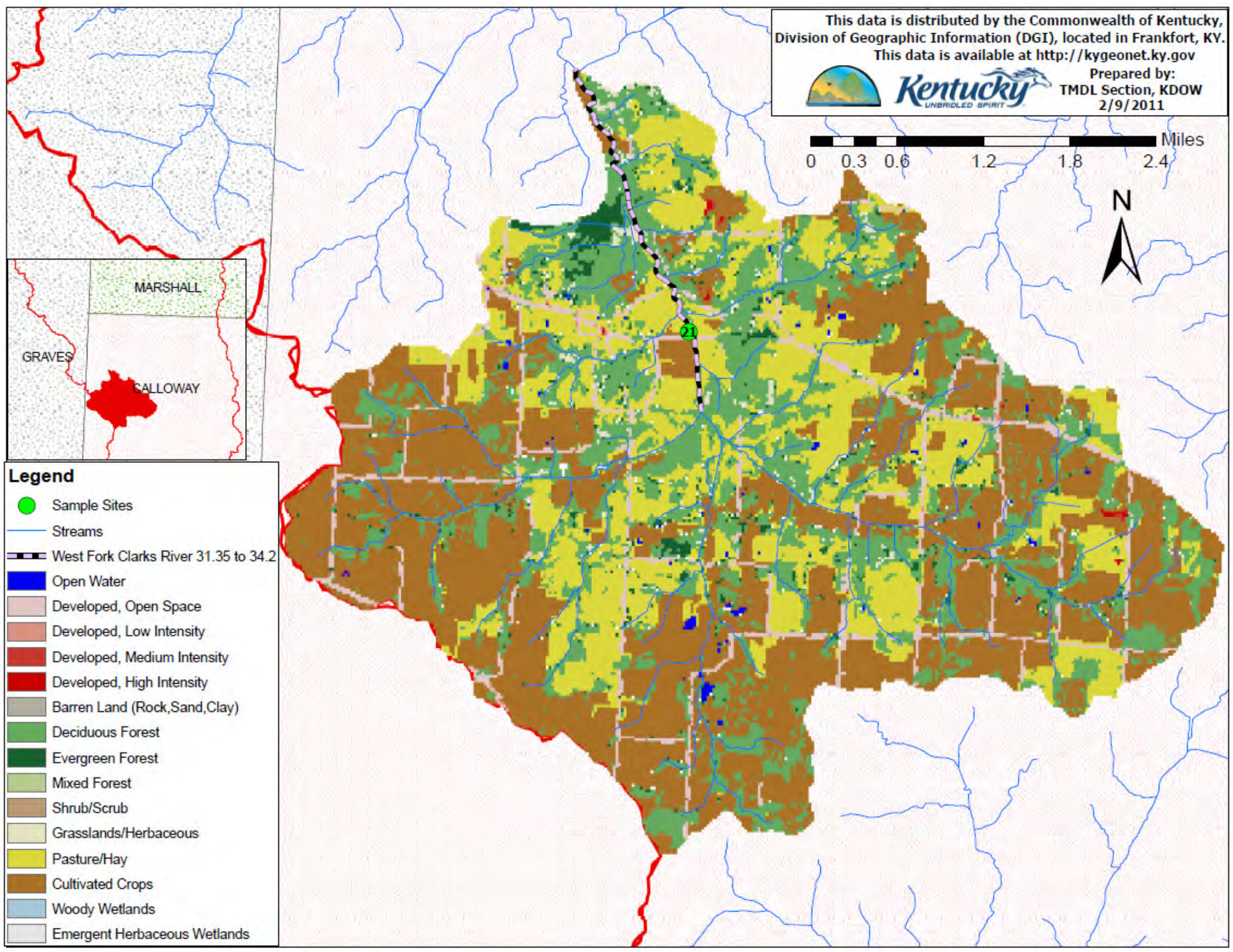

Figure 8.40 West Fork Clarks River RM 31.35 to 34.2 Subwatershed

Table 8.207 West Fork Clarks River RM 31.35 to 34.2 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
West Fork Clarks River of Clarks River	West Fork Clarks River RM 31.35 to 34.2	KY506426_07	Calloway	11,875	18.6	3rd
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
25.7	31.35	0.0	25.7			

Table 8.208 West Fork Clarks River RM 31.35 to 34.2 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
21	21	33.4	36.648033	-88.434417

Table 8.209 West Fork Clarks River RM 31.35 to 34.2 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	5.12	608.31	0.95	1
Agriculture (total)	65.63	7793.25	12.18	
Pasture	23.13	2747.06	4.29	
Row Crop	42.49	5046.18	7.88	
Forest	28.30	3360.93	5.25	
Natural Grassland	0.62	74.06	0.12	
Water	0.28	33.14	0.05	
Wetland	0.02	2.22	0.00	
Barren	0.02	2.89	0.00	
Total	100.00	11874.81	18.55	

Table 8.210 West Fork Clarks River RM 31.35 to 34.2 Data (Site 21)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Geomean *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
5/12/2005	150		
5/16/2005	148		
5/23/2005	378		
6/6/2005	3936		✓
6/13/2005	618	411.7	
6/20/2005	218	387.4	
6/27/2005	292	432.5	✓
7/7/2005	220		
7/11/2005	1366		
7/18/2005	456		
7/25/2005	378		
8/8/2005	374		
8/15/2005	492		
8/22/2005	758		
8/29/2005	1354		
9/12/2005	312		
9/19/2005	104		
9/26/2005	346		

Table 8.211 TMDL Calculations for West Fork Clarks River RM 31.35 to 34.2

Instantaneous[1] *E. coli* (colonies/day)	Geomean *E. coli* (colonies/day)	
2.47E+12	2.72E+11	Existing Load
1.51E+11	**8.17E+10**	**Total TMDL**
1.51E+10	**8.17E+09**	**MOS**
1.36E+11	7.36E+10	TMDL Target
94.5%	72.9%	% reduction
1.36E+11	7.36E+10	remainder
1.36E+09	**7.36E+08**	**Future Growth WLA**[2]
1.34E+11	**7.28E+10**	**LA**

Notes: [1]Because the Instantaneous TMDL has the greatest percent reduction, it sets the TMDL limits for this segment.
[2]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.2.41 West Fork Clarks River Relict Channel RM 0.0 to 13.8

West Fork Clarks River Relict Channel at RM 0.0 is a fourth order stream in the northwest part of the Clarks River watershed in Graves County (Figure 8.41). Information about West Fork Clarks River (relict Channel) RM 0.0 to 13.8 including its WBID and MAF is shown in Table 8.212. Site information is presented in Table 8.213. The subwatershed for the impaired segment has a total drainage area of approximately 10.7 square miles. The landcover in this subwatershed is predominantly mixed forest (48.4%) followed by agriculture (34.5%, mostly row crops) while urban/suburban development represents about 2.1% of the land cover (Table 8.214).

There are no KPDES permitted SWS discharges within the subwatershed boundary. Sampling data from site 40 are presented in Table 8.215 and the TMDL allocations in Table 8.216.

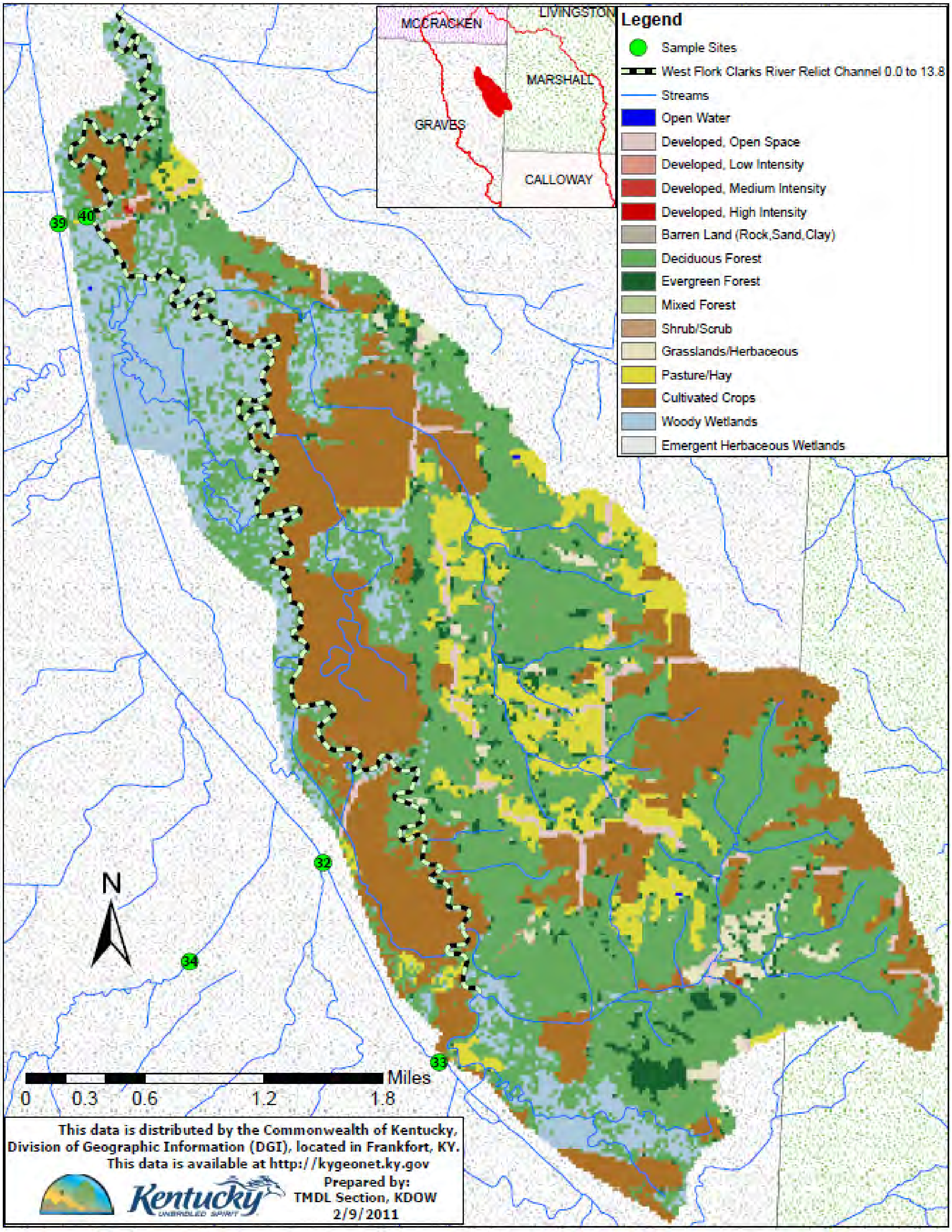

Figure 8.41 West Fork Clarks River Relict Channel RM 0.0 to13.8 Subwatershed

Table 8.212 West Fork Clarks River Relict Channel RM 0.0 to 13.8 Segment Information

Stream	Stream Segment	WBID #	County	Acres	Square Miles	Stream Order
West Fork Clarks River (Relict Channel) of Clarks River	West Fork Clarks River (Relict Channel) RM 0.0 to 13.8	KY506427_01	Graves	6826	10.7	4th
MAF (cfs)	RM of MAF Determination	+ to MAF (cfs)	Adjusted MAF (cfs)			
13.6	0.0	0.0	13.6			

Table 8.213 West Fork Clarks River Relict Channel RM 0.0 to 13.8 Site Information

Site Number	Map Site Number	Sample Point RM	Sample Site Latitude	Sample Site Longitude
40	40	2.4	36.884832	-88.550547

Table 8.214 West Fork Clarks River Relict Channel RM 0.0 to 13.8 Subwatershed Land Cover

Land Cover	% of Total Area	Acres	Watershed Square Miles	Future Growth WLA %
Developed	2.10	143.17	0.22	0.5
Agriculture (total)	34.56	2359.17	3.69	
Pasture	7.82	534.10	0.83	
Row Crop	26.74	1825.07	2.85	
Forest	48.36	3301.14	5.16	
Natural Grassland	1.58	108.16	0.17	
Water	0.02	1.12	0.00	
Wetland	13.38	913.20	1.43	
Barren	0.00	0.00	0.00	
Total	100.00	6825.95	10.67	

Table 8.215 West Fork Clarks River Relict Channel RM 0.0 to 13.8 Data (Site 40)

Sampling Date	Instantaneous *E. coli* colonies/100 mL	Exceedance used in TMDL calculations
6/14/2005	290	
6/21/2005	40	
7/14/2005	1300	✓
7/19/2005	126	
8/23/2005	40	
8/30/2005	768	
9/13/2005	20	
9/27/2005	104	

Table 8.216 TMDL Calculations for West Fork Clarks River Relict Channel RM 0.0 to 13.8

Instantaneous *E. coli* (colonies/day)	
4.33E+11	Existing Load
7.99E+10	**Total TMDL**
7.99E+09	**MOS**
7.19E+10	TMDL Target
83.4%	% reduction
7.19E+10	remainder
3.59E+08	**Future Growth WLA**[(1)]
7.15E+10	**LA**

Notes: [(1)]Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.

8.3 Summary for all TMDLs and Allocations

A summary table of the TMDL allocations for each segment is presented in Table 8.217.

Table 8.217 TMDL Summary Table

Waterbody Name	Existing Load (*E. coli* colonies/day)	**Total TMDL** (*E. coli* colonies/ day)	**MOS** (*E. coli* colonies / day)	TMDL Target (*E. coli* colonies/ day)	% reduction	**SWS-WLA** (*E. coli* colonies/day)	Remainder (*E. coli* colonies/ day)	**MS4 WLA** (*E. coli* colonies/ day)	**Future Growth WLA**[1] (*E. coli* colonies/ day)	**LA** (*E. coli* colonies/ day)
Bee Creek 0.0 to 0.7	1.59E+13	**1.35E+11**	**1.35E+10**	1.21E+11	99.2%	**7.95E+10 (Bee Creek WWTP 7.95E+10)**	4.17E+10	**1.21E+10**	**2.09E+09**	**2.75E+10**
Bee Creek 0.7 to 2.0	1.02E+13	**5.05E+10**	**5.05E+09**	4.54E+10	99.6%	**0**	4.54E+10	**1.31E+10**	**2.27E+09**	**3.00E+10**
Blizzard Pond 4.8 to 5.8	2.77E+12	**2.35E+10**	**2.35E+09**	2.12E+10	99.2%	**6.36E+08 (Great Oaks Subdivision 6.36E+08)**	2.05E+10	**N/A**[3]	**2.05E+08**	**2.03E+10**
Blizzard Pond Drainage Canal 0.0 to 3.7	1.28E+13	**1.09E+11**	**1.09E+10**	9.78E+10	99.2%	**6.63E+08 (Freemont Baptist Mission 2.73E+07), (Great Oaks Subdivision 6.36E+08)**	9.72E+10	**N/A**[3]	**9.72E+08**	**9.62E+10**
Camp Creek 0.0 to 5.4	1.04E+13	**1.12E+11**	**1.12E+10**	1.00E+11	99.0%	**0**	1.00E+11	**N/A**[3]	**5.02E+08**	**9.99E+10**
Camp Creek 5.4 to 9.5	8.76E+11	**2.88E+10**	**2.88E+09**	2.59E+10	97.0%	**0**	2.59E+10	**N/A**[3]	**1.29E+08**	**2.58E+10**
Chestnut Creek 0.0 to 3.0	1.24E+13	**6.15E+10**	**6.15E+09**	5.54E+10	99.6%	**1.65E+09 (Marshall County High School and Technical Center 2.73E+08), (Marshall County Sanitation District #2 1.36E+09), (Memory Lane Trailer Court 1.82E+07)**	5.37E+10	**N/A**[3]	**5.37E+08**	**5.32E+10**
Clarks River 13.2 to 20.6	1.45E+13	**2.46E+12**	**2.46E+11**	2.21E+12	84.7%	**9.24E+10 (Bee Creek WWTP 7.95E+10), (Benton STP 9.08E+09), (East Calloway Elementary School 7.27E+07), (Golden Acres Subdivision 2.27E+08), (Hardin STP 1.29E+09), (Marshall County High School and Technical Center 2.73E+08), (Marshall County Sanitation District #2 1.36E+09), (Memory Lane Trailer Court 1.82E+07), (Murray Mobile Home & RV Park 6.36E+07), (North Calloway Elementary School 7.27E+07), (South 641 Water District 2.73E+08), (South Marshall Elementary and Middle School 5.45E+07), (Southwest Calloway Elementary School 7.27E+07)**	2.12E+12	**4.04E+10**	**2.12E+10**	**2.06E+12**[2]

Waterbody Name	Existing Load (*E. coli* colonies/day)	**Total TMDL** (*E. coli* colonies/ day)	**MOS** (*E. coli* colonies / day)	TMDL Target (*E. coli* colonies/ day)	% reduction	**SWS-WLA** (*E. coli* colonies/day)	Remainder (*E. coli* colonies/ day)	**MS4 WLA** (*E. coli* colonies/ day)	**Future Growth WLA**(1) (*E. coli* colonies/ day)	**LA** (*E. coli* colonies/ day)
Clarks River 55.6 to 64.7	3.59E+13	**1.18E+12**	**1.18E+11**	1.06E+12	97.0%	**8.00E+10 (Bee Creek WWTP 7.95E+10), (East Calloway Elementary School 7.27E+07), (Murray Mobile Home and RV Park 6.36E+07), (North Calloway Elementary School 7.27E+07), (South 641 Water District 2.73E+08), (Southwest Calloway Elementary School 7.27E+07)**	9.18E+11	**4.03E+10**	**1.96E+10**	**9.21E+11**(2)
Clarks River 64.7 to 66.8	1.09E+14	**7.53E+11**	**7.53E+10**	6.78E+11	99.4%	**4.18E+08 (East Calloway Elementary School 7.27E+07), (South 641 Water District 2.73E+08), (Southwest Calloway Elementary School 7.27E+07)**	6.77E+11	**1.83E+10**	**6.77E+09**	**6.52E+11**(2)
Clayton Creek 3.3 to 7.7	3.82E+12	**5.28E+10**	**5.28E+09**	4.76E+10	98.8%	**0**	4.76E+10	**N/A**(3)	**4.76E+08**	**4.71E+10**
Clayton Creek Relict Channel 0.0 to 1.2	4.88E+11	**3.83E+10**	**3.83E+09**	3.45E+10	92.9%	**1.36E+08 (East Calloway Elementary School 7.27E+07), (Murray Mobile Home and RV Park 6.36E+07)**	3.43E+10	**N/A**(3)	**6.87E+08**	**3.36E+10**
Damon Creek 0.0 to 1.8	2.25E+12	**4.40E+10**	**4.40E+09**	3.96E+10	98.2%	**0**	3.96E+10	**N/A**(3)	**1.98E+08**	**3.94E+10**
Duncan Creek 0.0 to 2.5	1.45E+12	**8.93E+10**	**8.93E+09**	8.03E+10	94.5%	**0**	8.03E+10	**N/A**(3)	**4.02E+08**	**7.99E+10**
East Fork Clarks River 0.0 to 2.7	4.80E+11	**3.29E+11**	**3.29E+10**	2.96E+11	38.3%	**2.73E+08 (South 641 Water District 2.73E+08)**	2.96E+11	**N/A**(3)	**2.96E+09**	**2.93E+11**(2)
East Fork Clarks River 7.1 to 8.0	5.12E+11	**1.06E+11**	**1.06E+10**	9.51E+10	81.4%	**0**	9.51E+10	**N/A**(3)	**9.51E+08**	**9.42E+10**(2)
Farley Branch 0.0 to 2.2	3.22E+11	**1.10E+11**	**1.10E+10**	9.94E+10	69.1%	**0**	9.94E+10	**N/A**(3)	**9.94E+08**	**9.84E+10**(2)
Haskell Branch 1.2 to 4.5	3.17E+10	**2.17E+10**	**2.17E+09**	1.96E+10	38.3%	**0**	1.96E+10	**N/A**(3)	**9.78E+07**	**1.95E+10**
Middle Fork Creek of Clarks River 0.2 to 6.0	6.98E+12	**1.71E+11**	**1.71E+10**	1.54E+11	97.8%	**0**	1.54E+11	**N/A**(3)	**1.54E+09**	**1.53E+11**
Middle Fork of Clarks River 2.7 to 4.8	8.43E+11	**2.40E+11**	**2.40E+10**	2.16E+11	74.4%	**7.27E+07 (Southwest Calloway Elementary School 7.27E+07)**	2.16E+11	**N/A**(3)	**2.16E+09**	**2.13E+11**
Middle Fork of Clarks River 6.15 to 9.1	1.91E+12	**1.41E+11**	**1.41E+10**	1.27E+11	93.3%	**0**	1.27E+11	**N/A**(3)	**1.27E+09**	**1.26E+11**
Panther Creek 0.0 to 3.0	7.85E+11	**1.64E+11**	**1.64E+10**	1.48E+11	81.2%	**0**	1.48E+11	**N/A**(3)	**7.40E+08**	**1.47E+11**
Sand Lick Branch 0.0 to 1.2	2.11E+11	**2.41E+10**	**2.41E+09**	2.17E+10	89.7%	**0**	2.17E+10	**N/A**(3)	**2.17E+08**	**2.15E+10**
Soldier Creek 0.0 to 5.7	8.40E+11	**1.52E+11**	**1.52E+10**	1.37E+11	83.7%	**0**	1.37E+11	**N/A**(3)	**6.84E+08**	**1.36E+11**
South Fork Camp Creek 0.0 to 1.3	1.24E+12	**4.58E+10**	**4.58E+09**	4.12E+10	96.7%	**0**	4.12E+10	**N/A**(3)	**2.06E+08**	**4.10E+10**

Waterbody Name	Existing Load (*E. coli* colonies/day)	**Total TMDL** (*E. coli* colonies/ day)	**MOS** (*E. coli* colonies / day)	TMDL Target (*E. coli* colonies/ day)	% reduction	**SWS-WLA** (*E. coli* colonies/day)	Remainder (*E. coli* colonies/ day)	**MS4 WLA** (*E. coli* colonies/ day)	**Future Growth WLA**(1) (*E. coli* colonies/ day)	**LA** (*E. coli* colonies/ day)
Spring Creek 0.0 to 2.0	2.54E+13	**1.24E+11**	**1.24E+10**	1.12E+11	99.6%	**0**	1.12E+11	**N/A**(3)	**5.60E+08**	**1.11E+11**
Spring Creek 3.6 to 5.4	1.59E+10	**8.81E+09**	**8.81E+08**	7.93E+09	50.0%	**0**	7.93E+09	**N/A**(3)	**3.96E+07**	7.89E+09
Trace Creek 0.95 to 5.9	2.01E+11	**4.93E+10**	**4.93E+09**	4.44E+10	77.9%	**0**	4.44E+10	**N/A**(3)	**2.22E+08**	**4.42E+10**
Turkey Creek 0.0 to 3.4	7.03E+10	**2.35E+10**	**2.35E+09**	2.11E+10	69.9%	**0**	2.11E+10	**N/A**(3)	**1.06E+08**	**2.10E+10**
UT South Fork Camp Creek 0.0 to 3.0	1.55E+12	**3.82E+10**	**3.82E+09**	3.43E+10	97.8%	**0**	3.43E+10	**N/A**(3)	**3.43E+08**	**3.40E+10**
UT Chestnut Creek 0.0 to 0.7	2.01E+11	**3.12E+09**	**3.12E+08**	2.81E+09	98.6%	**1.36E+09 (Marshall County Sanitation District #2 1.36E+09)**	1.45E+09	**N/A**(3)	**5.80E+07**	**1.39E+09**
UT Blizzard Pond Drainage Canal 0.0 to 4.2	5.64E+11	**1.47E+10**	**1.47E+09**	1.32E+10	97.7%	**0**	1.32E+10	**N/A**(3)	**6.61E+07**	**1.31E+10**
West Fork of Clarks River 0.0 to 10.4	1.67E+13	**1.66E+12**	**1.66E+11**	1.49E+12	91.1%	**1.57E+09 (Freemont Baptist Mission 2.73E+07), (Great Oaks Subdivision 6.36E+08), (Symsonia Water and Sewer 9.08E+08)**	1.49E+12	**N/A**(3)	**7.47E+09**	**1.49E+12**
West Fork of Clarks River 10.4 to 13.1	3.71E+13	**1.18E+12**	**1.18E+11**	1.06E+12	97.1%	**0**	1.06E+12	**N/A**(3)	**5.30E+09**	**1.05E+12**
West Fork of Clarks River 13.1 to 17.2	8.08E+12	**1.01E+12**	**1.01E+11**	9.09E+11	88.7%	**0**	9.09E+11	**N/A**(3)	**4.55E+09**	**9.05E+11**
West Fork of Clarks River 20.1 to 28.4	1.35E+13	**5.44E+11**	**5.44E+10**	4.89E+11	96.4%	**0**	4.89E+11	**N/A**(3)	**2.45E+09**	**4.87E+11**
West Fork of Clarks River 28.4 to 29.15	3.11E+12	**2.47E+11**	**2.47E+10**	2.22E+11	92.9%	**0**	2.22E+11	**N/A**(3)	**2.22E+09**	**2.20E+11**
West Fork of Clarks River 29.15 to 31.35	1.16E+12	**2.31E+11**	**2.31E+10**	2.08E+11	82.1%	**0**	2.08E+11	**N/A**(3)	**2.08E+09**	**2.06E+11**
West Fork of Clarks River 31.35 to 34.2	2.47E+12	**1.51E+11**	**1.51E+10**	1.36E+11	94.5%	**0**	1.36E+11	**N/A**(3)	**1.36E+09**	**1.34E+11**
West Fork Clarks River Relict Channel 0.0 to 13.8	4.33E+11	**7.99E+10**	**7.99E+09**	7.19E+10	83.4%	**0**	7.19E+10	**N/A**(3)	**3.59E+08**	**7.15E+10**

Notes: (1)Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.
(2)The LA includes loadings entering KY from TN. To comply with this TMDL, KY expects waters entering the state from TN to meet the Water Quality Standards in 401 KAR 10:031 (i.e. geomean of 130 and instantaneous value of 240 *E. coli* colonies/100 ml).
(3)N/A indicates that there is no MS4 area in the subwatershed.

8.4 Translation of WLAs into Permit Limits

All KPDES-permitted point sources must meet permit limits based on the Water Quality Standards in 401 KAR 10:031. SWS-WLAs will be translated into KPDES permit limits as an *E. coli* effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average.

All MS4-WLAs will be translated into KPDES storm water permits.

9.0 Implementation Options

Section 303(e) of the Clean Water Act and 40 CFR Part 130, Section 130.5, require states to have a continuing planning process (CPP) composed of several parts specified in the Act and the regulation. The CPP provides an outline of agency programs and the available authority to address water issues. Under the CPP umbrella, the Watershed Management Branch of KDOW will provide technical support and leadership with developing and implementing watershed plans to address water quality and quantity problems and threats. Developing watershed plans enables more effective targeting of limited restoration funds and resources, thus improving environmental benefit, protection and recovery.

Watershed plans provide an integrative approach for identifying and describing how, when, who and what actions should be taken in order to meet water quality standards. At this time, a comprehensive watershed restoration plan for the Clarks River watershed has not been developed. This TMDL provides bacteria allocations and reduction goals that may assist with developing a detailed watershed plan to guide watershed restoration efforts.

A watershed plan for the Clarks River watershed should address both point and nonpoint sources of pollution in the watershed and should build on existing efforts as well as evaluate new approaches. Because of the specific landscape and location of the impairments in the Clarks River watershed, a watershed plan should incorporate all available restoration and protection mechanisms, including any existing Groundwater Protection Plans, storm water or wastewater KPDES permits. A comprehensive watershed plan should consider both voluntary and regulatory approaches to meet water quality standards. When such a plan is developed, pollutant trading may be a viable management strategy to consider for meeting the TMDL load reduction goals.

9.1 Kentucky Watershed Management Framework

A Watershed Management Framework approach to Water Quality Management was adopted by the KDOW in 1998. The plan divides Kentucky's major drainage basins into five groups of basins which are cycled through a five year staggered process which involves monitoring, assessment, prioritization, plan development, and plan implementation. As part of the process, a basin coordinator is assigned to each river basin to work with the citizens of the basin to develop a local Watershed Management Team associated with each priority watershed. For more information about the river basins see: http://water.ky.gov/watershed/Pages/Basins.aspx.

9.2 Non-Governmental Organizations

There are several Non-Governmental Organizations (NGO) that may be operating in the Clarks River watershed that may help to implement the TMDL, particularly with regard to nonpoint source issues. These organizations include Watershed Watch in Kentucky groups and Kentucky Waterways Alliance.

9.3 Watershed Watch in Kentucky

Watershed Watch is a citizen's water monitoring effort that relies exclusively on volunteers to provide administration, training, and volunteer and equipment coordination. The volunteers measure basic parameters of stream health to determine whether streams meet important "uses" under the Clean Water Act including aquatic life, human recreation, and drinking water.

Several water quality measurements are taken annually by Watershed Watch groups. Volunteers collect physical measurements, such as temperature, pH, dissolved oxygen, and conductivity. Stream monitoring may also include macroinvertebrate and habitat assessments. Data from annual monitoring are routinely used to help identify problems in the watershed, and assist with prioritizing streams for restoration and protection activities.

For more information about Watershed Watch see:
http://water.ky.gov/wsw/Pages/default.aspx.

9.4 Kentucky Waterways Alliance

The formation of Kentucky Waterways Alliance (KWA) was the result of a series of meetings sponsored by the Kentucky Environmental Quality Commission. The KWA has a mission to protect and restore Kentucky's waterways and their watersheds through alliances for watershed stewardship. This includes strengthening community and governmental stewardship for the restoration and preservation of Kentucky's water resources. The Alliance promotes networking, communication and mutual support among groups, government agencies, and businesses working on waterway issues.

For more information about KWA see:
http://www.kwalliance.org.

10.0 Public Participation

This TMDL document was published for a 30-day public comment period from August 24 through September 23, 2011. A public notice was be sent to all newspapers in the Commonwealth of Kentucky and an advertisement was purchased in three newspapers; the Mayfield Kentucky Messener, the Murray Ledger and Times, and the Paducah Sun. Additionally, the public notice was distributed electronically through the 'Press Release' mailing list maintained by the Governor's Office of media outlets across the Commonwealth.

All comments received during the public notice period were incorporated into the administrative record for these TMDLs. After consideration of each comment received, suitable revisions were made to the final TMDL document and responses were prepared and mailed to each individual or agency participating in the public notice process.

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Appendix A. Land Cover Definitions

Table A.1 National Land-Cover Database Class Descriptions
(taken from Homer et. al., 2004)

11. **Open Water** - All areas of open water, generally with less than 25% cover of vegetation or soil.

21. **Developed, Open Space** - Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes

22. **Developed, Low Intensity** - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.

23. **Developed, Medium Intensity** - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.

24**. Developed, High Intensity** - Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover.

31. **Barren Land (Rock/Sand/Clay)** - Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.

41. **Deciduous Forest** - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.

42. **Evergreen Forest** - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.

43. **Mixed Forest** - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.

52. **Shrub/Scrub** - Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.

71. **Grassland/Herbaceous** - Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.

81. **Pasture/Hay** - Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.

82. **Cultivated Crops** - Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.

90. **Woody Wetlands** - Areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

95. **Emergent Herbaceous Wetlands** - Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Appendix B. Monitoring Data

Tables B.1 through B.5 display the monitoring data summarized in Section 4. For all monitoring data tables, a red highlight indicates an exceedance of the instantaneous WQC (400 fecal coliform or 240 *E. coli* colonies/100ml) and an orange highlight indicates the sample failed the data validation process. Data that did not pass the validation process are not included in the data summary in Section 4 nor are they used in TMDL calculations.

Table B.1 TVA Data

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	Reason Not Validated
111207	36.8597	88.3597	5/15/1968	40	
111207	36.8597	88.3597	5/23/1968	20	
111207	36.8597	88.3597	5/31/1968	<10	
111207	36.8597	88.3597	6/12/1968	110	
111207	36.8597	88.3597	6/16/1968	310	
111207	36.8597	88.3597	6/25/1968	200	
111207	36.8597	88.3597	7/2/1968	<10	
111207	36.8597	88.3597	7/10/1968	<10	
111207	36.8597	88.3597	7/18/1968	150	
111207	36.8597	88.3597	7/26/1968	<10	
111207	36.8597	88.3597	8/11/1968	170	
111207	36.8597	88.3597	8/19/1968	<10	
111207	36.8597	88.3597	8/27/1968	<10	
111207	36.8597	88.3597	9/4/1968	1190	
111208	36.8597	88.3597	5/16/1968	40	
111208	36.8597	88.3597	5/23/1968	10	
111208	36.8597	88.3597	6/1/1968	<10	
111208	36.8597	88.3597	6/12/1968	<10	
111208	36.8597	88.3597	6/16/1968	<10	
111208	36.8597	88.3597	6/25/1968	70	
111208	36.8597	88.3597	7/2/1968	30	
111208	36.8597	88.3597	7/10/1968	80	
111208	36.8597	88.3597	7/18/1968	70	
111208	36.8597	88.3597	7/26/1968	<10	
111208	36.8597	88.3597	8/11/1968	<10	
111208	36.8597	88.3597	8/19/1968	<10	
111208	36.8597	88.3597	8/27/1968	20	
111208	36.8597	88.3597	9/4/1968	20	
111209	36.8597	88.3597	5/16/1968	<10	
111209	36.8597	88.3597	5/23/1968	<10	

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	Reason Not Validated
111209	36.8597	88.3597	6/1/1968	<10	
111209	36.8597	88.3597	6/12/1968	<10	
111209	36.8597	88.3597	6/16/1968	<10	
111209	36.8597	88.3597	6/25/1968	10	
111209	36.8597	88.3597	7/2/1968	20	
111209	36.8597	88.3597	7/10/1968	<10	
111209	36.8597	88.3597	7/18/1968	30	
111209	36.8597	88.3597	7/26/1968	<10	
111209	36.8597	88.3597	8/11/1968	<10	
111209	36.8597	88.3597	8/27/1968	<10	
111209	36.8597	88.3597	9/4/1968	<10	
111211	36.8597	88.3597	5/16/1968	10	
111211	36.8597	88.3597	5/23/1968	<10	
111211	36.8597	88.3597	6/1/1968	10	
111211	36.8597	88.3597	6/12/1968	10	
111211	36.8597	88.3597	6/16/1968	<10	
111211	36.8597	88.3597	6/25/1968	120	
111211	36.8597	88.3597	7/2/1968	50	
111211	36.8597	88.3597	7/10/1968	<10	
111211	36.8597	88.3597	7/18/1968	40	
111211	36.8597	88.3597	7/26/1968	<10	
111211	36.8597	88.3597	8/27/1968	<10	
111211	36.8597	88.3597	9/4/1968	<10	
111212	36.8597	88.3597	5/16/1968	30	
111212	36.8597	88.3597	5/23/1968	10	
111212	36.8597	88.3597	6/1/1968	<10	
111212	36.8597	88.3597	6/12/1968	30	
111212	36.8597	88.3597	6/16/1968	20	
111212	36.8597	88.3597	6/25/1968	20	
111212	36.8597	88.3597	7/3/1968	10	
111212	36.8597	88.3597	7/11/1968	<10	
111212	36.8597	88.3597	7/18/1968	<10	
111212	36.8597	88.3597	7/27/1968	<10	
111212	36.8597	88.3597	8/11/1968	<10	
111212	36.8597	88.3597	8/20/1968	100	
111212	36.8597	88.3597	8/27/1968	10	
111212	36.8597	88.3597	9/5/1968	50	
111221	36.8597	88.3597	5/23/1968	<10	

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	Reason Not Validated
111221	36.8597	88.3597	6/12/1968	<10	
111221	36.8597	88.3597	6/25/1968	200	
111221	36.8597	88.3597	7/10/1968	20	
111221	36.8597	88.3597	7/26/1968	20	
111221	36.8597	88.3597	8/11/1968	40	
111221	36.8597	88.3597	8/27/1968	10	
111222	36.8597	88.3597	5/15/1968	20	
111222	36.8597	88.3597	5/23/1968	<10	
111222	36.8597	88.3597	5/31/1968	<10	
111222	36.8597	88.3597	6/12/1968	10	
111222	36.8597	88.3597	6/16/1968	40	
111222	36.8597	88.3597	6/25/1968	300	
111222	36.8597	88.3597	7/2/1968	10	
111222	36.8597	88.3597	7/10/1968	10	
111222	36.8597	88.3597	7/19/1968	<10	
111222	36.8597	88.3597	7/26/1968	<10	
111222	36.8597	88.3597	8/4/1968	<10	
111222	36.8597	88.3597	8/11/1968	<10	
111222	36.8597	88.3597	8/19/1968	220	
111222	36.8597	88.3597	8/27/1968	<10	
111222	36.8597	88.3597	9/4/1968	<10	
111223	36.8597	88.3597	5/15/1968	110	
111223	36.8597	88.3597	5/23/1968	10	
111223	36.8597	88.3597	5/31/1968	<10	
111223	36.8597	88.3597	6/12/1968	20	
111223	36.8597	88.3597	6/16/1968	40	
111223	36.8597	88.3597	6/25/1968	140	
111223	36.8597	88.3597	7/2/1968	140	
111223	36.8597	88.3597	7/10/1968	170	
111223	36.8597	88.3597	7/19/1968	180	
111223	36.8597	88.3597	7/26/1968	<10	
111223	36.8597	88.3597	8/4/1968	150	
111223	36.8597	88.3597	8/11/1968	8000	
111223	36.8597	88.3597	8/19/1968	<10	
111223	36.8597	88.3597	9/4/1968	<10	
111224	36.8597	88.3597	5/15/1968	80	
111224	36.8597	88.3597	5/23/1968	10	
111224	36.8597	88.3597	5/31/1968	<10	

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	Reason Not Validated
111224	36.8597	88.3597	6/12/1968	30	
111224	36.8597	88.3597	6/16/1968	50	
111224	36.8597	88.3597	6/25/1968	150	
111224	36.8597	88.3597	7/2/1968	10	
111224	36.8597	88.3597	7/10/1968	20	
111224	36.8597	88.3597	7/19/1968	30	
111224	36.8597	88.3597	7/26/1968	<10	
111224	36.8597	88.3597	8/4/1968	80	
111224	36.8597	88.3597	8/11/1968	370	
111224	36.8597	88.3597	8/19/1968	100	
111224	36.8597	88.3597	8/27/1968	<10	
111224	36.8597	88.3597	9/4/1968	50	
111225	36.8597	88.3597	5/15/1968	<10	
111225	36.8597	88.3597	5/31/1968	<10	
111225	36.8597	88.3597	6/16/1968	30	
111225	36.8597	88.3597	7/2/1968	1500	
111225	36.8597	88.3597	7/19/1968	30	
111225	36.8597	88.3597	7/26/1968	<10	
111225	36.8597	88.3597	8/19/1968	<10	
111225	36.8597	88.3597	9/4/1968	<10	
111226	36.8597	88.3597	5/15/1968	340	
111226	36.8597	88.3597	5/31/1968	50	
111226	36.8597	88.3597	6/16/1968	100	
111226	36.8597	88.3597	7/2/1968	20	
111226	36.8597	88.3597	7/19/1968	<10	
111226	36.8597	88.3597	8/19/1968	<10	
111226	36.8597	88.3597	9/4/1968	40	
202836	36.5672	88.2925	3/20/1968	80	Not in PCR Season
202836	36.5672	88.2925	6/5/1968	1200	
202836	36.5672	88.2925	7/9/1968	2100	
202839	36.6131	88.2953	3/20/1968	430000	Not in PCR Season
202839	36.6131	88.2953	6/5/1968	560000	
202839	36.6131	88.2953	7/9/1968	1410	
202840	36.6128	88.2878	3/20/1968	200	Not in PCR Season
202840	36.6128	88.2878	6/5/1968	8000	
202840	36.6128	88.2878	7/9/1968	500	
202841	36.6536	88.2794	3/20/1968	6500	Not in PCR Season

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	Reason Not Validated
202841	36.6536	88.2794	6/5/1968	170	
202841	36.6536	88.2794	7/9/1968	2100	
202842	36.6917	88.2736	6/5/1968	50	
202842	36.6917	88.2736	7/9/1968	1500	
202843	36.7422	88.2733	6/5/1968	40	
202843	36.7422	88.2733	7/9/1968	300	
202849	36.8736	88.3464	6/5/1968	54000	
202849	36.8736	88.3464	7/9/1968	157000	
202849	36.8736	88.3464	8/19/1968	730000	
202849	36.8736	88.3464	8/21/1968	140000	
202850	36.88	88.3503	7/9/1968	18000	
202850	36.88	88.3503	8/19/1968	43000	
202850	36.88	88.3503	8/21/1968	64000	
202851	36.8669	88.3314	7/9/1968	7900	
202851	36.8669	88.3314	8/19/1968	2000	
202851	36.8669	88.3314	8/21/1968	800	
202852	36.895	88.3786	8/19/1968	1700	
202852	36.895	88.3786	8/21/1968	300	
202853	36.9069	88.4106	8/19/1968	400	
202853	36.9069	88.4106	8/21/1968	310	

Table B.2 KDOW Data

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI038	36.69167	88.27361	7/9/1984	465		
PRI038	36.69167	88.27361	8/13/1984	560		
PRI038	36.69167	88.27361	9/10/1984	160		
PRI038	36.69167	88.27361	10/8/1984	>80		
PRI038	36.69167	88.27361	11/12/1984	>320		Not in PCR Season
PRI038	36.69167	88.27361	12/10/1984	<100		Not in PCR Season
PRI038	36.69167	88.27361	1/14/1985	<40		Not in PCR Season
PRI038	36.69167	88.27361	2/11/1985	550		Not in PCR Season
PRI038	36.69167	88.27361	3/11/1985	220		Not in PCR Season
PRI038	36.69167	88.27361	4/8/1985	<100		Not in PCR Season
PRI038	36.69167	88.27361	5/13/1985	140		
PRI038	36.69167	88.27361	7/8/1985	<80		
PRI038	36.69167	88.27361	8/12/1985	100		
PRI038	36.69167	88.27361	9/9/1985	260		
PRI038	36.69167	88.27361	10/14/1985	66		
PRI038	36.69167	88.27361	11/11/1985	97		Not in PCR Season
PRI038	36.69167	88.27361	12/9/1985	50		Not in PCR Season
PRI038	36.69167	88.27361	1/13/1986	10		Not in PCR Season
PRI038	36.69167	88.27361	2/10/1986	13		Not in PCR Season
PRI038	36.69167	88.27361	3/17/1986	79		Not in PCR Season

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI038	36.69167	88.27361	4/14/1986	100		Not in PCR Season
PRI038	36.69167	88.27361	5/19/1986	200		
PRI038	36.69167	88.27361	6/16/1986	260		
PRI038	36.69167	88.27361	7/21/1986	80		
PRI038	36.69167	88.27361	8/11/1986	>80		
PRI038	36.69167	88.27361	9/8/1986	400		
PRI038	36.69167	88.27361	10/13/1986	340		
PRI038	36.69167	88.27361	11/10/1986	830		Not in PCR Season
PRI038	36.69167	88.27361	12/8/1986	18		Not in PCR Season
PRI038	36.69167	88.27361	1/12/1987	94		Not in PCR Season
PRI038	36.69167	88.27361	2/9/1987	3		Not in PCR Season
PRI038	36.69167	88.27361	3/9/1987	2		Not in PCR Season
PRI038	36.69167	88.27361	4/13/1987	20		Not in PCR Season
PRI038	36.69167	88.27361	5/12/1987	47		
PRI038	36.69167	88.27361	6/8/1987	26		
PRI038	36.69167	88.27361	7/13/1987	200		
PRI038	36.69167	88.27361	8/10/1987	<40		
PRI038	36.69167	88.27361	9/14/1987	8		
PRI038	36.69167	88.27361	10/13/1987	58		
PRI038	36.69167	88.27361	11/16/1987	22		Not in PCR Season
PRI038	36.69167	88.27361	12/14/1987	200		Not in PCR Season
PRI038	36.69167	88.27361	1/11/1988	3		Not in PCR Season
PRI038	36.69167	88.27361	2/8/1988	42		Not in PCR

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
						Season
PRI038	36.69167	88.27361	3/14/1988	200		Not in PCR Season
PRI038	36.69167	88.27361	4/11/1988	99		Not in PCR Season
PRI038	36.69167	88.27361	5/9/1988	200		
PRI038	36.69167	88.27361	6/13/1988	140		
PRI038	36.69167	88.27361	7/11/1988	198		
PRI038	36.69167	88.27361	8/8/1988	100		
PRI038	36.69167	88.27361	9/12/1988	>200		
PRI038	36.69167	88.27361	10/10/1988	190		
PRI038	36.69167	88.27361	11/14/1988	110		Not in PCR Season
PRI038	36.69167	88.27361	12/12/1988	>200		Not in PCR Season
PRI038	36.69167	88.27361	1/10/1989	200		Not in PCR Season
PRI038	36.69167	88.27361	2/27/1989	43		Not in PCR Season
PRI038	36.69167	88.27361	3/15/1989	>400		Not in PCR Season
PRI038	36.69167	88.27361	4/10/1989	380		Not in PCR Season
PRI038	36.69167	88.27361	5/15/1989	52		
PRI038	36.69167	88.27361	6/13/1989	8000		
PRI038	36.69167	88.27361	7/17/1989	300		
PRI038	36.69167	88.27361	8/16/1989	110		
PRI038	36.69167	88.27361	9/19/1989	>400		
PRI038	36.69167	88.27361	10/16/1989	100		
PRI038	36.69167	88.27361	11/13/1989	200		Not in PCR Season
PRI038	36.69167	88.27361	12/13/1989	58		Not in PCR Season

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI038	36.69167	88.27361	1/15/1990	50		Not in PCR Season
PRI038	36.69167	88.27361	2/12/1990	180		Not in PCR Season
PRI038	36.69167	88.27361	3/19/1990	160		Not in PCR Season
PRI038	36.69167	88.27361	4/11/1990	33		Not in PCR Season
PRI038	36.69167	88.27361	5/16/1990	37		
PRI038	36.69167	88.27361	6/11/1990	100		
PRI038	36.69167	88.27361	7/24/1990	160		
PRI038	36.69167	88.27361	8/13/1990	83		
PRI038	36.69167	88.27361	9/11/1990	75		
PRI038	36.69167	88.27361	10/15/1990	93		
PRI038	36.69167	88.27361	11/13/1990	<40		Not in PCR Season
PRI038	36.69167	88.27361	12/12/1990	<40		Not in PCR Season
PRI038	36.69167	88.27361	1/14/1991	<33		Not in PCR Season
PRI038	36.69167	88.27361	2/13/1991	>400		Not in PCR Season
PRI038	36.69167	88.27361	3/11/1991	<33		Not in PCR Season
PRI038	36.69167	88.27361	4/15/1991	>400		Not in PCR Season
PRI038	36.69167	88.27361	5/20/1991	240		
PRI038	36.69167	88.27361	6/19/1991	65		
PRI038	36.69167	88.27361	7/10/1991	47		
PRI038	36.69167	88.27361	8/27/1991	>200		
PRI038	36.69167	88.27361	9/24/1991	63		
PRI038	36.69167	88.27361	10/16/1991	110		

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI038	36.69167	88.27361	11/13/1991	<33		Not in PCR Season
PRI038	36.69167	88.27361	12/19/1991	58		Not in PCR Season
PRI038	36.69167	88.27361	1/22/1992	<33		Not in PCR Season
PRI038	36.69167	88.27361	2/11/1992	<33		Not in PCR Season
PRI038	36.69167	88.27361	3/11/1992	>400		Not in PCR Season
PRI038	36.69167	88.27361	4/13/1992	<33		Not in PCR Season
PRI038	36.69167	88.27361	5/11/1992	<33		
PRI038	36.69167	88.27361	6/9/1992	60		
PRI038	36.69167	88.27361	7/28/1992	280		
PRI038	36.69167	88.27361	8/12/1992	>400		
PRI038	36.69167	88.27361	9/15/1992	>400		
PRI038	36.69167	88.27361	10/12/1992	130		
PRI038	36.69167	88.27361	11/11/1992	90		Not in PCR Season
PRI038	36.69167	88.27361	12/15/1992	48		Not in PCR Season
PRI038	36.69167	88.27361	1/14/1993	>400		Not in PCR Season
PRI038	36.69167	88.27361	2/9/1993	<33		Not in PCR Season
PRI038	36.69167	88.27361	3/9/1993	<33		Not in PCR Season
PRI038	36.69167	88.27361	4/12/1993	>400		Not in PCR Season
PRI038	36.69167	88.27361	5/11/1993	100		
PRI038	36.69167	88.27361	6/16/1993	97		
PRI038	36.69167	88.27361	7/12/1993	130		

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI038	36.69167	88.27361	8/10/1993	88		
PRI038	36.69167	88.27361	9/14/1993	95		
PRI038	36.69167	88.27361	10/13/1993	<100		
PRI038	36.69167	88.27361	11/8/1993	<33		Not in PCR Season
PRI038	36.69167	88.27361	12/8/1993	110		Not in PCR Season
PRI038	36.69167	88.27361	1/10/1994	40		Not in PCR Season
PRI038	36.69167	88.27361	2/15/1994	70		Not in PCR Season
PRI038	36.69167	88.27361	3/15/1994	33		Not in PCR Season
PRI038	36.69167	88.27361	4/12/1994	240		Not in PCR Season
PRI038	36.69167	88.27361	5/16/1994	190		
PRI038	36.69167	88.27361	6/21/1994	70		
PRI038	36.69167	88.27361	7/26/1994	140		
PRI038	36.69167	88.27361	8/16/1994	120		
PRI038	36.69167	88.27361	9/13/1994	87		
PRI038	36.69167	88.27361	10/17/1994	90		
PRI038	36.69167	88.27361	11/15/1994	75		Not in PCR Season
PRI038	36.69167	88.27361	12/19/1994	190		Not in PCR Season
PRI038	36.69167	88.27361	1/10/1995	190		Not in PCR Season
PRI038	36.69167	88.27361	2/14/1995	50		Not in PCR Season
PRI038	36.69167	88.27361	3/15/1995	58		Not in PCR Season
PRI038	36.69167	88.27361	4/11/1995	50		Not in PCR Season

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI038	36.69167	88.27361	5/9/1995	89		
PRI038	36.69167	88.27361	6/19/1995	88		
PRI038	36.69167	88.27361	7/18/1995	78		
PRI038	36.69167	88.27361	8/15/1995	320		
PRI038	36.69167	88.27361	9/12/1995	72		
PRI038	36.69167	88.27361	4/9/1996	40		Not in PCR Season
PRI038	36.69167	88.27361	5/22/1996	110		
PRI038	36.69167	88.27361	6/18/1996	160		
PRI038	36.69167	88.27361	7/22/1996	110		
PRI038	36.69167	88.27361	8/21/1996	50		
PRI038	36.69167	88.27361	9/24/1996	250		
PRI038	36.69167	88.27361	10/23/1996	>400		
PRI038	36.69167	88.27361	5/21/1997	<200		
PRI038	36.69167	88.27361	6/17/1997	<400		
PRI038	36.69167	88.27361	8/11/1997	630		
PRI038	36.69167	88.27361	10/15/1997	50		
PRI038	36.69167	88.27361	5/12/1998	140		
PRI068	36.99567	88.56303	6/8/1998	450		
PRI068	36.99567	88.56303	8/30/1998	70		
PRI068	36.99567	88.56303	10/30/1998	30		
PRI068	36.996	-88.563	6/9/2010		>2420	
PRI068	36.996	-88.563	7/13/2010		836	
PRI068	36.996	-88.563	8/17/2010		11	
PRI106	36.9613	-88.4932	12/14/1999	600		Not in PCR Season
PRI106	36.9613	-88.4932	5/10/2000	30		
PRI106	36.9613	-88.4932	6/13/2000	30		
PRI106	36.9613	-88.4932	7/12/2000	20		
PRI106	36.9613	-88.4932	7/13/2000	100		
PRI106	36.9613	-88.4932	8/17/2000	30		
PRI106	36.9613	-88.4932	9/13/2000	80		
PRI106	36.9613	-88.4932	10/26/2000	10		
PRI106	36.9613	-88.4932	11/15/2000	60		Not in PCR Season

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI106	36.9613	-88.4932	1/11/2001	10		Not in PCR Season
PRI106	36.9613	-88.4932	2/14/2001	30		Not in PCR Season
PRI106	36.9613	-88.4932	3/12/2001	10		Not in PCR Season
PRI106	36.9613	-88.4932	5/17/2001	20		
PRI106	36.9613	-88.4932	6/14/2001	40		
PRI106	36.9613	-88.4932	7/9/2001	382		
PRI106	36.9613	-88.4932	7/18/2001	190		
PRI106	36.9613	-88.4932	8/22/2001	100		
PRI106	36.9613	-88.4932	9/18/2001	110		
PRI106	36.9613	-88.4932	10/17/2001	290		
PRI106	36.9613	-88.4932	5/22/2002	60		
PRI106	36.9613	-88.4932	6/20/2002	600		
PRI106	36.9613	-88.4932	7/18/2002	110		
PRI106	36.9613	-88.4932	8/20/2002	320		
PRI106	36.9613	-88.4932	9/17/2002	340		
PRI106	36.9613	-88.4932	10/22/2002	170		
PRI106	36.9613	-88.4932	5/21/2003	480		
PRI106	36.9613	-88.4932	6/12/2003	600		
PRI106	36.9613	-88.4932	8/18/2003	180		
PRI106	36.9613	-88.4932	9/16/2003	120		
PRI106	36.9613	-88.4932	10/20/2003	60		
PRI106	36.9613	-88.4932	5/20/2004	120		
PRI106	36.9613	-88.4932	6/17/2004	*Present < QL		
PRI106	36.9613	-88.4932	8/11/2004	65		
PRI106	36.9613	-88.4932	10/13/2004	1300		
PRI106	36.9613	-88.4932	5/18/2005	730		
PRI106	36.9613	-88.4932	6/15/2005	290		
PRI106	36.9613	-88.4932	7/13/2005	100		
PRI106	36.9613	-88.4932	8/10/2005	310		
PRI106	36.9613	-88.4932	9/20/2005	340		
PRI106	36.9613	-88.4932	10/18/2005	40		
PRI106	36.9613	-88.4932	5/11/2006	480		
PRI106	36.9613	-88.4932	6/14/2006	200		

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI106	36.9613	-88.4932	7/18/2006	160		
PRI106	36.9613	-88.4932	8/16/2006	160		
PRI106	36.9613	-88.4932	9/12/2006	800		
PRI106	36.9613	-88.4932	10/10/2006	120		
PRI106	36.9613	-88.4932	6/12/2007		50	
PRI106	36.9613	-88.4932	9/11/2007		50	
PRI106	36.9613	-88.4932	5/12/2008		165	
PRI106	36.9613	-88.4932	6/12/2008		15	
PRI106	36.9613	-88.4932	7/14/2008		600	
PRI106	36.9613	-88.4932	10/21/2008		25	
PRI106	36.9613	-88.4932	6/15/2009		641	
PRI106	36.9613	-88.4932	8/18/2009		33	
PRI106	36.9613	-88.4932	10/20/2009		186	
PRI106	36.9613	-88.4932	5/19/2010		1414	
PRI106	36.9613	-88.4932	6/10/2010		34	
PRI106	36.9613	-88.4932	7/15/2010		40	
PRI106	36.9613	-88.4932	8/19/2010		37	
PRI107	36.93245	-88.544	5/10/2000	180		
PRI107	36.93245	-88.544	6/13/2000	60		
PRI107	36.93245	-88.544	7/12/2000	130		
PRI107	36.93245	-88.544	8/17/2000	30		
PRI107	36.93245	-88.544	9/13/2000	220		
PRI107	36.93245	-88.544	10/26/2000	10		
PRI107	36.93245	-88.544	11/15/2000	530		Not in PCR Season
PRI107	36.93245	-88.544	1/11/2001	10		Not in PCR Season
PRI107	36.93245	-88.544	2/14/2001	260		Not in PCR Season
PRI107	36.93245	-88.544	3/12/2001	30		Not in PCR Season
PRI107	36.93245	-88.544	5/17/2001	40		
PRI107	36.93245	-88.544	6/14/2001	80		
PRI107	36.93245	-88.544	7/18/2001	510		
PRI107	36.93245	-88.544	8/22/2001	130		
PRI107	36.93245	-88.544	9/18/2001	180		

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI107	36.93245	-88.544	10/17/2001	280		
PRI107	36.93245	-88.544	5/22/2002	250		
PRI107	36.93245	-88.544	6/20/2002	10		
PRI107	36.93245	-88.544	7/18/2002	380		
PRI107	36.93245	-88.544	8/20/2002	540		
PRI107	36.93245	-88.544	9/17/2002	400		
PRI107	36.93245	-88.544	10/22/2002	140		
PRI107	36.93245	-88.544	5/21/2003	390		
PRI107	36.93245	-88.544	6/12/2003	600		
PRI107	36.93245	-88.544	8/18/2003	440		
PRI107	36.93245	-88.544	9/16/2003	350		
PRI107	36.93245	-88.544	10/20/2003	120		
PRI107	36.93245	-88.544	5/20/2004	270		
PRI107	36.93245	-88.544	6/17/2004	*Present < QL		
PRI107	36.93245	-88.544	8/11/2004	430		
PRI107	36.93245	-88.544	10/13/2004	1100		
PRI107	36.93245	-88.544	5/18/2005	380		
PRI107	36.93245	-88.544	6/15/2005	440		
PRI107	36.93245	-88.544	7/13/2005	1450		
PRI107	36.93245	-88.544	8/10/2005	750		
PRI107	36.93245	-88.544	9/20/2005	1800		
PRI107	36.93245	-88.544	10/18/2005	120		
PRI107	36.93245	-88.544	5/11/2006	570		
PRI107	36.93245	-88.544	6/14/2006	100		
PRI107	36.93245	-88.544	7/18/2006	80		
PRI107	36.93245	-88.544	8/16/2006	400		
PRI107	36.93245	-88.544	9/12/2006	800		
PRI107	36.93245	-88.544	10/10/2006	80		
PRI107	36.93245	-88.544	6/12/2007		50	
PRI107	36.93245	-88.544	9/11/2007		225	
PRI107	36.93245	-88.544	5/12/2008		402	
PRI107	36.93245	-88.544	6/12/2008		228	
PRI107	36.93245	-88.544	7/14/2008		1260	
PRI107	36.93245	-88.544	10/21/2008		230	
PRI107	36.93245	-88.544	6/15/2009		436	
PRI107	36.93245	-88.544	8/18/2009		96	
PRI107	36.93245	-88.544	10/20/2009		361	

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)	*E. coli* (colonies/100ml)	Reason Not Validated
PRI107	36.93245	-88.544	5/19/2010		214	
PRI107	36.93245	-88.544	6/10/2010		>2420	
PRI107	36.93245	-88.544	7/15/2010		123	
PRI107	36.93245	-88.544	8/19/2010		44	
TRW002	36.80556	-88.5222	5/10/2000	10		
TRW002	36.80556	-88.5222	6/13/2000	110		
TRW002	36.80556	-88.5222	7/12/2000	150		
TRW002	36.80556	-88.5222	8/17/2000	60		
TRW002	36.80556	-88.5222	9/12/2000	600		
TRW002	36.80556	-88.5222	10/25/2000	50		
TRW002	36.80556	-88.5222	11/16/2000	600		Not in PCR Season
TRW002	36.80556	-88.5222	12/12/2000	90		Not in PCR Season
TRW002	36.80556	-88.5222	1/9/2001	20		Not in PCR Season
TRW002	36.80556	-88.5222	2/13/2001	80		Not in PCR Season
TRW002	36.80556	-88.5222	3/20/2001	90		Not in PCR Season
TMDL01	36.74222	-88.2733	5/9/2000	30		
TMDL01	36.74222	-88.2733	7/13/2000	100		
TMDL01	36.74222	-88.2733	8/16/2000	30		
TMDL01	36.74222	-88.2733	9/12/2000	10		
TMDL01	36.74222	-88.2733	10/26/2000	10		
TMDL01	36.74222	-88.2733	5/21/2001	200		

Table B.3 MSU 319(h) Data

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)
1	36.6269	-88.302	5/25/2000	11,000
1	36.6269	-88.302	6/21/2000	3,200
1	36.6269	-88.302	7/26/2000	340
1	36.6269	-88.302	8/23/2000	370
1	36.6269	-88.302	9/27/2000	580
1	36.6269	-88.302	10/25/2000	70
2	36.9676	-88.545	5/24/2000	700
2	36.9676	-88.545	6/20/2000	410
2	36.9676	-88.545	7/24/2000	350
2	36.9676	-88.545	8/21/2000	160
2	36.9676	-88.545	9/25/2000	48,200
2	36.9676	-88.545	10/23/2000	30
3	36.9566	-88.543	5/24/2000	1,850
3	36.9566	-88.543	6/20/2000	320
3	36.9566	-88.543	7/26/2000	160
3	36.9566	-88.543	8/21/2000	30
3	36.9566	-88.543	9/25/2000	420
3	36.9566	-88.543	10/23/2000	300
4	36.9219	-88.37	5/24/2000	1,400
4	36.9219	-88.37	6/20/2000	300
4	36.9219	-88.37	7/24/2000	10
4	36.9219	-88.37	8/21/2000	210
4	36.9219	-88.37	9/25/2000	92,800
4	36.9219	-88.37	10/23/2000	10
5	36.5804	-88.252	5/25/2000	11,400
5	36.5804	-88.252	6/21/2000	1,700
5	36.5804	-88.252	7/26/2000	600
5	36.5804	-88.252	9/27/2000	740
6	36.7183	-88.459	5/25/2000	173,600
6	36.7183	-88.459	6/21/2000	228,000
6	36.7183	-88.459	7/26/2000	5,000
6	36.7183	-88.459	8/23/2000	21,600
6	36.7183	-88.459	9/27/2000	5,900
6	36.7183	-88.459	10/25/2000	750
7	36.7579	-88.449	5/25/2000	47,400
7	36.7579	-88.449	6/21/2000	1,500
7	36.7579	-88.449	7/26/2000	190
7	36.7579	-88.449	8/23/2000	100
7	36.7579	-88.449	9/27/2000	400
7	36.7579	-88.449	10/25/2000	70
8	36.6126	-88.288	5/25/2000	9,400
8	36.6126	-88.288	6/21/2000	800

Site	Latitude	Longitude	Date Sampled	Fecal Coliform (colonies/100ml)
8	36.6126	-88.288	7/26/2000	10
8	36.6126	-88.288	8/23/2000	30
8	36.6126	-88.288	9/27/2000	400
8	36.6126	-88.288	10/25/2000	10
9	36.5808	-88.315	5/25/2000	6,800
9	36.5808	-88.315	6/21/2000	1,100
9	36.5808	-88.315	7/26/2000	80
9	36.5808	-88.315	8/23/2000	30
9	36.5808	-88.315	9/27/2000	480
9	36.5808	-88.315	10/25/2000	60
10	36.8782	-88.412	5/24/2000	280
10	36.8782	-88.412	6/20/2000	570
10	36.8782	-88.412	7/24/2000	2,100
10	36.8782	-88.412	8/21/2000	260
10	36.8782	-88.412	9/25/2000	463,867
10	36.8782	-88.412	10/23/2000	10
11	36.933	-88.544	5/24/2000	1,650
11	36.933	-88.544	6/20/2000	1,500
11	36.933	-88.544	7/26/2000	100
11	36.933	-88.544	8/21/2000	60
11	36.933	-88.544	9/25/2000	3,050
11	36.933	-88.544	10/23/2000	40
12	36.8378	-88.527	5/24/2000	1,150
12	36.8378	-88.527	6/20/2000	2,100
12	36.8378	-88.527	7/24/2000	150
12	36.8378	-88.527	8/21/2000	20
12	36.8378	-88.527	9/25/2000	6,000
12	36.8378	-88.527	10/23/2000	40
13	36.7055	-88.461	5/25/2000	7,000
13	36.7055	-88.461	6/21/2000	82,000
13	36.7055	-88.461	7/26/2000	150
13	36.7055	-88.461	8/23/2000	290
13	36.7055	-88.461	9/27/2000	200
13	36.7055	-88.461	10/25/2000	90

Table B.4 JP RC&D 319(h) Data

Note: Many of the samples collected for this project were stormwater sampling events. A time of 0 indicates a sample collected before a storm began while other values indicate the time of sample collection after the storm began.

Site	Latitude	Longitude	Sample Date - Time	*E. coli* (colonies/100ml)	Reason Not validated
CR05	36.6126	-88.287	3/8/2006 - 0	98	Not in PCR Season
CR05	36.6126	-88.287	3/9/2006 - 6	244	Not in PCR Season
CR05	36.6126	-88.287	3/9/2006 - 12	5156	Not in PCR Season
CR05	36.6126	-88.287	3/10/2006 - 24	5510	Not in PCR Season
CR05	36.6126	-88.287	11/14/06 - 0	92	Not in PCR Season
CR05	36.6126	-88.287	11/15/06 - 6	10344	Not in PCR Season
CR05	36.6126	-88.287	11/15/06 - 14	264	Not in PCR Season
CR05	36.6126	-88.287	11/16/06 - 18	3030	Not in PCR Season
CR05	36.6126	-88.287	2/12/07 - 0	20	Not in PCR Season
CR05	36.6126	-88.287	2/12/07 - 6	388	Not in PCR Season
CR05	36.6126	-88.287	2/13/07 - 18	3076	Not in PCR Season
CR05	36.6126	-88.287	2/13/07 - 24	2613	Not in PCR Season
CR05	36.6126	-88.287	10/25/2006	370	
CR07	36.5916	-88.301	3/8/2006 - 0	52	Not in PCR Season
CR07	36.5916	-88.301	3/9/2006 - 6	172	Not in PCR Season
CR07	36.5916	-88.301	3/9/2006 - 12	9768	Not in PCR Season
CR07	36.5916	-88.301	3/10/2006 - 24	8704	Not in PCR Season
CR07	36.5916	-88.301	11/14/06 - 0	121	Not in PCR Season
CR07	36.5916	-88.301	11/15/06 - 6	12262	Not in PCR Season
CR07	36.5916	-88.301	11/15/06 - 14	2364	Not in PCR Season
CR07	36.5916	-88.301	11/16/06 - 18	2374	Not in PCR Season
CR07	36.5916	-88.301	2/12/07 - 0	41	Not in PCR Season
CR07	36.5916	-88.301	2/12/07 - 6	620	Not in PCR Season
CR07	36.5916	-88.301	2/13/07 - 18	1664	Not in PCR Season
CR07	36.5916	-88.301	2/13/07 - 24	2359	Not in PCR Season
CR07	36.5916	-88.301	10/25/2006	63	
CR08	36.5781	-88.388	3/8/2006 - 0	331	Not in PCR Season
CR08	36.5781	-88.388	3/9/2006 - 6	346	Not in PCR Season
CR08	36.5781	-88.388	3/9/2006 - 12	194	Not in PCR Season
CR08	36.5781	-88.388	3/10/2006 - 24	3836	Not in PCR Season
CR08	36.5781	-88.388	11/14/06 - 0	109	Not in PCR Season
CR08	36.5781	-88.388	11/15/06 - 6	10359	Not in PCR Season
CR08	36.5781	-88.388	11/15/06 - 14	194	Not in PCR Season
CR08	36.5781	-88.388	11/16/06 - 18	2666	Not in PCR Season
CR08	36.5781	-88.388	2/12/07 - 0	98	Not in PCR Season
CR08	36.5781	-88.388	2/12/07 - 6	41	Not in PCR Season
CR08	36.5781	-88.388	2/13/07 - 18	1032	Not in PCR Season
CR08	36.5781	-88.388	2/13/07 - 24	1017	Not in PCR Season
CR08	36.5781	-88.388	10/25/2006	98	Notes indicate that

Site	Latitude	Longitude	Sample Date - Time	*E. coli* (colonies/100ml)	Reason Not validated
					there was no flow
CR09	36.5649	-88.344	3/8/2006 - 0	122	Not in PCR Season
CR09	36.5649	-88.344	3/9/2006 - 6	104	Not in PCR Season
CR09	36.5649	-88.344	3/9/2006 - 12	82	Not in PCR Season
CR09	36.5649	-88.344	3/10/2006 - 24	2752	Not in PCR Season
CR09	36.5649	-88.344	11/14/06 - 0	171	Not in PCR Season
CR09	36.5649	-88.344	11/15/06 - 6	10950	Not in PCR Season
CR09	36.5649	-88.344	11/15/06 - 14	710	Not in PCR Season
CR09	36.5649	-88.344	11/16/06 - 18	3578	Not in PCR Season
CR09	36.5649	-88.344	2/12/07 - 0	228	Not in PCR Season
CR09	36.5649	-88.344	2/12/07 - 6	146	Not in PCR Season
CR09	36.5649	-88.344	2/13/07 - 18	2247	Not in PCR Season
CR09	36.5649	-88.344	2/13/07 - 24	2420	Not in PCR Season
CR09	36.5649	-88.344	10/25/2006	52	Notes indicate that there was no flow
CR11	36.5806	-88.253	3/8/2006 - 0	538	Not in PCR Season
CR11	36.5806	-88.253	3/9/2006 - 6	148	Not in PCR Season
CR11	36.5806	-88.253	3/9/2006 - 12	11588	Not in PCR Season
CR11	36.5806	-88.253	3/10/2006 - 24	5137	Not in PCR Season
CR11	36.5806	-88.253	11/14/06 - 0	52	Not in PCR Season
CR11	36.5806	-88.253	11/15/06 - 14	14540	Not in PCR Season
CR11	36.5806	-88.253	11/16/06 - 18	2324	Not in PCR Season
CR11	36.5806	-88.253	2/13/07 - 18	2755	Not in PCR Season
CR11	36.5806	-88.253	2/13/07 - 24	1597	Not in PCR Season
CR11	36.5806	-88.253	10/25/2006	30	Notes indicate that there was no flow
CR14	36.5027	-88.311	3/8/2006 - 0	379	Not in PCR Season
CR14	36.5027	-88.311	3/9/2006 - 6	976	Not in PCR Season
CR14	36.5027	-88.311	3/9/2006 - 12	7936	Not in PCR Season
CR14	36.5027	-88.311	3/10/2006 - 24	9768	Not in PCR Season
CR14	36.5027	-88.311	11/14/06 - 0	98	Not in PCR Season
CR14	36.5027	-88.311	11/15/06 - 14	25994	Not in PCR Season
CR14	36.5027	-88.311	11/16/06 - 18	13836	Not in PCR Season
CR14	36.5027	-88.311	2/12/07 - 0	146	Not in PCR Season
CR14	36.5027	-88.311	2/12/07 - 6	109	Not in PCR Season
CR14	36.5027	-88.311	2/13/07 - 18	2247	Not in PCR Season
CR14	36.5027	-88.311	2/13/07 - 24	1789	Not in PCR Season
CR14	36.5027	-88.311	10/25/2006	211	

Table B.5 TMDL Data

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
1	36.691694	-88.273557	5/18/05	646	0.0	No Flow
1	36.691694	-88.273557	5/25/05	148	0.0	No Flow
1	36.691694	-88.273557	6/1/05	124	81.0	
1	36.691694	-88.273557	6/8/05	126	161.7	
1	36.691694	-88.273557	6/15/05	320	627.9	
1	36.691694	-88.273557	6/22/05	104	72.7	
1	36.691694	-88.273557	7/12/05	1090	287.5	
1	36.691694	-88.273557	7/20/05	126	85.8	
1	36.691694	-88.273557	7/27/05	82	45.5	
1	36.691694	-88.273557	8/10/05	426	17.0	
1	36.691694	-88.273557	8/17/05	5510	56.7	QA Sample
1	36.691694	-88.273557	8/17/05	7308	56.7	
1	36.691694	-88.273557	8/24/05	150	14.2	QA Sample
1	36.691694	-88.273557	8/24/05	346	14.2	
1	36.691694	-88.273557	8/31/05	1248	1188.7	
1	36.691694	-88.273557	9/21/05	62	22.4	QA Sample
1	36.691694	-88.273557	9/21/05	194	22.4	
1	36.691694	-88.273557	9/28/05	82	7.8	
1	36.691694	-88.273557	10/12/05	20	26.0	
1	36.691694	-88.273557	10/12/05	126	26.0	
1	36.691694	-88.273557	10/19/05	20	19.0	
1	36.691694	-88.273557	10/26/05	82	11.1	
1	36.691694	-88.273557	10/26/05	82	11.1	QA Sample
2A	36.6516	-88.28253	5/18/05	432	2.4	
2A	36.6516	-88.28253	5/25/05	150	1.7	
2A	36.6516	-88.28253	6/1/05	292	2.5	
2A	36.6516	-88.28253	6/8/05	886	1.0	
2A	36.6516	-88.28253	6/15/05	452	1.7	
2A	36.6516	-88.28253	6/22/05	82	0.8	
2A	36.6516	-88.28253	7/12/05	196	6.3	
2A	36.6516	-88.28253	7/20/05	20	1.8	
2A	36.6516	-88.28253	7/27/05	82	5.2	
2A	36.6516	-88.28253	8/10/05	104	1.3	
2A	36.6516	-88.28253	8/17/05	342	1.6	
2A	36.6516	-88.28253	8/24/05	124	1.4	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
2A	36.6516	-88.28253	8/31/05	1326	2.5	
2A	36.6516	-88.28253	9/14/05	104	12.9	
2B	36.653982	-88.287220	09/21/05	20	0.0	No Flow
2B	36.653982	-88.287220	10/10/05	292	0.0	No Flow
2B	36.653982	-88.287220	10/12/05	82	0.0	No Flow
2B	36.653982	-88.287220	10/17/05	62	0.0	No Flow
2B	36.653982	-88.287220	10/19/05	82	0.0	No Flow
2B	36.653982	-88.287220	10/24/05	82	0.0	No Flow
2B	36.653982	-88.287220	10/26/05	40	0.0	No Flow
2B	36.653982	-88.287220	10/27/05	<20	0.0	No Flow
3	36.63045	-88.29300	5/18/05	82	4.2	
3	36.63045	-88.29300	5/18/05	82	4.2	QA Sample
3	36.63045	-88.29300	5/25/05	82	3.8	
3	36.63045	-88.29300	6/1/05	148	6.0	
3	36.63045	-88.29300	6/8/05	196	2.4	
3	36.63045	-88.29300	6/15/05	370	6.1	
3	36.63045	-88.29300	6/22/05	82	4.6	
3	36.63045	-88.29300	7/12/05	11588	13.3	
3	36.63045	-88.29300	7/20/05	214	7.1	
3	36.63045	-88.29300	7/27/05	346	2.4	
3	36.63045	-88.29300	8/10/05	322	2.4	
3	36.63045	-88.29300	8/17/05	28272	8.0	
3	36.63045	-88.29300	8/24/05	218	6.6	
3	36.63045	-88.29300	8/31/05	798	15.2	QA Sample
3	36.63045	-88.29300	8/31/05	816	15.2	
3	36.63045	-88.29300	9/21/05	264	6.9	
3	36.63045	-88.29300	9/28/05	320	5.2	
3	36.63045	-88.29300	10/12/05	<20	7.2	
3	36.63045	-88.29300	10/19/05	82	7.6	
3	36.63045	-88.29300	10/26/05	170	5.5	
4	36.626783	-88.301950	05/18/05	402	0.6	
4	36.626783	-88.301950	05/25/05	398	1.2	
4	36.626783	-88.301950	06/01/05	240	1.0	QA Sample
4	36.626783	-88.301950	06/01/05	296	1.0	
4	36.626783	-88.301950	06/08/05	452	0.7	QA Sample

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
4	36.626783	-88.301950	06/08/05	758	0.7	
4	36.626783	-88.301950	06/15/05	432	1.2	QA Sample
4	36.626783	-88.301950	06/15/05	590	1.2	
4	36.626783	-88.301950	06/22/05	170	1.4	
4	36.626783	-88.301950	07/12/05	48392	3.9	
4	36.626783	-88.301950	07/20/05	312	1.7	QA Sample
4	36.626783	-88.301950	07/20/05	398	1.7	
4	36.626783	-88.301950	07/27/05	62	0.6	
4	36.626783	-88.301950	08/10/05	482	1.2	
4	36.626783	-88.301950	08/17/05	48392	2.1	
4	36.626783	-88.301950	08/24/05	218	1.1	
4	36.626783	-88.301950	08/31/05	1812	7.0	
4	36.626783	-88.301950	09/21/05	338	1.3	
4	36.626783	-88.301950	09/28/05	374	1.8	
4	36.626783	-88.301950	10/12/05	20	1.1	
4	36.626783	-88.301950	10/19/05	196	1.1	
4	36.626783	-88.301950	10/26/05	<20	1.0	
5	36.612550	-88.287467	05/18/05	378	28.3	
5	36.612550	-88.287467	05/25/05	82	22.8	
5	36.612550	-88.287467	06/01/05	150	12.7	
5	36.612550	-88.287467	06/08/05	690	5.4	
5	36.612550	-88.287467	06/15/05	126	36.5	
5	36.612550	-88.287467	06/22/05	82	9.4	
5	36.612550	-88.287467	07/12/05	506	19.0	
5	36.612550	-88.287467	07/20/05	62	18.2	
5	36.612550	-88.287467	07/27/05	244	4.1	
5	36.612550	-88.287467	08/10/05	288	2.0	
5	36.612550	-88.287467	08/17/05	6152	8.4	
5	36.612550	-88.287467	08/24/05	20	1.2	
5	36.612550	-88.287467	08/31/05	320	123.4	
5	36.612550	-88.287467	09/21/05	82	4.6	
5	36.612550	-88.287467	09/28/05	20	4.1	
5	36.612550	-88.287467	09/28/05	126	4.1	
5	36.612550	-88.287467	10/12/05	172	4.8	
5	36.612550	-88.287467	10/19/05	<20	3.2	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
5	36.612550	-88.287467	10/26/05	20	3.2	
7	36.591583	-88.301200	05/18/05	220	0.0	No Flow
7	36.591583	-88.301200	05/25/05	242	7.5	
7	36.591583	-88.301200	06/01/05	242	4.8	
7	36.591583	-88.301200	06/08/05	146	6.4	
7	36.591583	-88.301200	06/15/05	126	34.2	
7	36.591583	-88.301200	06/22/05	126	9.4	
7	36.591583	-88.301200	07/12/05	366	18.6	
7	36.591583	-88.301200	07/20/05	62	18.4	
7	36.591583	-88.301200	07/27/05	34658	5.7	
7	36.591583	-88.301200	08/10/05	194	0.1	
7	36.591583	-88.301200	08/17/05	718	4.4	
7	36.591583	-88.301200	08/24/05	148	1.1	
7	36.591583	-88.301200	09/02/05	150	37.6	QA Sample
7	36.591583	-88.301200	09/02/05	170	37.6	
7	36.591583	-88.301200	09/07/05	82	13.1	
7	36.591583	-88.301200	09/14/05	40	3.8	
7	36.591583	-88.301200	09/14/05	40	3.8	QA Sample
7	36.591583	-88.301200	09/21/05	148	2.3	
7	36.591583	-88.301200	09/28/05	194	3.2	QA Sample
7	36.591583	-88.301200	09/28/05	242	3.2	
7	36.591583	-88.301200	10/10/05	82	3.0	QA Sample
7	36.591583	-88.301200	10/10/05	150	3.0	
7	36.591583	-88.301200	10/17/05	20	3.2	
7	36.591583	-88.301200	10/19/05	40	1.4	
7	36.591583	-88.301200	10/24/05	20	2.8	
7	36.591583	-88.301200	10/27/05	20	4.1	
8	36.578117	-88.388450	05/18/05	406	2.3	
8	36.578117	-88.388450	05/25/05	462	1.8	
8	36.578117	-88.388450	06/01/05	882	1.8	
8	36.578117	-88.388450	06/08/05	320	0.5	
8	36.578117	-88.388450	06/15/05	462	0.7	
8	36.578117	-88.388450	06/22/05	312	1.4	
8	36.578117	-88.388450	07/12/05	432	2.3	QA Sample
8	36.578117	-88.388450	07/12/05	718	2.3	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
8	36.578117	-88.388450	07/20/05	242	0.6	
8	36.578117	-88.388450	07/27/05	172	0.3	QA Sample
8	36.578117	-88.388450	07/27/05	196	0.3	
8	36.578117	-88.388450	08/10/05	1024	0.0	QA Sample, No Flow
8	36.578117	-88.388450	08/10/05	1314	0.0	No Flow
8	36.578117	-88.388450	08/17/05	3248	1.8	
8	36.578117	-88.388450	08/24/05	150	0.0	No Flow
8	36.578117	-88.388450	08/31/05	558	4.6	
8	36.578117	-88.388450	09/21/05	82	0.0	No Flow
8	36.578117	-88.388450	09/28/05	40	0.0	No Flow
8	36.578117	-88.388450	10/12/05	60	0.0	No Flow
8	36.578117	-88.388450	10/19/05	82	0.0	No Flow
8	36.578117	-88.388450	10/26/05	104	0.0	No Flow
9	36.564933	-88.344283	05/18/05	264	4.0	
9	36.564933	-88.344283	05/25/05	126	3.4	
9	36.564933	-88.344283	06/01/05	244	1.2	
9	36.564933	-88.344283	06/08/05	62	0.1	
9	36.564933	-88.344283	06/15/05	700	0.5	
9	36.564933	-88.344283	06/22/05	168	0.3	QA Sample
9	36.564933	-88.344283	06/22/05	220	0.3	
9	36.564933	-88.344283	07/12/05	398	0.0	No Flow
9	36.564933	-88.344283	07/20/05	40	0.6	
9	36.564933	-88.344283	07/27/05	244	0.3	
9	36.564933	-88.344283	08/10/05	82	0.0	No Flow
9	36.564933	-88.344283	08/17/05	758	0.0	No Flow
9	36.564933	-88.344283	08/24/05	20	0.0	No Flow
9	36.564933	-88.344283	08/31/05	362	6.3	
9	36.564933	-88.344283	09/21/05	104	0.0	No Flow
9	36.564933	-88.344283	09/28/05	322	3.0	
9	36.564933	-88.344283	10/12/05	82	0.0	No Flow
9	36.564933	-88.344283	10/19/05	40	0.0	No Flow
9	36.564933	-88.344283	10/26/05	104		
10	36.610650	-88.280867	05/18/05	20	0.3	
10	36.610650	-88.280867	05/25/05	<20	0.1	
10	36.610650	-88.280867	06/01/05	242	0.1	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
10	36.610650	-88.280867	06/08/05	82	0.1	
10	36.610650	-88.280867	06/15/05	336	0.5	
10	36.610650	-88.280867	06/22/05	20	0.3	
10	36.610650	-88.280867	07/12/05	62	0.2	
10	36.610650	-88.280867	07/20/05	20	0.3	
10	36.610650	-88.280867	07/27/05	104	0.0	
10	36.610650	-88.280867	08/10/05	20	0.0	No Flow
10	36.610650	-88.280867	08/17/05	3058	0.1	
10	36.610650	-88.280867	08/24/05	82	0.0	
10	36.610650	-88.280867	08/31/05	456	3.6	
10	36.610650	-88.280867	09/21/05	<20	0.3	
10	36.610650	-88.280867	09/28/05	126	0.6	
10	36.610650	-88.280867	10/12/05	62	0.3	
10	36.610650	-88.280867	10/19/05	196	0.1	QA Sample
10	36.610650	-88.280867	10/19/05	268	0.1	
10	36.610650	-88.280867	10/26/05	40	0.2	
11	36.580647	-88.253117	5/18/05	240	0.0	No Flow
11	36.580647	-88.253117	5/25/05	378	0.0	No Flow
11	36.580647	-88.253117	6/1/05	402	0.0	No Flow
11	36.580647	-88.253117	6/8/05	10344	0.0	No Flow
11	36.580647	-88.253117	6/15/05	288	0.2	
11	36.580647	-88.253117	6/22/05	148	0.0	No Flow
11	36.580647	-88.253117	7/20/05	170	0.4	
11	36.580647	-88.253117	7/27/05	2934	0.0	No Flow
11	36.580647	-88.253117	8/10/05	20	0.0	No Flow
11	36.580647	-88.253117	8/31/05	238	2.3	
11	36.580647	-88.253117	9/21/05	172	0.0	No Flow
11	36.580647	-88.253117	9/28/05	126	0.0	No Flow
11	36.580647	-88.253117	5/4/06	4978	32.0	
11	36.580647	-88.253117	5/10/06	3870	1.9	
11	36.580647	-88.253117	5/31/06	8704	6.2	
11	36.580647	-88.253117	6/19/06	2708	5.8	
11	36.580647	-88.253117	7/5/06	17328	9.0	
11	36.580647	-88.253117	7/13/06	576	0.3	
11	36.580647	-88.253117	9/25/06	268	0.8	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
12	36.572600	-88.343750	5/18/05	104	3.8	
12	36.572600	-88.343750	5/25/05	126	2.3	
12	36.572600	-88.343750	6/1/05	148	0.9	
12	36.572600	-88.343750	6/8/05	104	0.7	
12	36.572600	-88.343750	6/15/05	292	14.8	
12	36.572600	-88.343750	6/22/05	40	2.4	
12	36.572600	-88.343750	7/12/05	844	2.6	
12	36.572600	-88.343750	7/20/05	172	6.7	
12	36.572600	-88.343750	7/27/05	220	1.3	
12	36.572600	-88.343750	8/10/05	62	0.3	
12	36.572600	-88.343750	8/17/05	710	0.6	
12	36.572600	-88.343750	8/24/05	544	0.4	
12	36.572600	-88.343750	8/31/05	172	42.0	
12	36.572600	-88.343750	9/21/05	316	1.3	
12	36.572600	-88.343750	9/28/05	290	2.4	
12	36.572600	-88.343750	10/12/05	168	4.2	
12	36.572600	-88.343750	10/19/05	40	0.6	
12	36.572600	-88.343750	10/26/05	20	1.4	
13	36.517850	-88.314200	05/18/05	62	1.3	
13	36.517850	-88.314200	05/25/05	40	0.8	
13	36.517850	-88.314200	05/25/05	<20	0.8	QA Sample
13	36.517850	-88.314200	06/01/05	40	0.7	
13	36.517850	-88.314200	06/08/05	<20	0.7	
13	36.517850	-88.314200	06/15/05	218	4.0	
13	36.517850	-88.314200	06/22/05	40	1.6	
13	36.517850	-88.314200	07/12/05	550	4.0	
13	36.517850	-88.314200	07/20/05	104	2.2	
13	36.517850	-88.314200	07/27/05	172	0.8	
13	36.517850	-88.314200	08/10/05	126	0.3	
13	36.517850	-88.314200	08/17/05	20	0.2	
13	36.517850	-88.314200	08/24/05	<20	0.3	
13	36.517850	-88.314200	08/31/05	590	14.9	
13	36.517850	-88.314200	09/21/05	40	0.8	
13	36.517850	-88.314200	09/28/05	20	1.1	
13	36.517850	-88.314200	10/12/05	196	0.8	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
13	36.517850	-88.314200	10/19/05	172	1.1	
13	36.517850	-88.314200	10/26/05	40	0.5	
14	36.502667	-88.310917	5/18/05	172	0.0	No Flow
14	36.502667	-88.310917	5/25/05	126	0.0	No Flow
14	36.502667	-88.310917	6/1/05	220	0.8	
14	36.502667	-88.310917	6/8/05	370	0.4	
14	36.502667	-88.310917	6/15/05	148	2.5	
14	36.502667	-88.310917	6/22/05	126	0.6	
14	36.502667	-88.310917	7/12/05	728	3.7	
14	36.502667	-88.310917	7/20/05	492	2.4	
14	36.502667	-88.310917	7/27/05	168	0.8	
14	36.502667	-88.310917	8/10/05	1162	1.2	
14	36.502667	-88.310917	8/17/05	40	0.4	
14	36.502667	-88.310917	8/24/05	82	0.2	
14	36.502667	-88.310917	8/31/05	656	16.6	
14	36.502667	-88.310917	9/21/05	948	0.6	
14	36.502667	-88.310917	9/28/05	218	0.4	
14	36.502667	-88.310917	10/12/05	322	0.7	
14	36.502667	-88.310917	10/19/05	126	0.3	
14	36.502667	-88.310917	10/26/05	126	0.6	
15	36.919600	-88.357900	05/17/05	370	0.4	
15	36.919600	-88.357900	05/24/05	20	0.1	
15	36.919600	-88.357900	05/31/05	20	0.1	
15	36.919600	-88.357900	05/31/05	<20	0.1	QA Sample
15	36.919600	-88.357900	06/07/05	<20	0.0	No Flow
15	36.919600	-88.357900	06/07/05	<20	0.0	QA Sample, No Flow
15	36.919600	-88.357900	06/14/05	126	2.6	
15	36.919600	-88.357900	06/21/05	40	0.0	QA Sample, No Flow
15	36.919600	-88.357900	06/21/05	82	0.0	No Flow
15	36.919600	-88.357900	07/14/05	82	0.7	QA Sample
15	36.919600	-88.357900	07/14/05	126	0.7	
15	36.919600	-88.357900	07/19/05	172	1.3	QA Sample
15	36.919600	-88.357900	07/19/05	244	1.3	
15	36.919600	-88.357900	07/26/05	220	0.0	No Flow

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
15	36.919600	-88.357900	08/30/05	5510	44.1	QA Sample
15	36.919600	-88.357900	08/30/05	7308	44.1	
15	36.919600	-88.357900	09/08/05	82	0.0	No Flow
15	36.919600	-88.357900	09/13/05	40	0.0	No Flow
15	36.919600	-88.357900	09/20/05	18416	0.0	
15	36.919600	-88.357900	09/27/05	350	0.1	QA Sample
15	36.919600	-88.357900	09/27/05	398	0.1	
16	36.920927	-88.358109	05/17/05	264	0.1	
16	36.920927	-88.358109	05/24/05	82	0.0	
16	36.920927	-88.358109	05/31/05	194	0.1	
16	36.920927	-88.358109	06/07/05	40	0.1	
16	36.920927	-88.358109	06/14/05	626	0.1	QA Sample
16	36.920927	-88.358109	06/14/05	700	0.1	
16	36.920927	-88.358109	06/21/05	40	0.1	
16	36.920927	-88.358109	07/14/05	214	0.1	
16	36.920927	-88.358109	07/19/05	2668	0.2	
16	36.920927	-88.358109	07/26/05	62	0.0	No Flow
16	36.920927	-88.358109	08/09/05	1024	0.0	No Flow
16	36.920927	-88.358109	08/16/05	1918	0.1	QA Sample
16	36.920927	-88.358109	08/16/05	2034	0.1	
16	36.920927	-88.358109	08/23/05	242	0.0	No Flow
16	36.920927	-88.358109	08/30/05	15402	11.2	
16	36.920927	-88.358109	09/13/05	104	0.0	No Flow
16	36.920927	-88.358109	09/20/05	6510	0.6	
16	36.920927	-88.358109	09/27/05	150	0.1	
16	36.920927	-88.358109	10/11/05	20	0.0	
16	36.920927	-88.358109	10/18/05	40	0.0	No Flow
17	36.913700	-88.391300	05/17/05	2200	1.7	
17	36.913700	-88.391300	05/24/05	3978	0.4	
17	36.913700	-88.391300	05/31/05	456	0.0	No Flow
17	36.913700	-88.391300	06/07/05	104	0.0	No Flow
17	36.913700	-88.391300	06/14/05	1188	5.0	
17	36.913700	-88.391300	06/21/05	914	0.3	
17	36.913700	-88.391300	07/14/05	896	0.8	
17	36.913700	-88.391300	07/19/05	48392	1.5	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
17	36.913700	-88.391300	07/26/05	104	0.0	No Flow
17	36.913700	-88.391300	08/30/05	31062	0.0	No Flow
17	36.913700	-88.391300	09/08/05	338	0.0	QA Sample
17	36.913700	-88.391300	09/08/05	422	0.0	
17	36.913700	-88.391300	09/13/05	40	0.0	No Flow
17	36.913700	-88.391300	09/20/05	1446	1.2	
17	36.913700	-88.391300	09/27/05	610	0.4	
18	36.852800	-88.434800	05/17/05	104	9.1	
18	36.852800	-88.434800	05/24/05	104	1.1	
18	36.852800	-88.434800	05/31/05	194	0.5	
18	36.852800	-88.434800	06/07/05	150	0.4	
18	36.852800	-88.434800	06/14/05	418	40.9	
18	36.852800	-88.434800	06/21/05	20	0.9	
18	36.852800	-88.434800	07/14/05	60	4.2	
18	36.852800	-88.434800	07/19/05	172	4.1	
18	36.852800	-88.434800	07/26/05	20	0.0	
18	36.852800	-88.434800	08/09/05	<20	0.0	No Flow
18	36.852800	-88.434800	08/23/05	62	0.0	
18	36.852800	-88.434800	08/23/05	<20	0.0	QA Sample
18	36.852800	-88.434800	08/30/05	4718	814.4	
18	36.852800	-88.434800	09/13/05	62	0.0	No Flow
18	36.852800	-88.434800	09/20/05	40	0.0	No Flow
18	36.852800	-88.434800	09/20/05	<20	0.0	QA Sample, No Flow
18	36.852800	-88.434800	09/27/05	170	0.1	
18	36.852800	-88.434800	10/11/05	<20	0.0	No Flow
18	36.852800	-88.434800	10/11/05	<20	0.0	QA Sample, No Flow
19	36.877800	-88.411400	05/17/05	126	8.5	
19	36.877800	-88.411400	05/24/05	40	1.9	
19	36.877800	-88.411400	05/31/05	82	0.2	
19	36.877800	-88.411400	06/07/05	104	0.1	
19	36.877800	-88.411400	06/14/05	512	53.1	
19	36.877800	-88.411400	06/21/05	40	1.1	
19	36.877800	-88.411400	07/14/05	170	3.6	
19	36.877800	-88.411400	07/19/05	9768	7.5	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
19	36.877800	-88.411400	07/26/05	20	0.3	
19	36.877800	-88.411400	08/09/05	62	0.0	No Flow
19	36.877800	-88.411400	08/23/05	1090	0.0	No Flow
19	36.877800	-88.411400	08/30/05	5818	491.9	
19	36.877800	-88.411400	09/13/05	60	0.0	No Flow
19	36.877800	-88.411400	09/20/05	622	0.0	No Flow
19	36.877800	-88.411400	09/27/05	456	0.0	
19	36.877800	-88.411400	10/11/05	104	0.0	No Flow
20A	36.682257	-88.45547	05/12/05	350	0.5	
20A	36.682257	-88.45547	05/16/05	220	1.0	
20A	36.682257	-88.45547	05/23/05	62	0.7	
20A	36.682257	-88.45547	06/06/05	82	0.4	
20A	36.682257	-88.45547	06/13/05	928	4.7	
20A	36.682257	-88.45547	06/20/05	20	0.5	
20A	36.682257	-88.45547	06/27/05	570	0.4	
20A	36.682257	-88.45547	07/07/05	104	0.3	
20A	36.682257	-88.45547	07/11/05	728	1.2	
20A	36.682257	-88.45547	07/18/05	196	0.6	
20A	36.682257	-88.45547	07/25/05	82	0.6	
20A	36.682257	-88.45547	08/08/05	242	0.5	
20A	36.682257	-88.45547	08/15/05	662	0.3	
20A	36.682257	-88.45547	08/22/05	2100	0.4	
20A	36.682257	-88.45547	08/29/05	244	8.0	QA Sample
20A	36.682257	-88.45547	08/29/05	292	8.0	
20B	36.681800	-88.453950	9/12/05	196	10.0	
20B	36.681800	-88.453950	9/14/05	466	12.9	
20B	36.681800	-88.453950	9/19/05	126	8.7	
20B	36.681800	-88.453950	9/26/05	322	11.3	
20B	36.681800	-88.453950	10/10/05	150	6.1	
20B	36.681800	-88.453950	10/17/05	462	8.0	
20B	36.681800	-88.453950	10/24/05	126	8.5	
20B	36.681800	-88.453950	10/27/05	1210	8.7	
21	36.648033	-88.434417	05/12/05	150	3.9	
21	36.648033	-88.434417	05/16/05	148	4.4	
21	36.648033	-88.434417	05/23/05	378	41.8	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
21	36.648033	-88.434417	06/06/05	3030	3.7	QA Sample
21	36.648033	-88.434417	06/06/05	3936	3.7	
21	36.648033	-88.434417	06/13/05	618	9.0	
21	36.648033	-88.434417	06/20/05	218	4.8	
21	36.648033	-88.434417	06/27/05	292	4.4	
21	36.648033	-88.434417	07/07/05	104	3.6	QA Sample
21	36.648033	-88.434417	07/07/05	220	3.6	
21	36.648033	-88.434417	07/11/05	1366	5.8	
21	36.648033	-88.434417	07/18/05	456	6.3	
21	36.648033	-88.434417	07/25/05	378	4.5	
21	36.648033	-88.434417	08/08/05	374	3.6	
21	36.648033	-88.434417	08/15/05	492	2.8	
21	36.648033	-88.434417	08/22/05	758	4.2	
21	36.648033	-88.434417	08/29/05	1354	6.3	
21	36.648033	-88.434417	09/12/05	312	5.2	
21	36.648033	-88.434417	09/19/05	104	4.6	
21	36.648033	-88.434417	09/26/05	346	5.6	
22	36.705713	-88.462338	05/12/05	82	0.0	No Flow
22	36.705713	-88.462338	05/16/05	60	0.0	No Flow
22	36.705713	-88.462338	05/23/05	40	14.9	
22	36.705713	-88.462338	06/06/05	104	10.7	
22	36.705713	-88.462338	06/13/05	4028	65.2	QA Sample
22	36.705713	-88.462338	06/13/05	5974	65.2	
22	36.705713	-88.462338	06/20/05	82	11.7	
22	36.705713	-88.462338	06/27/05	172	7.6	
22	36.705713	-88.462338	07/07/05	40	7.8	
22	36.705713	-88.462338	07/11/05	320	9.9	
22	36.705713	-88.462338	07/18/05	432	13.5	
22	36.705713	-88.462338	07/25/05	126	7.0	
22	36.705713	-88.462338	08/08/05	320	7.4	
22	36.705713	-88.462338	08/15/05	168	5.0	
22	36.705713	-88.462338	08/22/05	918	7.2	
22	36.705713	-88.462338	08/29/05	268	7.5	
22	36.705713	-88.462338	09/12/05	126	9.8	
22	36.705713	-88.462338	09/19/05	82	10.1	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
22	36.705713	-88.462338	09/26/05	462	14.9	
23	36.704089	-88.461922	05/23/05	82	10.9	
23	36.704089	-88.461922	06/06/05	82	9.2	
23	36.704089	-88.461922	06/13/05	3030	59.4	
23	36.704089	-88.461922	06/20/05	150	9.9	
23	36.704089	-88.461922	06/27/05	150	7.9	
23	36.704089	-88.461922	07/07/05	20	6.0	
23	36.704089	-88.461922	07/11/05	244	9.0	
23	36.704089	-88.461922	07/18/05	264	13.3	QA Sample
23	36.704089	-88.461922	07/18/05	426	13.3	
23	36.704089	-88.461922	07/25/05	82	8.6	
23	36.704089	-88.461922	08/08/05	320	6.8	
23	36.704089	-88.461922	08/15/05	150	5.2	
23	36.704089	-88.461922	08/22/05	738	6.8	
23	36.704089	-88.461922	08/29/05	370	12.0	
23	36.704089	-88.461922	09/12/05	40	9.3	
23	36.704089	-88.461922	09/19/05	20	9.6	
23	36.704089	-88.461922	09/26/05	530	13.9	
23	36.704089	-88.461922	10/10/05	126	8.0	
23	36.704089	-88.461922	10/17/05	124	8.2	
24	36.704389	-88.463161	05/23/05	104	0.0	No Flow
24	36.704389	-88.463161	06/06/05	62	0.8	
24	36.704389	-88.463161	06/13/05	852	4.0	
24	36.704389	-88.463161	06/20/05	240	1.0	
24	36.704389	-88.463161	06/27/05	40	0.7	
24	36.704389	-88.463161	06/27/05	40	0.7	QA Sample
24	36.704389	-88.463161	07/07/05	<20	0.4	
24	36.704389	-88.463161	07/11/05	104	1.1	
24	36.704389	-88.463161	07/18/05	62	1.1	
24	36.704389	-88.463161	07/25/05	40	0.5	
24	36.704389	-88.463161	08/08/05	40	0.1	
24	36.704389	-88.463161	08/08/05	40	0.1	QA Sample
24	36.704389	-88.463161	08/15/05	82	0.1	
24	36.704389	-88.463161	08/22/05	338	0.4	
24	36.704389	-88.463161	08/29/05	1454	0.7	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
24	36.704389	-88.463161	09/12/05	40	0.8	
24	36.704389	-88.463161	09/19/05	40	1.0	
24	36.704389	-88.463161	09/26/05	40	1.4	
24	36.704389	-88.463161	09/26/05	40	1.4	QA Sample
24	36.704389	-88.463161	10/10/05	<20	0.5	
24	36.704389	-88.463161	10/17/05	20	0.4	QA Sample
24	36.704389	-88.463161	10/17/05	40	0.4	
25	36.715600	-88.440341	05/12/05	456	1.8	
25	36.715600	-88.440341	05/16/05	62	1.4	
25	36.715600	-88.440341	05/23/05	194	1.3	QA Sample
25	36.715600	-88.440341	05/23/05	216	1.3	
25	36.715600	-88.440341	06/06/05	40	0.9	
25	36.715600	-88.440341	06/13/05	682	17.4	
25	36.715600	-88.440341	06/20/05	436	0.7	QA Sample
25	36.715600	-88.440341	06/20/05	482	0.7	
25	36.715600	-88.440341	06/27/05	104	0.6	
25	36.715600	-88.440341	07/07/05	3340	0.7	
25	36.715600	-88.440341	07/11/05	1040	0.9	
25	36.715600	-88.440341	07/18/05	610	1.7	
25	36.715600	-88.440341	07/25/05	2338	1.0	
25	36.715600	-88.440341	08/08/05	1300	0.8	
25	36.715600	-88.440341	08/15/05	2518	1.0	
25	36.715600	-88.440341	08/22/05	2038	0.8	
25	36.715600	-88.440341	08/29/05	1508	0.6	
25	36.715600	-88.440341	09/12/05	3232	1.3	
25	36.715600	-88.440341	09/19/05	2092	2.2	QA Sample
25	36.715600	-88.440341	09/19/05	2306	2.2	
25	36.715600	-88.440341	09/26/05	170	2.8	
26	36.718616	-88.459096	05/12/05	2628	1.4	
26	36.718616	-88.459096	05/16/05	12262	0.4	
26	36.718616	-88.459096	05/23/05	1374	0.7	
26	36.718616	-88.459096	06/06/05	1434	0.3	
26	36.718616	-88.459096	06/13/05	1446	14.2	
26	36.718616	-88.459096	06/20/05	1204	0.8	
26	36.718616	-88.459096	06/27/05	1476	0.5	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
26	36.718616	-88.459096	07/07/05	746	0.7	
26	36.718616	-88.459096	07/11/05	2034	0.6	
26	36.718616	-88.459096	07/18/05	1366	0.8	
26	36.718616	-88.459096	07/25/05	738	0.6	
26	36.718616	-88.459096	08/08/05	1428	0.5	
26	36.718616	-88.459096	08/15/05	1008	0.5	
26	36.718616	-88.459096	08/22/05	398	1.0	
26	36.718616	-88.459096	08/29/05	914	2.8	
26	36.718616	-88.459096	09/12/05	506	0.8	
26	36.718616	-88.459096	09/19/05	844	0.8	
26	36.718616	-88.459096	09/26/05	1416	3.6	
27	36.741120	-88.461690	05/12/05	264	15.5	QA Sample
27	36.741120	-88.461690	05/12/05	316	15.5	
27	36.741120	-88.461690	05/16/05	218	12.7	QA Sample
27	36.741120	-88.461690	05/16/05	220	12.7	
27	36.741120	-88.461690	05/23/05	126	10.7	
27	36.741120	-88.461690	06/06/05	104	7.8	
27	36.741120	-88.461690	06/13/05	5510	101.0	
27	36.741120	-88.461690	06/20/05	104	12.6	
27	36.741120	-88.461690	06/27/05	148	10.2	
27	36.741120	-88.461690	07/07/05	62	8.2	
27	36.741120	-88.461690	07/11/05	402	12.0	
27	36.741120	-88.461690	07/18/05	544	17.6	
27	36.741120	-88.461690	07/25/05	40	10.5	
27	36.741120	-88.461690	08/08/05	374	10.6	
27	36.741120	-88.461690	08/15/05	618	6.3	QA Sample
27	36.741120	-88.461690	08/15/05	808	6.3	
27	36.741120	-88.461690	08/22/05	194	8.3	
27	36.741120	-88.461690	08/29/05	350	11.2	
27	36.741120	-88.461690	09/12/05	242	11.3	QA Sample
27	36.741120	-88.461690	09/12/05	262	11.3	
27	36.741120	-88.461690	09/19/05	322	1.2	
27	36.741120	-88.461690	09/26/05	682	21.2	
28	36.758170	-88.448791	05/12/05	82	2.8	
28	36.758170	-88.448791	05/16/05	62	3.9	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
28	36.758170	-88.448791	05/23/05	82	2.2	
28	36.758170	-88.448791	06/06/05	148	1.2	
28	36.758170	-88.448791	06/13/05	3912	43.0	
28	36.758170	-88.448791	06/20/05	196	2.5	
28	36.758170	-88.448791	06/27/05	312	1.0	
28	36.758170	-88.448791	07/07/05	40	1.0	
28	36.758170	-88.448791	07/11/05	244	2.4	QA Sample
28	36.758170	-88.448791	07/11/05	292	2.4	
28	36.758170	-88.448791	07/18/05	62	1.6	
28	36.758170	-88.448791	07/25/05	60	0.9	QA Sample
28	36.758170	-88.448791	07/25/05	148	0.9	
28	36.758170	-88.448791	08/08/05	426	1.1	
28	36.758170	-88.448791	08/15/05	654	0.8	
28	36.758170	-88.448791	08/22/05	196	1.9	QA Sample
28	36.758170	-88.448791	08/22/05	350	1.9	
28	36.758170	-88.448791	08/29/05	268	1.9	
28	36.758170	-88.448791	09/12/05	150	1.1	
28	36.758170	-88.448791	09/19/05	126	1.4	
28	36.758170	-88.448791	09/26/05	292	3.4	
28	36.758170	-88.448791	09/26/05	292	3.4	QA Sample
29	36.779998	-88.467427	05/19/05	82	12.4	
29	36.779998	-88.467427	05/26/05	40	8.7	
29	36.779998	-88.467427	06/02/05	342	17.4	
29	36.779998	-88.467427	06/09/05	126	11.9	
29	36.779998	-88.467427	06/16/05	82	30.2	
29	36.779998	-88.467427	06/23/05	62	11.8	
29	36.779998	-88.467427	07/13/05	194	37.4	
29	36.779998	-88.467427	07/21/05	104	14.9	QA Sample
29	36.779998	-88.467427	07/21/05	214	14.9	
29	36.779998	-88.467427	07/28/05	62	10.3	
29	36.779998	-88.467427	08/11/05	262	7.0	
29	36.779998	-88.467427	8/18/05	262	78.9	
29	36.779998	-88.467427	08/25/05	218	7.6	
29	36.779998	-88.467427	09/01/05	288	78.5	
29	36.779998	-88.467427	09/16/05	786	15.3	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
29	36.779998	-88.467427	09/22/05	20	11.3	
29	36.779998	-88.467427	09/29/05	148	14.2	
29	36.779998	-88.467427	10/11/05	126	12.4	
29	36.779998	-88.467427	10/18/05	62	9.6	QA Sample
29	36.779998	-88.467427	10/18/05	124	9.6	
29	36.779998	-88.467427	10/25/05	<20	10.8	
30	36.796753	-88.457499	05/19/05	296	3.4	
30	36.796753	-88.457499	05/26/05	82	0.6	
30	36.796753	-88.457499	06/02/05	82	1.6	
30	36.796753	-88.457499	06/09/05	172	1.2	
30	36.796753	-88.457499	06/16/05	196	5.5	
30	36.796753	-88.457499	06/23/05	40	2.1	
30	36.796753	-88.457499	07/13/05	82	1.8	
30	36.796753	-88.457499	07/21/05	104	1.4	
30	36.796753	-88.457499	07/28/05	104	0.5	
30	36.796753	-88.457499	08/11/05	104	0.0	No Flow
30	36.796753	-88.457499	08/25/05	292	0.1	
30	36.796753	-88.457499	09/01/05	126	11.3	
30	36.796753	-88.457499	09/01/05	126	11.3	QA Sample
30	36.796753	-88.457499	09/16/05	172	1.7	QA Sample
30	36.796753	-88.457499	09/16/05	362	1.7	
30	36.796753	-88.457499	09/22/05	296	0.8	
30	36.796753	-88.457499	09/29/05	1326	1.0	
30	36.796753	-88.457499	10/11/05	124	0.6	
30	36.796753	-88.457499	10/18/05	942	0.3	
30	36.796753	-88.457499	10/25/05	62	0.2	QA Sample
30	36.796753	-88.457499	10/25/05	126	0.2	
31	36.796753	-88.457499	05/19/05	558	4.6	
31	36.796753	-88.457499	05/26/05	172	3.5	
31	36.796753	-88.457499	06/02/05	170	6.3	
31	36.796753	-88.457499	06/09/05	390	6.2	
31	36.796753	-88.457499	06/16/05	338	7.8	
31	36.796753	-88.457499	06/23/05	126	5.6	QA Sample
31	36.796753	-88.457499	06/23/05	316	5.6	
31	36.796753	-88.457499	07/13/05	370	10.6	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
31	36.796753	-88.457499	07/21/05	60	4.4	
31	36.796753	-88.457499	07/28/05	20	3.2	QA Sample
31	36.796753	-88.457499	07/28/05	60	3.2	
31	36.796753	-88.457499	08/11/05	700	3.6	
31	36.796753	-88.457499	08/25/05	564	3.8	
31	36.796753	-88.457499	09/01/05	646	16.4	
31	36.796753	-88.457499	09/16/05	196	5.5	
31	36.796753	-88.457499	09/22/05	126	4.8	QA Sample
31	36.796753	-88.457499	09/22/05	148	4.8	
31	36.796753	-88.457499	09/29/05	790	5.8	QA Sample
31	36.796753	-88.457499	09/29/05	1146	5.8	
31	36.796753	-88.457499	10/11/05	270	4.5	
31	36.796753	-88.457499	10/18/05	126	6.6	
31	36.796753	-88.457499	10/25/05	82	4.6	
32	36.837811	-88.527267	5/19/05	168	22.7	
32	36.837811	-88.527267	5/26/05	104	17.4	
32	36.837811	-88.527267	6/2/05	218	36.6	
32	36.837811	-88.527267	6/9/05	346	21.5	
32	36.837811	-88.527267	6/16/05	322	50.2	
32	36.837811	-88.527267	6/23/05	104	21.0	
32	36.837811	-88.527267	7/13/05	1918	58.6	
32	36.837811	-88.527267	7/21/05	102	23.9	
32	36.837811	-88.527267	7/28/05	170	17.2	
32	36.837811	-88.527267	8/11/05	148	10.0	
32	36.837811	-88.527267	8/25/05	82	13.1	
33	36.823384	-88.516169	05/19/05	768	24.6	
33	36.823384	-88.516169	05/26/05	62	22.2	
33	36.823384	-88.516169	06/02/05	492	40.4	
33	36.823384	-88.516169	06/09/05	172	22.4	
33	36.823384	-88.516169	06/16/05	240	50.9	QA Sample
33	36.823384	-88.516169	06/16/05	290	50.9	
33	36.823384	-88.516169	06/23/05	82	23.8	
33	36.823384	-88.516169	07/13/05	1096	56.9	
33	36.823384	-88.516169	07/21/05	104	23.6	
33	36.823384	-88.516169	07/28/05	124	15.8	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
33	36.823384	-88.516169	08/11/05	170	11.4	
33	36.823384	-88.516169	08/25/05	102	10.8	
34	36.830248	-88.53912	05/19/05	126	1.9	QA Sample
34	36.830248	-88.53912	05/19/05	196	1.9	
34	36.830248	-88.53912	05/26/05	62	1.9	
34	36.830248	-88.53912	06/02/05	40	2.0	QA Sample
34	36.830248	-88.53912	06/02/05	170	2.0	
34	36.830248	-88.53912	06/09/05	976	3.4	
34	36.830248	-88.53912	06/16/05	220	2.0	
34	36.830248	-88.53912	06/23/05	40	1.9	
34	36.830248	-88.53912	06/27/05	82	1.8	QA Sample
34	36.830248	-88.53912	06/27/05	192	1.8	
34	36.830248	-88.53912	07/07/05	270	2.0	
34	36.830248	-88.53912	07/13/05	486	4.3	
34	36.830248	-88.53912	07/21/05	82	2.0	
34	36.830248	-88.53912	07/28/05	126	1.7	
34	36.830248	-88.53912	08/11/05	40	1.6	
34	36.830248	-88.53912	08/25/05	244	1.8	
34	36.830248	-88.53912	09/01/05	220	3.8	
34	36.830248	-88.53912	09/16/05	104	2.5	
34	36.830248	-88.53912	09/22/05	126	2.5	
34	36.830248	-88.53912	09/29/05	150	2.3	
34	36.830248	-88.53912	10/11/05	150	1.8	
34	36.830248	-88.53912	10/25/05	62	1.8	
35	36.862380	-88.572497	05/19/05	240	0.0	No Flow
35	36.862380	-88.572497	05/26/05	244	0.0	No Flow
35	36.862380	-88.572497	06/02/05	518	1.6	
35	36.862380	-88.572497	06/09/05	>49000	10.8	
35	36.862380	-88.572497	06/16/05	462	0.0	No Flow
35	36.862380	-88.572497	06/23/05	718	0.0	No Flow
35	36.862380	-88.572497	06/27/05	264	0.0	No Flow
35	36.862380	-88.572497	07/07/05	220	0.0	No Flow
35	36.862380	-88.572497	07/13/05	602	12.4	QA Sample
35	36.862380	-88.572497	07/13/05	700	12.4	
35	36.862380	-88.572497	07/21/05	816	5.4	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
35	36.862380	-88.572497	07/28/05	240	5.5	
35	36.862380	-88.572497	08/11/05	316	0.0	No Flow
35	36.862380	-88.572497	8/18/05	220	7.4	
35	36.862380	-88.572497	8/25/05	220	0.0	QA Sample, No Flow
35	36.862380	-88.572497	8/25/05	292	0.0	No Flow
35	36.862380	-88.572497	9/1/05	976	0.0	No Flow
35	36.862380	-88.572497	9/16/05	852	0.0	No Flow
35	36.862380	-88.572497	9/22/05	610	0.0	No Flow
35	36.862380	-88.572497	9/29/05	512	0.0	No Flow
35	36.862380	-88.572497	10/11/05	214	0.0	No Flow
36	36.869883	-88.595579	05/19/05	492	0.1	
36	36.869883	-88.595579	05/26/05	240	0.0	No Flow
36	36.869883	-88.595579	06/02/05	1040	0.0	No Flow
36	36.869883	-88.595579	06/09/05	2934	0.0	No Flow
36	36.869883	-88.595579	06/16/05	290	0.2	
36	36.869883	-88.595579	06/23/05	398	0.0	No Flow
36	36.869883	-88.595579	06/27/05	20	0.0	No Flow
36	36.869883	-88.595579	07/21/05	170	0.0	No Flow
36	36.869883	-88.595579	07/28/05	20	0.0	No Flow
36	36.869883	-88.595579	09/01/05	718	0.0	
37	36.8508	-88.60518	06/02/05	20	0.0	No Flow
37	36.8508	-88.60518	06/09/05	804	0.0	No Flow
37	36.8508	-88.60518	06/16/05	104	0.1	
37	36.8508	-88.60518	06/23/05	126	0.0	No Flow
37	36.8508	-88.60518	06/27/05	82	0.0	
37	36.8508	-88.60518	07/07/05	242	0.0	QA Sample
37	36.8508	-88.60518	07/07/05	398	0.0	
37	36.8508	-88.60518	07/13/05	312	0.0	No Flow
37	36.8508	-88.60518	07/21/05	104	0.0	No Flow
37	36.8508	-88.60518	07/28/05	104	0.0	No Flow
37	36.8508	-88.60518	08/11/05	786	0.0	No Flow
37	36.8508	-88.60518	08/25/05	60	0.0	No Flow
37	36.8508	-88.60518	09/01/05	264	0.0	
37	36.8508	-88.60518	09/16/05	432	0.1	
37	36.8508	-88.60518	09/22/05	126	0.1	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
37	36.8508	-88.60518	09/29/05	104	0.0	No Flow
37	36.8508	-88.60518	10/11/05	104	0.0	No Flow
37	36.8508	-88.60518	10/18/05	62	0.1	
37	36.8508	-88.60518	10/25/05	40	0.1	
38	36.843900	-88.585800	05/19/05	150	0.0	No Flow
38	36.843900	-88.585800	05/26/05	<20	0.0	
38	36.843900	-88.585800	06/02/05	40	0.0	No Flow
38	36.843900	-88.585800	06/09/05	1188	0.0	No Flow
38	36.843900	-88.585800	06/16/05	268	0.3	
38	36.843900	-88.585800	06/23/05	350	0.1	
38	36.843900	-88.585800	06/27/05	104	0.0	No Flow
38	36.843900	-88.585800	07/21/05	918	0.0	No Flow
38	36.843900	-88.585800	07/28/05	40	0.0	No Flow
38	36.843900	-88.585800	09/01/05	1720	0.0	No Flow
38	36.843900	-88.585800	09/08/05	290	0.0	No Flow
39	36.884262	-88.553082	05/17/05	192	32.3	QA Sample
39	36.884262	-88.553082	05/17/05	336	32.3	
39	36.884262	-88.553082	05/24/05	196	24.6	
39	36.884262	-88.553082	05/31/05	62	19.8	
39	36.884262	-88.553082	06/07/05	20	23.8	
39	36.884262	-88.553082	06/14/05	378	145.7	
39	36.884262	-88.553082	06/21/05	82	28.9	
39	36.884262	-88.553082	07/14/05	218	74.4	
39	36.884262	-88.553082	07/19/05	7568	601.1	
39	36.884262	-88.553082	07/26/05	40	21.2	QA Sample
39	36.884262	-88.553082	07/26/05	126	21.2	
39	36.884262	-88.553082	08/09/05	126	15.2	QA Sample
39	36.884262	-88.553082	08/09/05	264	15.2	
39	36.884262	-88.553082	08/16/05	432	21.3	
39	36.884262	-88.553082	08/23/05	210	20.4	
39	36.884262	-88.553082	08/30/05	4092	2006.6	
39	36.884262	-88.553082	09/13/05	104	24.6	QA Sample
39	36.884262	-88.553082	09/13/05	124	24.6	
39	36.884262	-88.553082	09/20/05	636	24.8	
39	36.884262	-88.553082	09/27/05	1042	31.6	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
39	36.884262	-88.553082	10/11/05	124	22.8	
39	36.884262	-88.553082	10/18/05	82	18.6	
40	36.884832	-88.550547	05/17/05	40	0.0	No Flow
40	36.884832	-88.550547	05/24/05	40	0.0	QA Sample, No Flow
40	36.884832	-88.550547	05/24/05	62	0.0	No Flow
40	36.884832	-88.550547	05/31/05	40	0.0	No Flow
40	36.884832	-88.550547	06/07/05	82	0.0	No Flow
40	36.884832	-88.550547	06/14/05	290	32.3	
40	36.884832	-88.550547	06/21/05	40	31.7	
40	36.884832	-88.550547	07/14/05	1300	19.5	
40	36.884832	-88.550547	07/19/05	126	7.3	
40	36.884832	-88.550547	07/26/05	20	0.0	No Flow
40	36.884832	-88.550547	08/09/05	40	0.0	No Flow
40	36.884832	-88.550547	08/16/05	82	0.0	No Flow
40	36.884832	-88.550547	08/23/05	40	23.2	
40	36.884832	-88.550547	08/30/05	768	31.6	
40	36.884832	-88.550547	09/13/05	<20	1.8	
40	36.884832	-88.550547	09/20/05	766	0.0	No Flow
40	36.884832	-88.550547	09/27/05	104	22.5	
40	36.884832	-88.550547	10/11/05	40	0.0	No Flow
40	36.884832	-88.550547	10/18/05	20	0.0	No Flow
41	36.932511	-88.543938	05/19/05	462	0.0	No Flow
41	36.932511	-88.543938	05/26/05	150	0.0	No Flow
41	36.932511	-88.543938	06/02/05	346	778.6	
41	36.932511	-88.543938	06/09/05	840	471.1	
41	36.932511	-88.543938	06/16/05	374	424.5	
41	36.932511	-88.543938	06/23/05	194	260.6	
41	36.932511	-88.543938	06/29/05	172	75.9	
41	36.932511	-88.543938	07/13/05	1526	368.0	
41	36.932511	-88.543938	07/21/05	172	131.7	
41	36.932511	-88.543938	07/28/05	170	0.0	No Flow
41	36.932511	-88.543938	08/11/05	194	34.4	QA Sample
41	36.932511	-88.543938	08/11/05	216	34.4	
41	36.932511	-88.543938	08/25/05	62	58.2	
41	36.932511	-88.543938	09/01/05	808	917.5	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
41	36.932511	-88.543938	09/16/05	264	59.0	QA Sample
41	36.932511	-88.543938	09/16/05	292	59.0	
41	36.932511	-88.543938	09/22/05	242	44.8	
41	36.932511	-88.543938	09/29/05	374	59.3	
41	36.932511	-88.543938	10/06/05	398	48.4	QA Sample
41	36.932511	-88.543938	10/06/05	402	48.4	
41	36.932511	-88.543938	10/13/05	82	49.1	QA Sample
41	36.932511	-88.543938	10/13/05	220	49.1	
41	36.932511	-88.543938	10/20/05	104	57.9	QA Sample
41	36.932511	-88.543938	10/20/05	172	57.9	
42	36.996017	-88.562900	05/26/05	20	0.0	No Flow
42	36.996017	-88.562900	06/02/05	40	103.4	
42	36.996017	-88.562900	06/09/05	82	316.4	QA Sample
42	36.996017	-88.562900	06/09/05	148	316.4	
42	36.996017	-88.562900	06/16/05	214	1016.0	
42	36.996017	-88.562900	06/23/05	40	312.2	
42	36.996017	-88.562900	06/29/05	<20	0.0	No Flow
42	36.996017	-88.562900	07/13/05	104	288.7	
42	36.996017	-88.562900	07/21/05	104	873.3	
42	36.996017	-88.562900	07/28/05	60	88.3	
42	36.996017	-88.562900	08/25/05	<20	127.1	
42	36.996017	-88.562900	09/01/05	602	3253.2	
42	36.996017	-88.562900	09/16/05	192	191.1	
42	36.996017	-88.562900	09/22/05	82	306.5	
42	36.996017	-88.562900	09/29/05	370	121.8	
42	36.996017	-88.562900	10/06/05	60	0.0	No Flow
42	36.996017	-88.562900	10/13/05	20	0.0	No Flow
42	36.996017	-88.562900	10/18/05	40	57.6	
42	36.996017	-88.562900	10/20/05	60	190.7	
42	36.996017	-88.562900	10/25/05	20	195.6	
43	36.956560	-88.543430	05/19/05	40	1.9	
43	36.956560	-88.543430	05/19/05	40	1.9	QA Sample
43	36.956560	-88.543430	05/26/05	60	1.1	QA Sample
43	36.956560	-88.543430	05/26/05	172	1.1	
43	36.956560	-88.543430	06/02/05	104	0.0	No Flow

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
43	36.956560	-88.543430	06/09/05	22398	7.8	
43	36.956560	-88.543430	06/16/05	4800	0.6	
43	36.956560	-88.543430	06/23/05	150	0.0	No Flow
43	36.956560	-88.543430	06/29/05	240	0.0	No Flow
43	36.956560	-88.543430	07/13/05	20	3.0	
43	36.956560	-88.543430	07/21/05	40	0.0	No Flow
43	36.956560	-88.543430	07/28/05	192	0.3	
43	36.956560	-88.543430	08/11/05	260	0.3	
43	36.956560	-88.543430	08/25/05	40	0.3	
43	36.956560	-88.543430	09/01/05	930	8.3	
43	36.956560	-88.543430	09/16/05	20	0.8	
43	36.956560	-88.543430	09/22/05	20	0.6	
43	36.956560	-88.543430	09/29/05	20	1.7	
43	36.956560	-88.543430	10/06/05	40	0.4	
43	36.956560	-88.543430	10/13/05	104	0.4	
43	36.956560	-88.543430	10/20/05	40	0.3	
44	36.935442	-88.606696	05/19/05	104	0.2	
44	36.935442	-88.606696	05/26/05	192	0.3	
44	36.935442	-88.606696	06/02/05	2086	0.1	
44	36.935442	-88.606696	06/09/05	6510	0.1	
44	36.935442	-88.606696	06/16/05	104	6.1	
44	36.935442	-88.606696	06/23/05	426	0.0	
44	36.935442	-88.606696	06/29/05	120	0.5	
44	36.935442	-88.606696	07/13/05	366	0.0	No Flow
44	36.935442	-88.606696	07/21/05	40	0.1	
44	36.935442	-88.606696	07/28/05	828	0.0	No Flow
44	36.935442	-88.606696	08/11/05	576	0.0	No Flow
44	36.935442	-88.606696	08/25/05	82	0.0	No Flow
44	36.935442	-88.606696	08/25/05	82	0.0	QA Sample, No Flow
44	36.935442	-88.606696	09/01/05	1456	4.7	
44	36.935442	-88.606696	09/16/05	104	0.0	No Flow
44	36.935442	-88.606696	09/22/05	<20	0.0	No Flow
44	36.935442	-88.606696	09/29/05	322	0.3	QA Sample
44	36.935442	-88.606696	09/29/05	402	0.3	
44	36.935442	-88.606696	10/06/05	40	0.1	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
44	36.935442	-88.606696	10/13/05	104	0.0	No Flow
44	36.935442	-88.606696	10/20/05	40	1.0	
45	36.941388	-88.608314	05/19/05	60	0.0	No Flow
45	36.941388	-88.608314	05/26/05	290	0.8	
45	36.941388	-88.608314	06/02/05	482	0.3	
45	36.941388	-88.608314	06/09/05	9222	0.5	
45	36.941388	-88.608314	06/16/05	602	0.4	
45	36.941388	-88.608314	06/23/05	338	0.0	No Flow
45	36.941388	-88.608314	06/29/05	172	1.0	
45	36.941388	-88.608314	07/13/05	2752	0.4	
45	36.941388	-88.608314	07/21/05	126	0.8	
45	36.941388	-88.608314	07/28/05	40	0.0	No Flow
45	36.941388	-88.608314	08/11/05	190	0.0	No Flow
45	36.941388	-88.608314	08/25/05	126	0.1	
45	36.941388	-88.608314	09/01/05	244	0.4	
45	36.941388	-88.608314	09/16/05	212	0.1	
45	36.941388	-88.608314	09/22/05	62	0.1	
45	36.941388	-88.608314	09/29/05	124	0.2	
45	36.941388	-88.608314	10/06/05	40	0.1	
45	36.941388	-88.608314	10/13/05	<20	0.2	
45	36.941388	-88.608314	10/20/05	20	0.1	
46	36.942527	-88.608167	05/19/05	104	0.2	
46	36.942527	-88.608167	05/26/05	20	0.2	
46	36.942527	-88.608167	06/02/05	322	0.3	
46	36.942527	-88.608167	06/09/05	7308	1.2	
46	36.942527	-88.608167	06/16/05	148	0.6	
46	36.942527	-88.608167	06/23/05	102	0.0	
46	36.942527	-88.608167	06/29/05	590	0.3	
46	36.942527	-88.608167	07/13/05	150	0.6	
46	36.942527	-88.608167	07/21/05	170	0.1	
46	36.942527	-88.608167	07/28/05	124	0.1	
46	36.942527	-88.608167	08/11/05	104	0.0	No Flow
46	36.942527	-88.608167	08/25/05	482	0.1	
46	36.942527	-88.608167	09/01/05	378	0.2	
46	36.942527	-88.608167	09/16/05	194	0.2	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
46	36.942527	-88.608167	09/22/05	82	0.1	QA Sample
46	36.942527	-88.608167	09/22/05	172	0.1	
46	36.942527	-88.608167	09/29/05	264	0.2	
46	36.942527	-88.608167	10/06/05	214	0.1	
46	36.942527	-88.608167	10/13/05	312	0.2	
46	36.942527	-88.608167	10/20/05	456	0.2	
47	36.967246	-88.544824	05/19/05	126	1.2	
47	36.967246	-88.544824	05/26/05	20	2.2	
47	36.967246	-88.544824	06/02/05	374	0.0	No Flow
47	36.967246	-88.544824	06/09/05	28272	14.3	
47	36.967246	-88.544824	06/16/05	338	4.4	
47	36.967246	-88.544824	06/23/05	126	1.5	
47	36.967246	-88.544824	06/29/05	104	0.4	
47	36.967246	-88.544824	07/13/05	218	7.1	
47	36.967246	-88.544824	07/21/05	148	0.8	
47	36.967246	-88.544824	07/28/05	82	0.6	
47	36.967246	-88.544824	08/11/05	296	0.4	
47	36.967246	-88.544824	08/25/05	40	0.3	
47	36.967246	-88.544824	09/01/05	530	0.0	No Flow
47	36.967246	-88.544824	09/16/05	220	1.0	
47	36.967246	-88.544824	09/22/05	214	0.1	
47	36.967246	-88.544824	09/29/05	1354	2.6	
47	36.967246	-88.544824	10/06/05	82	0.4	
47	36.967246	-88.544824	10/13/05	62	0.5	
47	36.967246	-88.544824	10/20/05	<20	0.5	
48	36.984236	-88.634550	05/26/05	220	0.8	
48	36.984236	-88.634550	06/02/05	976	0.3	
48	36.984236	-88.634550	06/09/05	28272	1.6	
48	36.984236	-88.634550	06/16/05	196	13.8	
48	36.984236	-88.634550	06/23/05	268	0.4	
48	36.984236	-88.634550	06/29/05	82	0.2	
48	36.984236	-88.634550	07/13/05	214	0.6	
48	36.984236	-88.634550	07/21/05	422	0.1	
48	36.984236	-88.634550	07/28/05	20	0.2	
48	36.984236	-88.634550	08/11/05	11588	0.2	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
48	36.984236	-88.634550	08/25/05	17328	0.1	
48	36.984236	-88.634550	09/01/05	1146	0.2	
48	36.984236	-88.634550	09/16/05	506	0.2	
48	36.984236	-88.634550	09/22/05	220	0.2	
48	36.984236	-88.634550	09/29/05	718	0.4	
48	36.984236	-88.634550	10/06/05	196	0.2	
48	36.984236	-88.634550	10/13/05	150	0.2	
48	36.984236	-88.634550	10/18/05	148	0.3	
48	36.984236	-88.634550	10/20/05	82	0.2	
49	36.974513	-88.614451	05/19/05	62	0.3	
49	36.974513	-88.614451	05/26/05	40	0.4	
49	36.974513	-88.614451	06/02/05	378	0.5	
49	36.974513	-88.614451	06/09/05	9768	2.3	
49	36.974513	-88.614451	06/16/05	20	3.3	
49	36.974513	-88.614451	06/23/05	62	0.2	
49	36.974513	-88.614451	06/29/05	62	0.1	QA Sample
49	36.974513	-88.614451	06/29/05	82	0.1	
49	36.974513	-88.614451	07/13/05	62	0.7	
49	36.974513	-88.614451	07/21/05	288	0.0	
49	36.974513	-88.614451	07/28/05	104	0.0	
49	36.974513	-88.614451	08/11/05	2666	0.2	
49	36.974513	-88.614451	08/25/05	126	0.2	
49	36.974513	-88.614451	09/01/05	172	1.0	
49	36.974513	-88.614451	09/16/05	62	0.2	
49	36.974513	-88.614451	09/22/05	<20	0.2	
49	36.974513	-88.614451	09/29/05	40	0.4	
49	36.974513	-88.614451	10/06/05	<20	0.2	
49	36.974513	-88.614451	10/13/05	<20	0.3	
49	36.974513	-88.614451	10/20/05	20	0.2	
50	36.588050	-88.303250	08/24/05	104	0.0	
50	36.588050	-88.303250	09/02/05	196	14.9	
50	36.588050	-88.303250	09/07/05	126	4.5	
50	36.588050	-88.303250	09/14/05	148	2.4	
50	36.588050	-88.303250	09/21/05	268	1.7	
50	36.588050	-88.303250	09/28/05	126	1.8	

Site	Latitude	Longitude	Sample Date	*E. coli* (colonies/100ml)	Flow (cfs)	Reason Not Validated
50	36.588050	-88.303250	10/10/05	126	1.2	
50	36.588050	-88.303250	10/17/05	126	0.8	
50	36.588050	-88.303250	10/19/05	350	0.7	
50	36.588050	-88.303250	10/24/05	194	0.6	
50	36.588050	-88.303250	10/27/05	40	0.9	
51	36.588517	-88.303983	08/24/05	172	0.8	
51	36.588517	-88.303983	09/02/05	60	29.3	
51	36.588517	-88.303983	09/07/05	126	11.1	
51	36.588517	-88.303983	09/07/05	126	11.1	QA Sample
51	36.588517	-88.303983	09/14/05	62	2.9	
51	36.588517	-88.303983	09/21/05	82	1.5	
51	36.588517	-88.303983	09/28/05	148	2.5	
51	36.588517	-88.303983	10/10/05	82	2.3	
51	36.588517	-88.303983	10/17/05	60	1.9	
51	36.588517	-88.303983	10/19/05	20	1.9	
51	36.588517	-88.303983	10/24/05	20	1.7	
51	36.588517	-88.303983	10/24/05	<20	1.7	QA Sample
51	36.588517	-88.303983	10/27/05	40	1.8	
51	36.588517	-88.303983	10/27/05	40	1.8	QA Sample

Appendix C. Discharge Monitoring Report Data for SWS Sources

DMR data are reported in Tables C.1 through C.16 below. A red highlight indicates an exceedance of permit limits (130 geomean and 240 instantaneous *E. coli*/100 ml or 200 geomean and 400 instantaneous fecal coliform colonies/100 ml). TNTC indicates that the colonies were too numerous too count and is assumed to be an exceedance.

Table C.1 Bee Creek WWTP

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Apr-11	300	51		
31-Mar-11	250	9		
28-Feb-11	250	77		
31-Jan-11	39	14		
31-Dec-10	60	15		
30-Nov-10	6	6		
31-Oct-10	50	28		
30-Sep-10	90	29		
31-Aug-10	30	7		
31-Jul-10	20	13		
30-Jun-10	28	6		
31-May-10	80	11		
30-Apr-10	42	10		
31-Mar-10	400	19		
28-Feb-10	260	26		
31-Jan-10	300	32		
31-Dec-09	77	19		
30-Nov-09	600	93		
31-Oct-09			600	150
30-Sep-09			99	45
31-Aug-09			202	40
31-Jul-09			129	19
30-Jun-09			167	17
31-May-09			293	33
30-Apr-09			81	13
31-Mar-09			18	10
28-Feb-09			87	11

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Jan-09			24	13
31-Dec-08			600	29
30-Nov-08			11	8
31-Oct-08			83	18
30-Sep-08			65	29
31-Aug-08			71	18
31-Jul-08			118	45
30-Jun-08			113	44
31-May-08			436	39
30-Apr-08			537	41
31-Mar-08			600	25
29-Feb-08			116	48
31-Jan-08			65	29
31-Dec-07			50	23
30-Nov-07			166	49
31-Oct-07			110	43
30-Sep-07			164	129
31-Aug-07			201	69
31-Jul-07			48	31
30-Jun-07			274	32
31-May-07			25	18
30-Apr-07			80	26
31-Mar-07			118	46
28-Feb-07			75	29
31-Jan-07			109	27
31-Dec-06			95	20
30-Nov-06			34	26
31-Oct-06			100	24
30-Sep-06			84	61
31-Aug-06			51	35
31-Jul-06			121	63
30-Jun-06			104	47
31-May-06			384	94
30-Apr-06			288	54

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Mar-06			151	37
28-Feb-06			49	34
31-Jan-06			178	114
31-Dec-05			105	83
30-Nov-05			278	133
31-Oct-05			68	11
30-Sep-05			73	51
31-Aug-05			100	55
31-Jul-05			330	107
30-Jun-05			104	42
31-May-05			128	20
30-Apr-05			22	12
31-Mar-05			54	8
28-Feb-05			16	14
31-Jan-05			40	8

Table C.2 Benton STP

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-May-11	166	26
30-Apr-11	10	10
31-Mar-11	10	10
28-Feb-11	10	10
31-Jan-11	10	10
31-Dec-10	10	10
30-Nov-10	10	10
31-Oct-10	10	10
30-Sep-10	10	10
31-Aug-10	10	10
31-Jul-10	10	10
30-Jun-10	10	10
31-May-10	10	10

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Apr-10	10	10
31-Mar-10	10	10
28-Feb-10	10	10
31-Jan-10	10	6
31-Dec-09	10	10
30-Nov-09	10	10
31-Oct-09	10	6
30-Sep-09	10	6
31-Aug-09	10	10
31-Jul-09	< 10	< 10
30-Jun-09	10	10
31-May-09	10	5.6
30-Apr-09	20	< 11.5
31-Mar-09	40	< 14
28-Feb-09	< 10	< 10
31-Jan-09	< 10	< 10
31-Dec-08	< 10	< 10
30-Nov-08	< 10	< 10
31-Oct-08	< 10	< 10
30-Sep-08	100	< 18
31-Aug-08	< 10	< 10
31-Jul-08	30	< 18
30-Jun-08	< 10	< 10
31-May-08	< 10	< 10
30-Apr-08	< 10	< 10
31-Mar-08	10	10
29-Feb-08	< 10	< 10
31-Jan-08	40	13.2
31-Dec-07	< 10	< 10
30-Nov-07	20	11
31-Oct-07	50	13
30-Sep-07	10	9
31-Aug-07	190	20
31-Jul-07	800	40
30-Jun-07	10	< 10
31-May-07	20	< 10

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Apr-07	< 10	< 10
31-Mar-07	10	< 10
28-Feb-07	< 10	< 10
31-Jan-07	< 10	< 10
31-Dec-06	40	10
30-Nov-06	40	< 10
31-Oct-06	20	10
30-Sep-06	10	10
31-Aug-06	340	28
31-Jul-06	< 10	< 10
30-Jun-06	< 10	< 10
31-May-06	20	11
30-Apr-06	20	12
31-Mar-06	< 10	< 10
28-Feb-06	10	10
31-Jan-06	< 10	< 10
31-Dec-05	< 10	< 10
30-Nov-05	< 10	< 10
31-Oct-05	225	47
30-Sep-05	60	16
31-Aug-05	95	17
31-Jul-05	35	16
30-Jun-05	210	24
31-May-05	< 10	< 10
30-Apr-05	< 10	< 10
31-Mar-05	10	10
28-Feb-05	60	16
31-Jan-05	155	22

Table C.3 East Calloway Elementary School

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Dec-10	No Report			
30-Sep-10	1	1		
30-Jun-10	1	1		
31-Mar-10			10	10
31-Dec-09			10	10
30-Sep-09			10	10
30-Jun-09			10	10
31-Mar-09			<10	<10
31-Dec-08			<10	<10
30-Sep-08			<10	<10
30-Jun-08			<10	<10
31-Mar-08			10	10
31-Dec-07			458	300
30-Sep-07			20	20
30-Jun-07			<10	<10
31-Mar-07			TNTC	<10
31-Dec-06			280	280
30-Sep-06			TNTC	TNTC
30-Jun-06			<10	<10
31-Mar-06			<10	<10
31-Dec-05			<10	<10
30-Sep-05			10	10
30-Jun-05			<10	<10

Table C.4 Freemont Baptist Mission

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)
31-Mar-11	No Discharge
31-Dec-10	No Discharge
30-Sep-10	No Discharge
30-Jun-10	No Discharge
31-Mar-10	No Discharge

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)
31-Dec-09	No Discharge
30-Sep-09	No Discharge
30-Jun-09	No Discharge
31-Mar-09	No Discharge
31-Dec-08	No Discharge
30-Sep-08	No Discharge
30-Jun-08	No Discharge
31-Mar-08	No Discharge
31-Dec-07	No Discharge
30-Sep-07	No Discharge
30-Jun-07	No Discharge
31-Mar-07	No Discharge
31-Dec-06	No Discharge
30-Sep-06	No Discharge
30-Jun-06	No Discharge
31-Mar-06	No Discharge
31-Dec-05	No Discharge
30-Sep-05	No Discharge
30-Jun-05	No Discharge
31-Mar-05	No Discharge

Table C.5 Golden Acres Subdivision

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Mar-11	>2420	>2420		
31-Dec-10	2420	2420		
30-Sep-10	124	124		
30-Jun-10	> 600	> 600		
31-Mar-10	No Report			
30-Nov-09			<10	<10
31-Oct-09			>600	>600
30-Sep-09			<10	<10
31-Aug-09			>600	>600
31-Jul-09			10	10
30-Jun-09			10	10

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-May-09			<10	<10
30-Apr-09			<10	<10
31-Mar-09			<10	<10
28-Feb-09			<10	<10
31-Jan-09			<10	<10
31-Dec-08			>600	>600
30-Nov-08			260	260
31-Oct-08			<10	<10
30-Sep-08			130	130
31-Aug-08			130	130
31-Jul-08			>600	>600
30-Jun-08			>600	>600
31-May-08			<10	<10
30-Apr-08			<10	<10
31-Mar-08			30	30
29-Feb-08			>600	>600
31-Jan-08			>600	>600
31-Dec-07			<10	<10
30-Nov-07			<10	<10
31-Oct-07			10	10
30-Sep-07			<10	<10
31-Aug-07			<10	<10
31-Jul-07			>600	>600
30-Jun-07			<10	<10
31-May-07			<10	<10
30-Apr-07			380	195
31-Mar-07			<10	<10
28-Feb-07			<10	<10
31-Jan-07			<10	<10
31-Dec-06			>600	>600
30-Nov-06			10	10
31-Oct-06			120	120
30-Sep-06				
31-Aug-06			20	20
31-Jul-06			<10	<10
30-Jun-06			<10	<10

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-May-06			<10	<10
30-Apr-06			<10	<10
31-Mar-06			>600	>600
28-Feb-06			10	10
31-Jan-06			<10	<10
31-Dec-05			70	70
30-Nov-05			<10	<10
31-Oct-05			<10	<10
30-Sep-05			70	70
31-Aug-05			40	40
31-Jul-05			30	30
30-Jun-05			20	20
31-May-05			10	10
30-Apr-05			<10	<10
31-Mar-05			<10	<10
28-Feb-05			90	90
31-Jan-05			<10	<10

Table C.6 Great Oaks Subdivision

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Jan-11	No Report			
31-Dec-10	50	21.7		
30-Nov-10	40	16.8		
31-Oct-10	16	11.2		
30-Sep-10	20	11.5		
31-Aug-10	40	16.8		
31-Jul-10	32	13.1		
30-Jun-10	32	15.8		
31-May-10	48	27.5		
30-Apr-10	48	14.8		
31-Mar-10	44	14.8		
28-Feb-10	20	14.1		
31-Jan-10	80	41		
31-Dec-09	60	34.4		

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Nov-09	40	14.1		
31-Oct-09	60	16.6		
30-Sep-09	60	31.3		
31-Aug-09	50	20.6		
31-Jul-09	90	42.5		
30-Jun-09	70	42.1		
31-May-09	60	29.6		
30-Apr-09	16	11.2		
31-Mar-09	72	24		
28-Feb-09	100	23		
31-Jan-09	40	25.2		
31-Dec-08	32	10.5		
30-Nov-08	52	17		
31-Oct-08	20	16.3		
30-Sep-08	50	14.1		
31-Aug-08	44	23		
31-Jul-08	40	15.2		
30-Jun-08	100	38.7		
31-May-08	60	15.7		
30-Apr-08	18	11.2		
31-Mar-08	56	28.6		
29-Feb-08	60	29.1		
31-Jan-08	32	22.5		
31-Dec-07	24	12.4		
30-Nov-07	104	42.3		
31-Oct-07	60	32.6		
30-Sep-07	10	10		
31-Aug-07	10	10		
31-Jul-07	20	11.9		
30-Jun-07	84	33		
31-May-07	60	24.4		
30-Apr-07	10	10		
31-Mar-07	10	10		
28-Feb-07	80	22.5		
31-Jan-07			30	12.5
31-Dec-06			40	15.9

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Nov-06			50	16.4
31-Oct-06			30	20.2
30-Sep-06			10	10
31-Aug-06			10	10
31-Jul-06			600	33.1
30-Jun-06			60	25.2
31-May-06			40	23.8
30-Apr-06			34	13.6
31-Mar-06			88	25.4
28-Feb-06			110	38.1
31-Jan-06			100	35.2
31-Dec-05			10	10
30-Nov-05			60	23.7
31-Oct-05			40	22.1
30-Sep-05			20	20
31-Aug-05			10	10
31-Jul-05			14.4	10
30-Jun-05			10	10
31-May-05			40	14.1
30-Apr-05			20	11.9
31-Mar-05			80	22
28-Feb-05			12	10.5
31-Jan-05			20	15.9

Table C.7 Hardin STP

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Jan-11				
31-Dec-10	50	4		
30-Nov-10	162	5		
31-Oct-10	2420	7		
30-Sep-10	86	19		
31-Aug-10	2420	10		
31-Jul-10	344	16		

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Jun-10	2420	101		
31-May-10	2420	334		
30-Apr-10	21	7		
31-Mar-10	4	2		
28-Feb-10	6	2		
31-Jan-10	2420	21		
31-Dec-09	1011	4		
30-Nov-09	238	4		
31-Oct-09	961	229		
30-Sep-09	313	14		
31-Aug-09	961	13		
31-Jul-09	1011	202		
30-Jun-09	1011	283		
31-May-09	1240	347		
30-Apr-09	546	32		
31-Mar-09	530	21		
28-Feb-09	20	7		
31-Jan-09	110	14		
31-Dec-08	382	39		
30-Nov-08	245	17		
31-Oct-08	1600	83		
30-Sep-08	20	8		
31-Aug-08	310	98		
31-Jul-08	940	20		
30-Jun-08	315	61		
31-May-08	1600	693		
30-Apr-08	590	43		
31-Mar-08	1360	71		
29-Feb-08	1600	58		
31-Jan-08	900	35		
31-Dec-07	1200	45		
30-Nov-07	75	10		
31-Oct-07	557	53		
30-Sep-07	250	40		
31-Aug-07	60	25		
31-Jul-07	30	17		

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Jun-07	600	48		
31-May-07	600	23		
30-Apr-07	600	119		
31-Mar-07	600	52		
28-Feb-07	90	21		
31-Jan-07	60	31		
31-Dec-06	600	166		
30-Nov-06	600	143		
31-Oct-06	600	178		
30-Sep-06	600	471		
31-Aug-06			600	180
31-Jul-06			600	421
30-Jun-06			600	260
31-May-06			>600	>600
30-Apr-06			600	228
31-Mar-06			600	140
28-Feb-06			600	374
31-Jan-06			600	576
31-Dec-05			600	315
30-Nov-05			600	167
31-Oct-05			110	43
30-Sep-05				
31-Aug-05			600	43
31-Jul-05				
30-Jun-05			600	158
31-May-05			510	169
30-Apr-05			390	106
31-Mar-05			600	200
28-Feb-05			600	275
31-Jan-05			600	339

Table C.8 Marshall County High School & Technical Center

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Jan-11	no report			
31-Dec-10	78	76		
30-Nov-10	1	1		
31-Oct-10	17	17		
30-Sep-10	1300	1300		
31-Aug-10	23	23		
31-Jul-10	290	290		
30-Jun-10	15	15		
31-May-10	8	8		
30-Apr-10	2420	2420		
31-Mar-10			10	10
28-Feb-10			10	10
31-Jan-10			600	600
31-Dec-09			95	95
30-Nov-09			600	600
31-Oct-09			10	10
30-Sep-09			10	10
31-Aug-09			10	10
31-Jul-09			160	160
30-Jun-09			10	10
31-May-09			300	300
30-Apr-09			<10	<10
31-Mar-09			<10	<10
28-Feb-09			<10	<10
31-Jan-09			>600	>600
31-Dec-08			>600	>600
30-Nov-08			>600	>600
31-Oct-08			>600	>600
30-Sep-08			>600	>600
31-Aug-08			>600	>600
31-Jul-08			>600	>600
30-Jun-08			>600	>600
31-May-08			>600	>600
30-Apr-08			>600	>600
31-Mar-08			>600	>600

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
29-Feb-08			<10	<10
31-Jan-08			>600	>600
31-Dec-07			>600	>600
30-Nov-07			60	60
31-Oct-07			340	340
30-Sep-07			>600	>600
31-Aug-07			>600	>600
31-Jul-07			10	10
30-Jun-07	no discharge			
31-May-07			>600	>600
30-Apr-07			600	77
31-Mar-07			>600	>600
28-Feb-07			>600	>600
31-Jan-07			>600	>600
31-Dec-06			>600	>600
30-Nov-06			>600	>600
31-Oct-06			30	30
30-Sep-06			10	10
31-Aug-06			<10	<10
31-Jul-06			<10	<10
30-Jun-06			<10	<10
31-May-06			>600	>600
30-Apr-06			>600	>600
31-Mar-06			>600	>600
28-Feb-06	no discharge			
31-Jan-06	no discharge			
31-Dec-05			>600	>600
30-Nov-05	no report			
31-Oct-05	no report			
30-Sep-05			>600	>600
31-Aug-05	no report			
31-Jul-05	no report			
30-Jun-05			<10	<10
31-May-05	no report			
30-Apr-05	no report			

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Mar-05	no report			
28-Feb-05	no report			
31-Jan-05	no report			

Table C.9 Marshall County Sanitation District #2

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
New Outfall Location				
31-Jan-11	No Report			
31-Dec-10	105	20.8		
30-Nov-10	18	8.5		
31-Oct-10	387	97.5		
30-Sep-10	54	3.77		
31-Aug-10	3	1		
31-Jul-10	2420	236		
30-Jun-10	15	3.66		
31-May-10	5	1.4		
30-Apr-10	816	204		
31-Mar-10	7	2.2		
28-Feb-10	36	12.667		
31-Jan-10	1	1		
31-Dec-09	111	28.5		
30-Nov-09	8	3.3333		
Old Outfall Location				
31-Dec-09	No Discharge			
30-Nov-09	No Report			
31-Oct-09	2	2		
30-Sep-09	1	1		
31-Aug-09	1011	506		
31-Jul-09	1011	1011		
30-Jun-09	1011	1011		
31-May-09	> 1600	> 1600		
30-Apr-09	> 1600	> 1600		
31-Mar-09	> 1600	> 1600		
28-Feb-09	325	325		
31-Jan-09	10	10		
31-Dec-08	1600	1600		
30-Nov-08	15	15		
31-Oct-08	500	500		

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Sep-08	547	547		
31-Aug-08	1600	1600		
31-Jul-08	5	5		
30-Jun-08	20	20		
31-May-08	5	5		
30-Apr-08			10	10
31-Mar-08				>600
29-Feb-08				>600
31-Jan-08				30
31-Dec-07				7600
30-Nov-07				7600
31-Oct-07				7600
30-Sep-07				
31-Aug-07				
31-Jul-07				
30-Jun-07				10
31-May-07				400
30-Apr-07				10
31-Mar-07				10
28-Feb-07				10
31-Jan-07				TNTC
31-Dec-06				TNTC
30-Nov-06				10
31-Oct-06				10
30-Sep-06				300
31-Aug-06				1000
31-Jul-06				10
30-Jun-06				TNTC
31-May-06				10
30-Apr-06				10
31-Mar-06				10
28-Feb-06				TNTC
31-Jan-06				TNTC
31-Dec-05				220
30-Nov-05				TNTC
31-Oct-05				10

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Sep-05				10
31-Aug-05				10
31-Jul-05				10
30-Jun-05				10
31-May-05				3000
30-Apr-05				10
31-Mar-05				10
28-Feb-05				260
31-Jan-05				3000

Table C.10 Memory Lane Trailer Court

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Dec-10	> 2420	> 2420		
30-Sep-10	2420	2420		
30-Jun-10	185	185		
31-Mar-10	2420	2420		
31-Dec-09	No Discharge			
30-Sep-09	No Report			
30-Jun-09			3840	3840
31-Mar-09			2020	2020
31-Dec-08			>600	>600
30-Sep-08			>600	>600
30-Jun-08			>600	>600
31-Mar-08			>600	>600
31-Dec-07			>600	>600
30-Sep-07			<10	<10
30-Jun-07			160	160
31-Mar-07			>60000	>20000
31-Dec-06			TNTC	TNTC
30-Sep-06			700	700
30-Jun-06			TNTC	TNTC
31-Mar-06			TNTC	TNTC
31-Dec-05			<10	<10

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Sep-05			<10	<10
30-Jun-05			320	320
31-Mar-05			<10	<10

Table C.11 Murray Mobile Home & RV Park

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Dec-10	62	62		
30-Sep-10	1	1		
30-Jun-10	No report			
31-Mar-10	270	52		33.3333
31-Dec-09			10	10
30-Sep-09			4180	4180
30-Jun-09			10	10
31-Mar-09			<10	<10
31-Dec-08			1570	1570
30-Sep-08			<10	<10
30-Jun-08			<10	<10
31-Mar-08			<10	<10
31-Dec-07			<10	<10
30-Sep-07			250	250
30-Jun-07			<10	<10
31-Mar-07			<10	<10
31-Dec-06			<10	<10
30-Sep-06			TNTC	TNTC
30-Jun-06			10	10
31-Mar-06	No report			
31-Dec-05	no discharge			
30-Sep-05	no discharge			
30-Jun-05	no discharge			
31-Mar-05	no discharge			

Table C.12 North Calloway Elementary School

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Dec-10	No Report			
30-Sep-10	1	1		
30-Jun-10	1	1		
31-Mar-10			90	90
31-Dec-09			10	10
30-Sep-09			10	10
30-Jun-09			10	10
31-Mar-09			<10	<10
31-Dec-08			<10	<10
30-Sep-08			<10	<10
30-Jun-08			<10	<10
31-Mar-08			1280	1280
31-Dec-07			800	155
30-Sep-07			<10	<10
30-Jun-07			<10	<10
31-Mar-07			80	80
31-Dec-06			<10	<10
30-Sep-06			TNTC	TNTC
30-Jun-06			130	130
31-Mar-06			<10	<10
31-Dec-05			<10	<10
30-Sep-05			30	30
30-Jun-05			<10	<10

Table C.13 South 641 Water District

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Jan-11	No Report	
31-Dec-10	10	10
30-Nov-10	No Discharge	
31-Oct-10	No Discharge	
30-Sep-10	No Discharge	

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Aug-10	No Discharge	
31-Jul-10	No Discharge	
30-Jun-10	No Discharge	
31-May-10	600	349
30-Apr-10	600	66
31-Mar-10	940	55
28-Feb-10	840	356
31-Jan-10	600	130
31-Dec-09	4640	375
30-Nov-09	120	19
31-Oct-09	3440	469
30-Sep-09	No Discharge	
31-Aug-09	4150	500
31-Jul-09	No Discharge	
30-Jun-09	600	36
31-May-09	330	60
30-Apr-09	1010	122
31-Mar-09	20	< 13
28-Feb-09	30	< 14
31-Jan-09	1680	275
31-Dec-08	1630	590
30-Nov-08	No Discharge	
31-Oct-08	No Discharge	
30-Sep-08	No Discharge	
31-Aug-08	No Discharge	
31-Jul-08	> 600	< 117
30-Jun-08	> 600	> 439
31-May-08	< 50	< 50
30-Apr-08	< 30	< 30
31-Mar-08	610	55.89
29-Feb-08	63	63
31-Jan-08	430	63
31-Dec-07	600	321
30-Nov-07	< 600	< 28
31-Oct-07	600	490
30-Sep-07	No Discharge	

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Aug-07	No Discharge	
31-Jul-07	No Discharge	
30-Jun-07	No Discharge	
31-May-07	No Discharge	
30-Apr-07	600	62
31-Mar-07	250	48
28-Feb-07	600	34
31-Jan-07	150	47
31-Dec-06	600	72
30-Nov-06	600	77
31-Oct-06	600	449
30-Sep-06	No Discharge	
31-Aug-06	> 600	> 600
31-Jul-06	No Discharge	
30-Jun-06	60	24
31-May-06	600	37
30-Apr-06	280	52
31-Mar-06	20	13
28-Feb-06	600	28
31-Jan-06	400	133
31-Dec-05	190	97
30-Nov-05	No Discharge	
31-Oct-05	No Discharge	
30-Sep-05	600	93
31-Aug-05	No Discharge	
31-Jul-05	No Discharge	
30-Jun-05	No Discharge	
31-May-05	420	13
30-Apr-05	110	27
31-Mar-05	110	19
28-Feb-05	230	61
31-Jan-05	10	10
31-Dec-04	600	178
30-Nov-04	220	106
31-Oct-04	600	96
30-Sep-04	< 10	< 10

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Aug-04	No Discharge	
31-Jul-04	No Discharge	
30-Jun-04	< 10	< 10
31-May-04	< 10	< 10
30-Apr-04	600	69
31-Mar-04	< 10	< 10
29-Feb-04	70	25
31-Jan-04	600	211
31-Dec-03	600	77
30-Nov-03	No Discharge	
31-Oct-03	< 600	< 77
30-Sep-03	600	438
31-Aug-03	No Discharge	
31-Jul-03	> 600	> 600
30-Jun-03	600	186
31-May-03	600	258
30-Apr-03	360	40
31-Mar-03	340	62
28-Feb-03	120	26
31-Jan-03	600	152
31-Dec-02	170	26
30-Nov-02	> 600	> 77
31-Oct-02	450	< 26
30-Sep-02	> 600	> 537
31-Aug-02	10	< 10
31-Jul-02	< 10	< 10
30-Jun-02	No Discharge	
31-May-02	520	94
30-Apr-02	520	195
31-Mar-02	> 600	> 499
28-Feb-02	< 10	< 10
31-Jan-02	380	166
31-Dec-01	> 600	> 371
30-Nov-01	> 600	> 77
31-Oct-01	> 600	> 56
30-Sep-01	No Discharge	

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Aug-01	> 600	< 70
31-Jul-01	No Discharge	
30-Jun-01	> 600	< 77
31-May-01	> 600	> 77
30-Apr-01	> 600	> 92
31-Mar-01		
28-Feb-01	> 600	< 53
31-Jan-01	No Discharge	
31-Dec-00	> 600	> 600
30-Nov-00	> 600	> 600
31-Oct-00	No Discharge	
30-Sep-00	No Discharge	
31-Aug-00	No Discharge	
31-Jul-00	> 600	> 140
30-Jun-00	< 10	10
31-May-00	> 600	28
30-Apr-00	230	36

Table C.14 South Marshall Elementary & Middle School

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Dec-10	73	73		
30-Sep-10	1	1		
30-Jun-10	10	10		
31-Mar-10	1	1		
31-Dec-09	1	1		
30-Sep-09	1	1		
30-Jun-09			10	10
31-Mar-09			<10	<10
31-Dec-08			10	10
30-Sep-08			>600	>600
30-Jun-08			>600	>600
31-Mar-08			<10	<10
31-Dec-07			<10	<10

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Sep-07			>600	>600
30-Jun-07			600	153
31-Mar-07			10	10
31-Dec-06			>600	>600
30-Sep-06			130	130
30-Jun-06			>600	>600
31-Mar-06			<10	<10
31-Dec-05			<10	<10
30-Sep-05			>600	>600
30-Jun-05			<10	<10

Table C.15 Southwest Calloway Elementary

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
31-Dec-10	No Report			
30-Sep-10	1	1		
30-Jun-10	1	1		
31-Mar-10			10	10
31-Dec-09			40	40
30-Sep-09			10	10
30-Jun-09			10	10
31-Mar-09			<10	<10
31-Dec-08			<10	<10
30-Sep-08			<10	<10
30-Jun-08			<10	<10
31-Mar-08			4010	4010
31-Dec-07			<10	<10
30-Sep-07			<10	<10
30-Jun-07			<10	<10
31-Mar-07			<10	<10
31-Dec-06			<10	<10
30-Sep-06			500	500

Monitoring Period End Date	*E. coli* Concentration Maximum (colonies/100 ml)	*E. coli* Concentration Average (colonies/100 ml)	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Jun-06			<10	<10
31-Mar-06			<10	<10
31-Dec-05			<10	<10
30-Sep-05			10	10
30-Jun-05			<10	<10

Table C.16 Symsonia WWTP

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
30-Apr-11	<10	<10
31-Mar-11	<10	<10
28-Feb-11	10	10
31-Jan-11	<10	<10
31-Dec-10	< 10	< 10
30-Nov-10	< 10	< 10
31-Oct-10	< 10	< 10
30-Sep-10	< 10	< 10
31-Aug-10	< 10	< 10
31-Jul-10	< 10	< 10
30-Jun-10	< 10	< 10
31-May-10	< 10	< 10
30-Apr-10	< 10	< 10
31-Mar-10	< 10	< 10
28-Feb-10	< 10	< 10
31-Jan-10	< 10	< 10
31-Dec-09	20	12.5
30-Nov-09	< 10	< 10
31-Oct-09	< 10	< 10
30-Sep-09	< 10	< 10
31-Aug-09	< 10	< 10
31-Jul-09	< 10	< 10
30-Jun-09	< 10	< 10
31-May-09	< 10	< 10
30-Apr-09	< 10	< 10
31-Mar-09	< 10	< 10

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
28-Feb-09	< 10	< 10
31-Jan-09	< 10	< 10
31-Dec-08	< 10	< 10
30-Nov-08	< 10	< 10
31-Oct-08	< 10	< 10
30-Sep-08	< 10	< 10
31-Aug-08	< 10	< 10
31-Jul-08	< 10	< 10
30-Jun-08	15	11.25
31-May-08	< 10	< 10
30-Apr-08	< 10	< 10
31-Mar-08	< 10	< 10
29-Feb-08	15	11.25
31-Jan-08	< 10	< 10
31-Dec-07	< 10	< 10
30-Nov-07	25	15
31-Oct-07	10	10
30-Sep-07	< 10	< 10
31-Aug-07	< 10	< 10
31-Jul-07	10	10
30-Jun-07	< 10	< 10
31-May-07	< 10	< 10
30-Apr-07	10	10
31-Mar-07	< 10	< 10
28-Feb-07	< 10	< 10
31-Jan-07	< 10	< 10
31-Dec-06	< 10	< 10
30-Nov-06	< 10	< 10
31-Oct-06	< 10	< 10
30-Sep-06	20	12.5
31-Aug-06	< 10	< 10
31-Jul-06	< 10	< 10
30-Jun-06	< 10	< 10
31-May-06	< 10	< 10
30-Apr-06	< 10	< 10
31-Mar-06	< 10	< 10

Monitoring Period End Date	Fecal Coliform Concentration Maximum (colonies/100 ml)	Fecal Coliform Concentration Average (colonies/100 ml)
28-Feb-06	< 10	< 10
31-Jan-06	< 10	< 10
31-Dec-05	< 10	< 10
30-Nov-05	< 10	< 10
31-Oct-05	< 10	< 10
30-Sep-05	< 10	< 10
31-Aug-05	< 10	< 10
31-Jul-05	< 10	< 10
30-Jun-05	< 10	< 10
31-May-05	< 10	< 10
30-Apr-05	10	10
31-Mar-05	< 10	< 10
28-Feb-05	< 10	< 10
31-Jan-05	< 10	< 10