Michigan Department of Environmental Quality

Water Resources Division

August 2007

Revised December 2010

Total Maximum Daily Load for *E. coli* for the Rouge River Wayne and Oakland Counties, Michigan

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Acronyms

ARC	Alliance of Rouge Communities
BMP	Best Management Practices
BST	Bacterial Source Tracking
CFS	Cubic Feet per Second
CFU	Colony Forming Units
COC	Certificates of Coverage
CSO	Combined Sewer Overflow
DAR	Drainage Area Ratio
FOTR	Friends of the Rouge
LA	Load Allocation
LC	Loading Capacity
LDC	Load Duration Curve
MDEQ	Michigan Department of Environmental Quality
MDOT	Michigan Department of Transportation
mL	Milliliter
MOS	Margin of Safety
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
OCDC	Oakland County Drain Commission
OSDS	On-Site Disposal System
RPO	Rouge Program Office
RTB	Retention Treatment Basin
SEMCOG	Southeast Michigan Council of Governments
SSO	Sanitary Sewer Overflow
SWMA	Storm Water Management Area
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WLA	Waste Load Allocation
WQS	Water Quality Standards
WWTP	Wastewater Treatment Plant
YCUA	Ypsilanti Community Utility Authority

1.0 INTRODUCTION

Section 303(d) of the federal Clean Water Act and the United States Environmental Protection Agency's (USEPA's) Water Quality Planning and Management Regulations (Title 40 of the Code of Federal Regulations, Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for water bodies that are not meeting water quality standards (WQS). The TMDL process establishes the allowable loadings of pollutants for a water body based on the relationship between pollution sources and in-stream water quality conditions. TMDLs provide states a basis for determining the pollutant reductions necessary from both point and nonpoint sources to restore and maintain the quality of their water resources. The purpose of this TMDL is to identify the allowable levels of *E. coli* that will result in the attainment of the applicable WQS in the Rouge River, located in Wayne and Oakland Counties, Michigan.

Portions of this TMDL have been modified to incorporate changes made to the city of Detroit's Long-Term Combined Sewer Overflow (CSO) Control Plan. The modification is necessary to provide waste load allocations (WLAs) to several first flush basins, which are designed to treat currently uncontrolled sewage overflows. In the process of providing WLAs to the future first flush basins, other areas of the TMDL required modification. Specifically, the following tables, figures, sections, and appendices are affected by this modification: Tables 14-22, Figures 9-12, Sections 7, 10.2.1, 10.2.2, and Appendices G-J, L, and N. It should also be noted that the Notices of Coverage under Permit by Rule have been eliminated from this TMDL.

2.0 PROBLEM STATEMENT

The TMDL reach for the Rouge River appears on the Section 303(d) list as:

RIVER ROUGE (MAIN BR.); UPPER BR.; MIDDLE BR.; LOWER BR., BELL BR.; FRANKLIN BR.; EVANS DITCH WBID#: 061305G
County: Oakland/Wayne Size: 91 M

Location: Detroit River confluence u/s (Main River Rouge (u/s to Big Beaver Road); Upper River Rouge (u/s to Rt. 696); Middle Br. River Rouge (u/s to 8 Mile Rd.); Lower Br. (u/s to Beck Road); Bell Br. (u/s to 7 Mile Rd.); Evans Ditch (u/s to Lahser Rd.); and the Franklin Br. (u/s to Big Beaver Rd.)
HUC: 4090004 **RF3RchID: 4090004 15**
Problem: Fish and macroinvertebrate communities rated poor; pathogens; WQS exceedances for dissolved oxygen (D.O.)
TMDL YEAR(s): 2007 (2011 for D.O.)

The Rouge River was placed on the Section 303(d) list due to impairment of recreational uses as indicated by the presence of elevated levels of *E. coli* (Edly and Wuycheck, 2006). Monitoring data collected by the Michigan Department of Environmental Quality (MDEQ) in 2005 documented exceedances of the WQS for *E. coli* at all sampling locations during the total body contact recreational season of May 1 through October 31. Elevated *E. coli* levels have been observed through the years in sampling conducted on this water body.

3.0 NUMERIC TARGET

The impaired designated use addressed by this TMDL is total body contact recreation. The designated use rule (R 323.1100 of the Part 4 rules, WQS, promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended) states that this water body is to be protected for total body contact

recreation from May 1 to October 31. The target levels for this designated use are the ambient *E. coli* standards established in Rule 62 of the WQS as follows:

> R 323.1062 Microorganisms.
>
> Rule 62. (1) All waters of the state protected for total body contact recreation shall not contain more than 130 *E. coli* per 100 milliliters, as a 30-day geometric mean. Compliance shall be based on the geometric mean of all individual samples taken during 5 or more sampling events representatively spread over a 30-day period. Each sampling event shall consist of 3 or more samples taken at representative locations within a defined sampling area. At no time shall the waters of the state protected for total body contact recreation contain more than a maximum of 300 *E. coli* per 100 milliliters. Compliance shall be based on the geometric mean of 3 or more samples taken during the same sampling event at representative locations within a defined sampling area.
>
> (2) All surface waters of the state protected for partial body contact recreation shall not contain more than a maximum of 1,000 *E. coli* per 100 ml. Compliance shall be based on the geometric mean of 3 or more samples, taken during the same sampling event, at representative locations within a defined sampling area.

The target for sanitary wastewater discharges is:

> Rule 62. (3) Discharges containing treated or untreated human sewage shall not contain more than 200 fecal coliform bacteria per 100 milliliters, based on the geometric mean of all of 5 or more samples taken over a 30-day period, nor more than 400 fecal coliform bacteria per 100 milliliters, based on the geometric mean of all of 3 or more samples taken during any period of discharge not to exceed 7 days. Other indicators of adequate disinfection may be utilized where approved by the department.

The targets for this TMDL are 300 *E. coli* per 100 mL expressed as a daily maximum load and concentration from May 1 to October 31 (i.e., daily target) and 130 *E. coli* per 100 mL as a 30-day geometric mean, expressed as a concentration (i.e., monthly target). An additional target is the partial body contact standard of 1,000 *E. coli* per 100 mL as a daily maximum concentration year-round. Achievement of the total body contact daily maximum target is expected to result in attainment of the partial body contact standard.

3.1 Linkage Analysis

Determining the link between the *E. coli* concentrations in the Rouge River and the potential sources is necessary to develop the TMDL. TMDLs must be established at a level necessary to attain and maintain the applicable WQS. In Michigan, the applicable total body contact recreation WQS for *E. coli* consists of 2 criteria values: a daily maximum of 300 *E. coli* per 100 ml (daily target) and a 30-day geometric mean of 130 *E. coli* per 100 ml (monthly target). Because the WLAs (the loading associated with point source discharges) provided herein are based on the daily target, a linkage analysis is needed to demonstrate these allocations also assure attainment of the monthly target.

The USEPA's development of ambient water quality criteria for bacteria, as contained in the "Ambient Water Quality Criteria for Bacteria - 1986" (USEPA, 1986), defines the statistical relationship between the daily maximum and 30-day geometric mean criteria values. The assumption used to develop the 30-day geometric mean of 126 *E. coli* per 100 ml (rounded to 130 *E. coli* per 100 ml as the Michigan criterion) is a log-normal distribution using a log standard

deviation of 0.4. Using this assumption and a comparable recurrence interval (e.g., 30 days), a daily maximum projected from the 30-day geometric mean would be 713 *E. coli* per 100 ml. Conversely, the Michigan daily maximum criterion of 300 *E. coli* per 100 ml is comparable to a 30-day geometric mean of approximately 55 *E. coli* per 100 ml. This relationship provides the basis for demonstrating that attaining the daily target in the TMDL will also achieve the monthly target. A further conservative assumption is the log standard deviation of 0.4. The log standard deviation observed in most riverine systems is generally at least 0.3, and often quite larger (Cleland, 2007). The greater the variability, the more protective the daily maximum is relative to the monthly target.

Michigan regulates discharges containing treated or untreated human waste (i.e., sanitary wastewater) using fecal coliform. Sanitary wastewater discharges are required to meet 200 fecal coliform per 100 ml as a monthly average and 400 fecal coliform per 100 ml as a maximum. The MDEQ believes the sanitary wastewater discharges are in compliance with the daily and monthly targets and the allocations associated with the daily target, if their NPDES permit limits for fecal coliform are met. The *E. coli* criteria contained in the 1986 document were derived to approximate the degree of protection (i.e., 8 illnesses per 1,000 swimmers) provided by the fecal coliform indicator level of 200 *E. coli* per 100 ml recommended by the USEPA prior to the adoption of the 1986 criteria. All wastewater treatment plants (WWTPs) provide year-round disinfection, providing another level of confidence that the WQS will be met by these sources.

4.0 DATA DISCUSSION

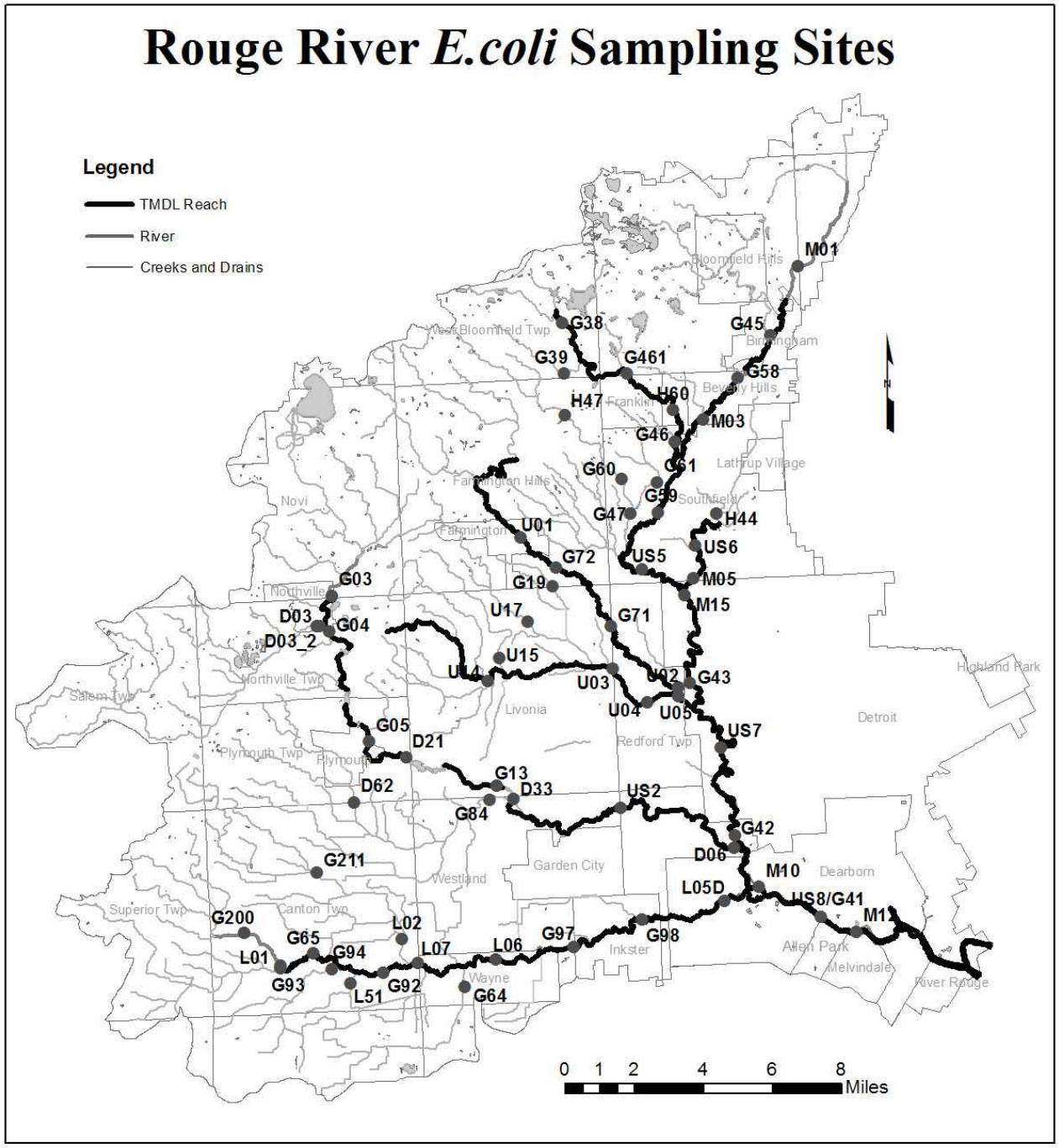
The data discussion is separated into three parts:

- Data collected by the MDEQ in 2005 and 2006.
- Data collected by the Alliance of Rouge Communities (ARC) and the Wayne County Rouge Program Office (RPO).
- A brief overall summary.

4.1 MDEQ 2005 and 2006 Sampling Data

E. coli Data. In 2005, the Section 303(d) listed reaches in the Rouge River watershed were sampled by the MDEQ at 62 locations in Wayne and Oakland Counties (Figure 1). *E. coli* sampling was performed weekly from May through October 2005 consistent with the sampling requirements of Rule 62. To evaluate compliance with the targets, 30-day rolling geometric means and daily geometric means, e.g., daily maximums, were calculated for each location sampled, per Rule 62(1). Figures A-1 through A-20 (Appendix A) and Figures B-1 through B-20 (Appendix B) graphically display the daily maximums and 30-day rolling geometric means, respectively, of *E. coli* levels in the water samples during the total body contact recreational season at all sampling stations. Appendices C, D, E, and F each contain tabular summaries of the sampling locations, sample dates, and *E. coli* results (daily maximums and 30-day rolling geometric means) for the Main, Upper, Middle, and Lower Branches of the Rouge River, respectively. Sampling location field IDs in the appendix data refer to the map locations shown in Figure 1.

Figure 1



Bacterial Source Tracking (BST). To further investigate sources of the *E. coli* detected in samples collected from sites throughout the Rouge River watershed, samples were also collected for human *Bacteroidetes* analysis in 2005 and for human *Bacteroidetes* and human *Enterococcus* analyses in 2006. These DNA-based methods screen for the presence of specific genes in samples suspected of containing human fecal matter. The BST analyses were conducted by Source Molecular Corporation (Miami, Florida) using the Human *Bacteroidetes* ID™ method and the Human *Enterococcus* ID™ method. A positive result would suggest, but would not conclusively prove, a human source for at least some of the *E. coli* in the samples

analyzed. A negative result would suggest, but would not conclusively prove, the absence of human-derived fecal pollution.

Load Duration Curves (LDCs). Information linking *E. coli* data to potential sources was determined through the calculation of *E. coli* LDCs. LDCs help assess under what streamflow conditions, ranging from low dry weather flows to peak wet weather flows, the daily target is most frequently exceeded (and by how much), giving investigators insight into the possible sources of contaminants. LDCs were developed for each of the Rouge River locations sampled in 2005 using United States Geological Survey (USGS) historical flow data. *E. coli* LDCs developed from MDEQ *E. coli* data collected in 2005 are presented in Appendices G-J. Note that in the LDCs, the points above the curve on the left side of the figure are indicative of water quality exceedances of the daily target during wet weather conditions (higher flows) and the points above the curve to the middle and right side of the figure indicate water quality exceedances during midflow to dry weather conditions (lower flows). The calculated LDCs were evaluated for the number and magnitude of exceedances of the daily target under all flow conditions (wet to dry). The target level shown on each figure is the daily maximum criterion of 300 *E. coli* per 100 ml calculated using USGS historical flow data. Summaries of the LDC data are presented in this section.

The remainder of Section 4.1 summarizes the following 3 topics for the Main Rouge, Upper Rouge, Middle Rouge, and Lower Rouge in turn, based on the 2005 and 2006 MDEQ data:

- Daily maximums and 30-day rolling geometric means of *E. coli* concentrations, which are compared with the daily and monthly targets, respectively.
- BST testing to determine linkage to sources.
- LDCs to determine linkage to sources.

4.1.1 Main Rouge

4.1.1.1 Overview

There are high *E. coli* levels in all weather conditions throughout the Main Branch, Franklin Branch, Pebble Creek, and Evans Ditch. Positive results for human sources were obtained in the Main Branch and Evans Ditch in wet weather, Franklin Branch in wet and dry weather, and in Pebble Creek in dry weather.

4.1.1.2 Daily Maximum and 30-Day Rolling Geometric Mean

For the 2005 MDEQ-collected data in the Main Rouge subwatershed, Figures 2 and 3 show the percentages of the daily maximum *E. coli* concentrations that fall into each of the following numeric ranges:

- Less than or equal to 300 *E. coli* per 100 ml (i.e., meeting the daily target).
- Greater than 300 but less than or equal to 1,000 *E. coli* per 100 ml (i.e., meeting the state partial body contact standard).
- Greater than 1,000 *E. coli* per 100 ml.

Figure 2 shows the values for the Main Branch (Upper) and Figure 3 shows the values for the Main Branch (Lower), coded to specific sampling locations. On the pie chart at each location, darker shading corresponds with higher *E. coli* levels.

Detailed graphs of the daily maximums for the Main Rouge are shown in Figures A-1 through A-6 in Appendix A. Graphs of the 30-day rolling geometric means for the Main Rouge are

shown in Figures B-1 through B-6 in Appendix B. A detailed tabulation of results for each Main Rouge location, showing sampling dates, individual sample results, and calculated means, is included in Appendix C.

There was no compliance with the monthly target in the Main Rouge except at 1 location, Franklin Branch at Middlebelt Road (G38), with a compliance of 41 percent. Compliance with the daily target ranged from 60 percent at Franklin Branch at Middlebelt Road (G38) to 0 percent at Plymouth Road (US7). The percentage of values exceeding 1,000 *E. coli* per 100 ml, the partial body contact standard, ranged from 71 percent at Plymouth Road (US7) to 0 percent in the Franklin Branch at Middlebelt Road (G38).

Figure 2

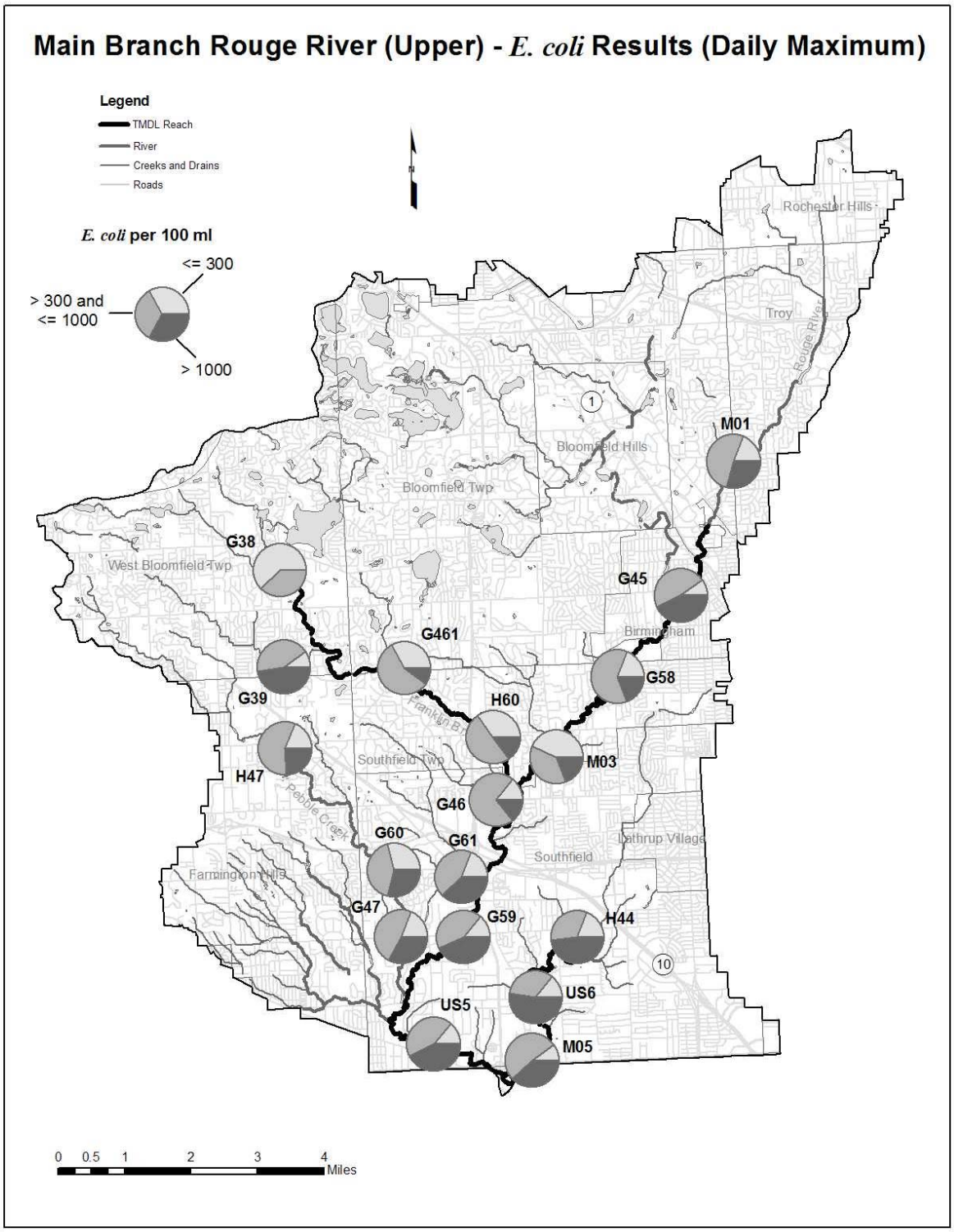
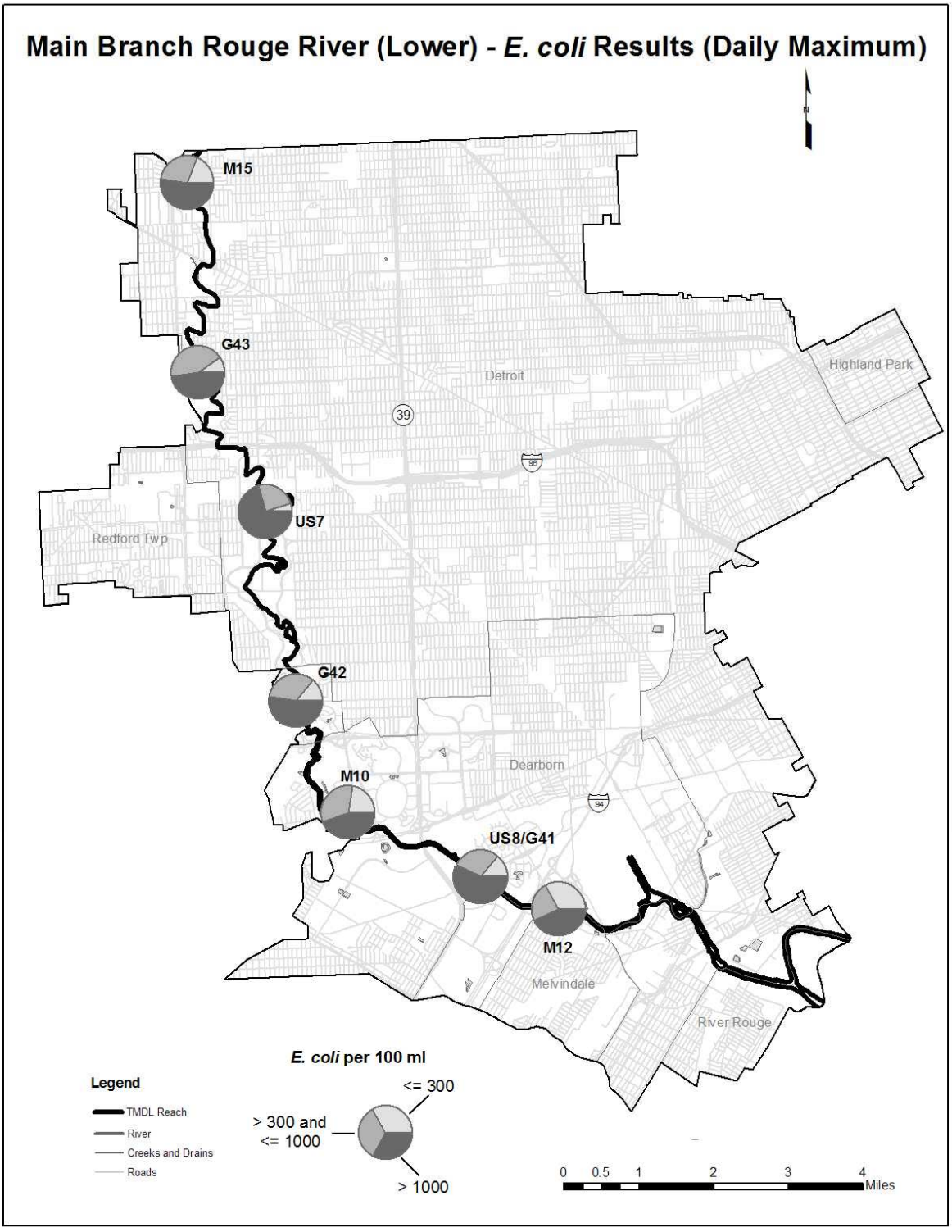

Main Branch Rouge River (Upper) - E. coli Results (Daily Maximum)
Legend
TMDL Reach
River
Creeks and Drains
Roads
E. coli per 100 ml
<= 300
> 300 and <= 1000
> 1000
Rochester Hills
Troy
Rouge River
Bloomfield Hills
Bloomfield Twp
West Bloomfield Twp
Birmingham
Southfield Twp
Southfield
Lathrup Village
Farmington Hills
Pebble Creek
Franklin Br
M01
G45
G58
M03
G38
G461
G39
H60
H47
G46
G60
G61
G47
G59
H44
US6
US5
M05
0 0.5 1 2 3 4
Miles

Figure 3


Main Branch Rouge River (Lower) - E. coli Results (Daily Maximum)
M15
G43
US7
G42
M10
US8/G41
M12
Detroit
Highland Park
Redford Twp
Dearborn
Melvindale
River Rouge
39
96
94
E. coli per 100 ml
<= 300
> 300 and <= 1000
> 1000
Legend
TMDL Reach
River
Creeks and Drains
Roads
0 0.5 1 2 3 4
Miles

4.1.1.3 BST

Tables 1a and 1b list the Main Rouge locations from which samples were analyzed for human *Bacteroidetes* and/or human *Enterococcus* in 2005 and 2006, the results of these BST analyses, and the concurrent *E. coli* values. Positive results suggesting human-associated bacteria were obtained at Maple Road (G45) in wet weather, the Franklin Branch at Middlebelt between 14 Mile Road and Maple Road (G39) in dry and wet weather, Pebble Creek at Franklin Road (G61) in dry weather, and Evans Ditch at Berg Road (M05) in wet weather. Wet and dry weather upstream human sources might include illicit connections, failing on-site disposal systems (OSDS), and sanitary sewer overflows (SSOs). Negative results obtained using the Human *Bacteroidetes* ID™ or Human *Enterococcus* ID™ laboratory methodologies do not necessarily mean that human sources of *E. coli* are not present.

Table 1a
2005 Main Rouge River BST Analyses (Bacteroidetes analyses only)

Main Rouge River		2005 SAMPLING RESULTS							
Field ID	Location Description	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Dry/Wet Weather	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Dry/Wet Weather
G39	Franklin Branch at Middlebelt between 14 Mile and Maple Road	8/9/2005	1,890	Negative	Dry	8/23/2005	628	**Positive**	Dry
G61	Pebble Creek at Franklin Road south of 11Mile Road	8/9/2005	1,715	**Positive**	Dry	8/23/2005	870	Negative	Dry
US6	Evans Ditch at 9 Mile Rd.	8/9/2005	1,931	Negative	Wet	8/23/2005	765	Negative	Dry
M05	Evans Ditch at Berg and 8 Mile Road	9/27/2005	944	Negative	Wet				

Note: Shading indicates no sample collection.

Table 1b
2006 Main Rouge River BST Analyses (Bacteroidetes and Enterococcus analyses)

Main Rouge River		2006 SAMPLING RESULTS							
		Dry Weather				Wet Weather			
Field ID	Location Description	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Human Enterococcus	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Human Enterococcus
G45/US4	Maple, west of Southfield Road	7/24/2006	340	Negative	Negative	9/12/2006	10,000	Negative	**Positive**
G39	Franklin Branch at Middlebelt between 14 Mile and Maple Road	7/24/2006	820	Negative	Negative	9/12/2006	70,000	**Positive**	Negative
M05	Evans Ditch at Berg and 8 Mile Road	7/24/2006	310	Negative	Negative	9/12/2006	12,000	Negative	**Positive**

4.1.1.4 Load Duration Curves

Table 2 summarizes the results of the LDC analyses from the 2005 Main Rouge data; the curves are in Appendix G. The table shows results for sample locations on the Main Rouge (white rows) and also on its tributaries (shaded). The locations in the table are ordered from upstream to downstream.

Main Rouge (13 locations sampled). The data indicate that exceedances of the daily target were observed in all weather conditions. *E. coli* levels increased in dry weather relative to wet weather at 10 Mile Road (G59), which is downstream of the confluence with the Franklin Branch. Upstream sources in dry weather might include illicit connections, failing OSDS, SSOs, wildlife, or waterfowl. From Ann Arbor Trail (G42) to Greenfield Road (M12) *E. coli* levels increased in wet weather conditions. Possible sources could be those described above; however, there are also active CSOs downstream of 8 Mile Road that are likely contributing to wet weather exceedances.

Franklin Branch (5 locations sampled). Overall there was little change in *E. coli* levels from upstream to downstream. Levels were near the daily target at 4 of the 5 locations. The Franklin Branch at Middlebelt between 14 Mile Road and 15 Mile Road (G39) had higher *E. coli* levels in all weather conditions than the other locations. Since there are no CSOs in the Franklin Branch, dry and wet weather sources might include illicit connections, failing OSDS, SSOs, wildlife, or waterfowl.

Pebble Creek (4 locations sampled). Overall there was little change in *E. coli* levels from upstream to downstream. There were *E. coli* exceedances of the daily target in all weather conditions; however, the levels were only slightly above the target. Dry and wet weather sources include those suggested for the Franklin Branch.

Evans Ditch (3 locations sampled). Overall there was little change in *E. coli* levels from upstream to downstream. *E. coli* levels exceeded the target in all weather conditions. Dry and wet weather sources include those suggested for the Franklin Branch.

Table 2
2005 Main Rouge Load Duration Curve Evaluation
(Locations are ordered from upstream to downstream)

Main Rouge River		WET WEATHER (High-flow and Moist Conditions)		Mid-Range Flow		DRY WEATHER (Dry and Low-flow conditions)		Weather Condition associated with target exceedances
Field ID	Location	Greater than	Percent Less than or Equal to Target	Percent Greater than Target	than or Equal to Target	Greater than	Percent Less than or Equal to Target	(Dry, Mid-range, Wet, or All)
M01	Main Rouge at Adams Rd.	50	50	67	33	80	20	All
G45	Main Rouge at Maple Rd.	50	50	80	20	100	0	All
G58	Main Rouge at Riverside Dr.	75	25	50	50	90	10	All
M03	Main Rouge at Lahser Rd.	75	25	33	67	55	45	All
G38	Franklin Branch at Middlebelt between Walnut Lake and 15 Mile Rd.	50	50	33	67	18	82	Wet, Mid
G39	Franklin Branch at Middlebelt between 14 Mile Rd. and 15 Mile Rd.	100	0	60	40	82	18	All
G461	Franklin Branch at Franklin Rd.	75	25	33	67	36	64	All
H60	Franklin Branch at 13 Mile Rd.	100	0	20	80	64	36	Wet, Dry
G46	Franklin Branch at 12 Mile Rd.	50	50	50	50	80	20	All
G59	Main Rouge at 10 Mile Rd. west of Telegraph Rd.	50	50	50	50	85	15	All
H47	Pebble Creek west of Middlebelt and south of 13 Mile Rd.	100	0	17	83	73	27	Wet, Dry
G60	Pebble Creek at 11 Mile Rd.	75	25	50	50	64	36	All
G61	Pebble Creek at Franklin Rd.	75	25	80	20	64	36	All
G47	Pebble Creek at 10 Mile Rd.	100	0	50	50	91	9	All
US5	Main Rouge at Beech Rd.	100	0	50	50	83	17	All
H44	Evans Ditch at Tamarack off 10 Mile Rd.	75	25	50	50	92	8	All
US6	Evans Ditch at 9 Mile Rd.	100	0	50	50	77	23	All
M05	Evans Ditch at Berg Rd.	75	25	50	50	62	38	All
M15	Main Rouge north of 7 Mile Rd. at Bonnie Brook Golf Course	100	0	50	50	77	23	All
G43	Main Rouge at Fenkell Rd.	100	0	50	50	92	8	All
US7	Main Rouge at Plymouth Rd.	100	0	80	20	100	0	All
G42	Main Rouge at Ann Arbor Trail	100	0	80	20	64	36	All
M10	Main Rouge at Ford Mansion	100	0	33	67	73	27	All
US8/G41	Main Rouge at Rotunda Dr.	88	13	75	25	100	0	All
M12	Main Rouge at Greenfield Rd.	75	25	63	38	20	80	Wet, Mid

Shaded rows are tributary to the unshaded row directly below them.

4.1.2 Upper Rouge

4.1.2.1 Overview

There are high *E. coli* levels in all weather conditions throughout the Upper Rouge Branch, Bell Branch, and Tarabusi Creek. Positive results for human sources were obtained in the Upper Rouge Branch, Bell Branch, and Tarabusi Creek in wet weather, but not in dry weather.

4.1.2.2 Daily Maximum and 30-Day Rolling Geometric Mean

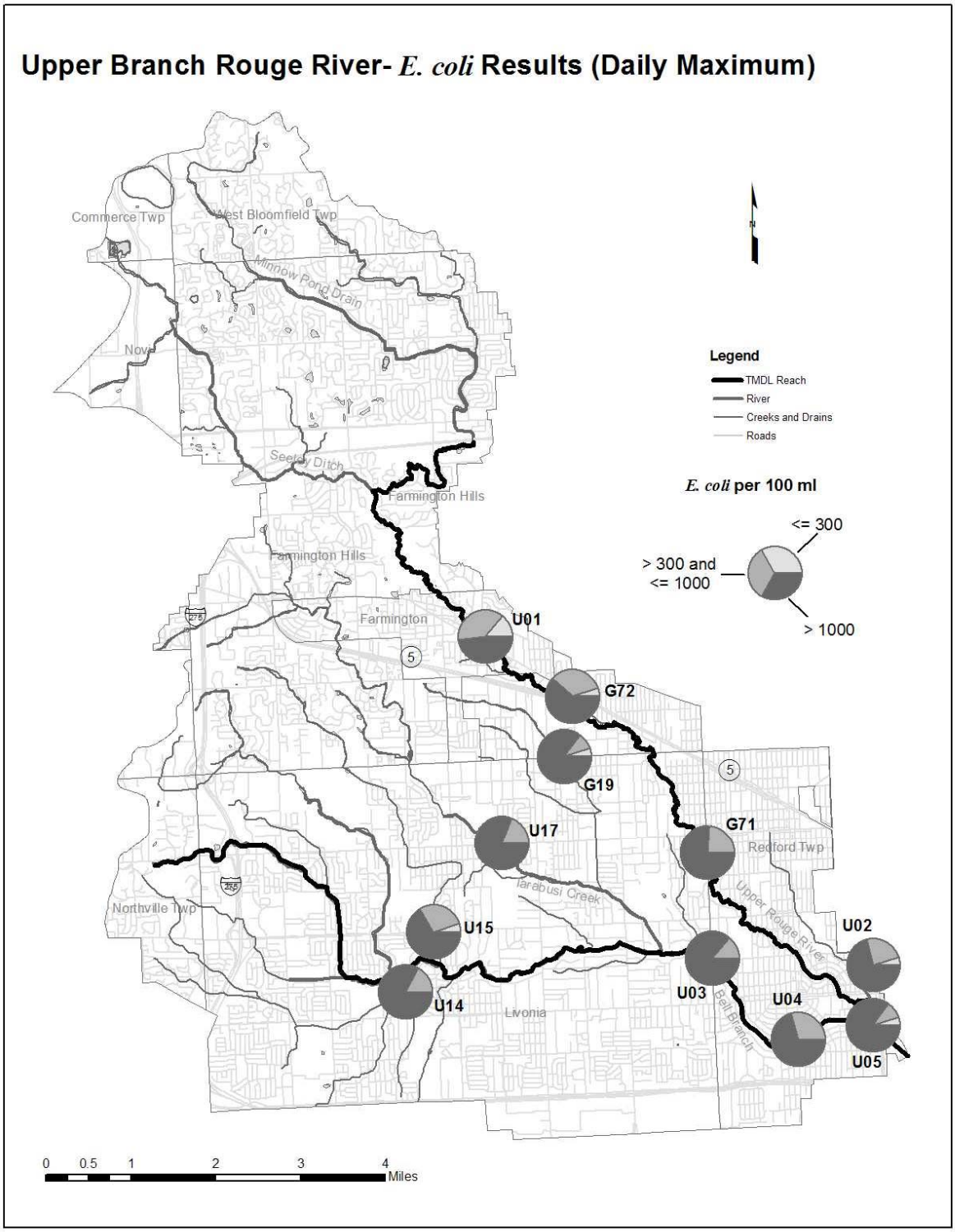
Figure 4 shows, in summarized form, the percentages of the Upper Rouge Branch, Bell Branch, and Tarabusi Creek daily maximum *E. coli* concentrations that fall into each of the following numeric ranges:

- Less than or equal to 300 *E. coli* per 100 ml.
- Greater than 300, but less than or equal to 1,000 *E. coli* per 100 ml.
- Greater than 1,000 *E. coli* per 100 ml.

Detailed graphs of the daily maximums for the Upper Rouge are shown in Figures A-7 through A-10 in Appendix A. Graphs of the 30-day rolling geometric means for the Upper Rouge are shown in Figures B-7 through B-10 in Appendix B. A detailed tabulation of results for each Upper Rouge sampling location is included in Appendix D.

There was no compliance with the monthly target in the Upper Rouge or its tributaries. Only 1 location, the Upper Rouge at Powers Road (U01), complied with the daily target (10 percent of the time). The percentage of values exceeding 1,000 *E. coli* per 100 ml, the partial body contact standard, ranged from 86 percent at 3 locations to 48 percent at Upper Rouge at Powers Road (U01).

Figure 4


Upper Branch Rouge River- E. coli Results (Daily Maximum)
Commerce Twp
West Bloomfield Twp
Minnow Pond Drain
Novi
Seeley Ditch
Farmington Hills
Farmington Hills
Farmington
U01
G72
G19
U17
G71
Redford Twp
Upper Rouge River
Tarabusi Creek
Northville Twp
U15
U02
U03
U04
U14
Livonia
East Branch
U05
Legend
TMDL Reach
River
Creeks and Drains
Roads
E. coli per 100 ml
<= 300
> 300 and <= 1000
> 1000
0 0.5 1 2 3 4
Miles

4.1.2.3 BST

Tables 3a and 3b list the locations from which samples were analyzed for human *Bacteroidetes* and/or human *Enterococcus* in 2005 and 2006 in the Upper Rouge Storm Water Management Area (SWMA), with the results and the concurrent *E. coli* values. Positive results suggesting human-associated bacteria were obtained during wet weather conditions at Inkster Road (G71), Riverside Drive (U14), 7 Mile Road west of Merriman Road (U17), and at 8 Mile Road and Purlingbrook (G19). Wet weather upstream human sources might include illicit connections, failing OSDS, and SSOs. There are no CSOs upstream of these locations. Dry weather samples were all negative for human *Bacteroidetes* and *Enterococcus*. Negative results obtained using the Human *Bacteroidetes* ID™ or Human *Enterococcus* ID™ laboratory methodologies do not necessarily mean that human sources are not present.

Table 3a
2005 Upper Rouge River BST Analyses (Bacteroidetes analyses only)

Upper Rouge River		2005 SAMPLING RESULTS							
Field ID	Location Description	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Dry/Wet Weather	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Dry/Wet Weather
G71	Inkster Road	9/26/2005	2,499	Negative	Wet				
U14	Riverside at Alpine (Bell Branch)	8/12/2005	7,151	Negative	Wet	8/26/2005	1,104	Negative	Dry
G19	Purlingbrook/8 Mile (Tarabusi Creek)	8/12/2005	3,208	Negative	Wet	8/26/2005	400	Negative	Dry

Note: Shading indicates no sample collection.

Table 3b
2006 Upper Rouge River BST Analyses (Bacteroidetes and Enterococcus analyses)

Upper Rouge River		2006 SAMPLING RESULTS							
		Dry Weather				Wet Weather			
Field ID	Location Description	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Human Enterococcus	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Human Enterococcus
G71	Inkster Road	7/24/2006	1,100	Negative	Negative	9/12/2006	9,600	**Positive**	**Positive**
U14	Riverside at Alpine (Bell Branch)	7/24/2006	1,600	Negative	Negative	9/13/2006	7,700	Negative	**Positive**
U17	7 Mile Road west of Merriman Road (Tarabusi Creek)	7/24/2006	770	Negative	Negative	9/12/2006	13,000	Negative	**Positive**
G19	Purlingbrook/8 Mile (Tarabusi Creek)	7/24/2006	3,100	Negative	Negative	9/12/2006	11,000	**Positive**	**Positive**

4.1.2.4 Load Duration Curves

Table 4 summarizes the results of the LDC analyses from the 2005 Upper Rouge data; the curves are in Appendix H. Most of the CSOs have been controlled in the Upper Rouge. CSOs in the Rouge watershed have been controlled by the installation of retention treatment basins (RTBs) or sewer separation projects in which previously combined sewer systems have been separated into sanitary and storm sewer systems. During wet weather events, RTBs store excess flow until the sewer system can manage the flow to the WWTP. In an extreme wet weather event, the storage capacity of a basin may be exceeded and the excess flow released to the river. The discharge to the river from the basin receives minimal treatment including settling, skimming, and disinfection.

CSOs actively discharge in the downstream end of the Bell Branch below Inkster Road (U03). Table 4 shows results for sample locations on the Upper Rouge mainstem (white rows) and also on its tributaries (shaded). Different levels of shading indicate that Tarabusi Creek, a tributary to Bell Branch (which is itself a tributary), flows into Bell Branch before the Bell's confluence with the Upper Rouge. The locations in the table are listed in order from upstream to downstream. The following general comments about the trend of conditions along the stream reaches are an interpretation of the data in Table 4, and the detailed data in Appendix H.

Upper Rouge (5 locations sampled). *E. coli* levels exceeded the daily target throughout the Upper Rouge in all weather conditions, and levels were consistent from upstream to downstream except at U05, where *E. coli* levels were slightly higher in dry weather.

Bell Branch (4 locations sampled). *E. coli* levels exceeded the daily target throughout the Bell Branch, and levels were consistent from upstream to downstream in all weather conditions.

Tarabusi Creek (2 locations sampled in different branches). *E. coli* levels exceeded the daily target in both branches in all weather conditions.

When elevated *E. coli* levels are measured in the Upper Rouge, Bell Branch, and Tarabusi Creek, in dry and wet weather, upstream sources might include illicit connections, failing OSDS, SSOs, wildlife, or waterfowl. Additional sources in wet weather are the CSOs discharging below Inkster Road (U03).

Table 4
2005 Upper Rouge Load Duration Curve Evaluation
(Locations are ordered from upstream to downstream)

Upper Rouge River		WET WEATHER (High-flow and Moist Conditions)		Mid-Range Flow		DRY WEATHER (Dry and Low-flow conditions)		Weather Condition associated with target exceedances
Field ID	Location	Percent Greater than Target	Percent Less than or Equal to Target	Percent Greater than Target	Percent Less than or Equal to Target	Percent Greater than Target	Percent Less than or Equal to Target	(Dry, Mid-range, Wet, or All)
U01	Upper Rouge at Powers Rd.	83	17	100	0	83	17	All
G72	Upper Rouge at Tuck Rd.	100	0	100	0	83	17	All
G71	Upper Rouge at Inkster Rd.	100	0	100	0	92	8	All
U02	Upper Rouge at Graham Rd.	100	0	100	0	91	9	All
U14	Bell Branch at Riverside St.	100	0	100	0	100	0	All
U15	Bell Branch at 6 Mile Rd., west of Farmington	100	0	100	0	83	17	All
U17	Tarabusi Creek at 7 Mile Rd. between Farmington Rd. and Merriman Rd.	100	0	100	0	100	0	All
G19	Tributary to Tarabusi Creek at 8 Mile Rd. and Purlingbrook, east of Orchard Lake Rd.	100	0	100	0	92	8	All
U03	Bell Branch at Inkster Rd. between 5 Mile Rd. and 6 Mile Rd.	100	0	100	0	91	9	All
U04	Bell Branch at Beech Daly Rd. south of 5 Mile Rd.	100	0	100	0	100	0	All
U05	Upper Rouge at Telegraph Rd. north of I-96	100	0	100	0	92	8	All

Shaded rows are tributary to the unshaded row directly below them.

4.1.3 Middle Rouge

4.1.3.1 Overview

The *E. coli* levels in the Middle Rouge and Johnson Creek are worse in wet conditions. Tonquish Creek has high *E. coli* levels in all weather conditions, but the problem appears worse in wet weather. Positive results for human sources were obtained in the Middle Rouge in wet weather and in Tonquish Creek in dry and wet weather.

4.1.3.2 Daily Maximum and 30-Day Rolling Geometric Mean

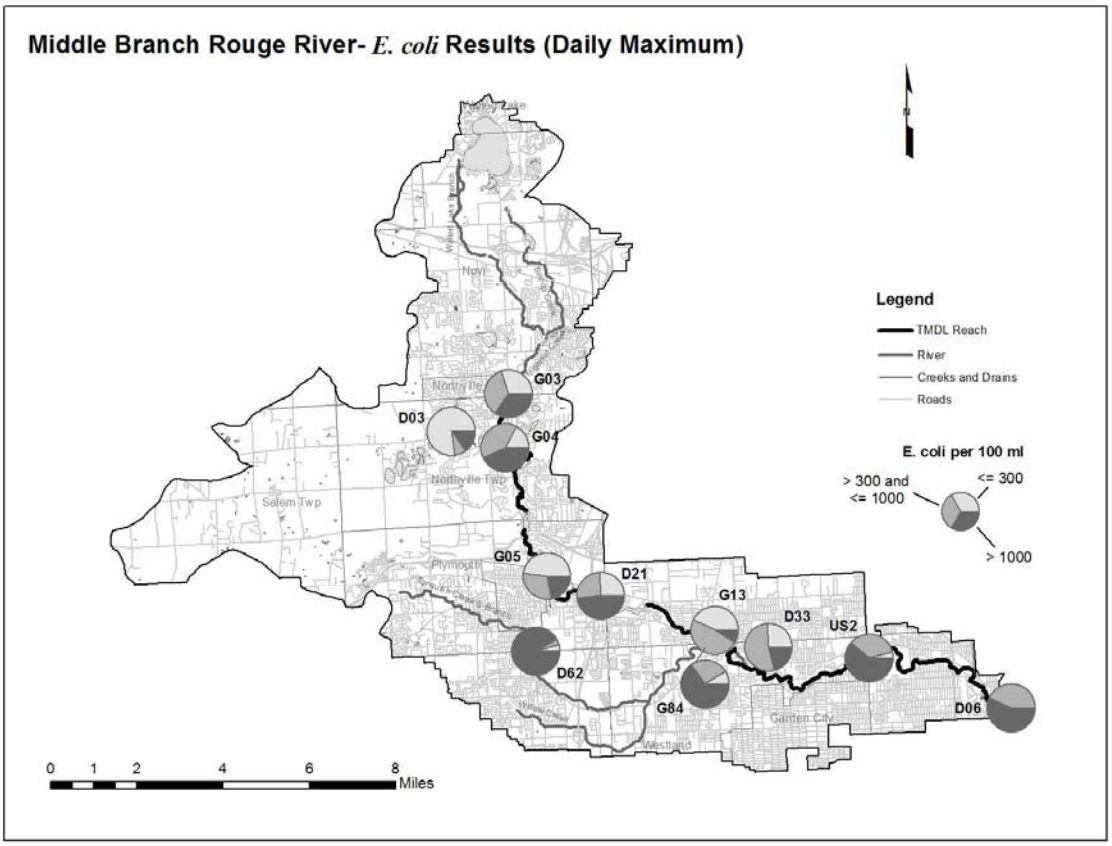
Figure 5 shows, in summarized form, the percentages of the daily maximum *E. coli* concentrations that fall into the following numeric ranges for the Middle Rouge:

- Less than or equal to 300 *E. coli* per 100 ml.
- Greater than 300, but less than or equal to 1,000 *E. coli* per 100 ml.
- Greater than 1,000 *E. coli* per 100 ml.

Detailed graphs of daily maximums for the Middle Rouge are shown in Figures A-11 through A-14 (Appendix A). Graphs of the 30-day rolling geometric means are shown in Figures B-11 through B-14 (Appendix B). A detailed tabulation of results for each Middle Rouge sampling location is included in Appendix E.

There was compliance with the monthly target only at 3 locations: Johnson Creek at Sheldon Road (D03), Gunsolly Drive (G05), and Hines Drive east of Wayne Road (G13). The 3 locations were in compliance with the monthly target 11 percent, 5 percent, and 5 percent of the time, respectively. Compliance with the daily target ranged from 61 percent at Johnson Creek at Sheldon Road (D03) to 0 percent at 3 other locations. The percentage of values exceeding 1,000 *E. coli* per 100 ml, the partial body contact standard, ranged from 91 percent at Tonquish Creek at Joy Road (D62) to 9 percent at Hines Drive east of Wayne Road (G13).

Figure 5



4.1.3.3 BST

Tables 5a and 5b list the Middle Rouge locations from which samples were analyzed for human *Bacteroidetes* and/or human *Enterococcus* in 2005 and 2006, along with the BST results and the concurrent *E. coli* values. Positive results suggesting human-associated bacteria were obtained at Old Novi Road, Baseline Road (G03), and Newburgh Lake Inlet (D21) in wet weather, and Tonquish Creek at Joy Road (D62) in dry and wet weather. Wet and dry weather

upstream human sources might include illicit connections, failing OSDS, and SSOs. Negative results obtained using the human *Bacteroidetes* ID™ or human *Enterococcus* ID™ laboratory methodologies do not necessarily mean that human sources are not present.

Table 5a
2005 Middle Rouge River BST Analyses (Bacteroidetes analyses only)

Middle Rouge River		2005 SAMPLING RESULTS			
Field ID	Location Description	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Dry/Wet Weather
G03	Old Novi Rd./Baseline	9/28/2005	179	Negative	Wet
D21	Newburgh Lake Inlet, in river near mouth	8/24/2005	201	Negative	Dry
D62	Tonquish Creek at Joy Road west of Lilley	8/24/2005	3,826	Negative	Dry
G84	Tonquish Creek at Wayne Rd.	9/28/2005	1,174	Negative	Wet

Table 5b
2006 Middle Rouge River BST Analyses (Bacteroidetes and Enterococcus analyses)

Middle Rouge River		2006 SAMPLING RESULTS							
		Dry Weather				Wet Weather			
Field ID	Location Description	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Human Enterococcus	Date	*E. coli* (cfu/100ml)	Human Bacteroidetes	Human Enterococcus
G03	Old Novi Rd./Baseline					9/12/2006	16,000	**Positive**	Negative
D21	Newburgh Lake Inlet, in river near mouth					9/13/2006	2,500	Negative	**Positive**
D62	Tonquish Creek at Joy Road west of Lilley	7/25/2006	4,900	**Positive**	Negative	9/13/2006	10,000	Negative	**Positive**

Note: Shading indicates no sample collection.

4.1.3.4 Load Duration Curves

Table 6 summarizes the results of the LDC analyses from 2005 Middle Rouge data; the curves are in Appendix I. The locations are listed in order from upstream to downstream. Within the dry weather category, there were no samples collected in low flow conditions in the Middle Rouge. There are several impoundments in the Middle Rouge: a small impoundment upstream of Old Novi Road (G03) and 3 between King's Mill Farm Park Bridge (G04) and Gunsolly Drive (G05). Hines Drive east of Wayne Road (G13) is downstream of Newburgh Lake (an impoundment) and upstream of Nankin Lake (an impoundment), and Hines Drive at Nankin Lake (D33) is at the downstream end of Nankin Lake. There are no other impoundments in the downstream end of the Middle Branch to the confluence with the Main Branch. Impoundments might cause a reduction in the levels of bacteria through various processes including die-off from exposure to the ultraviolet radiation from the sun, adsorption onto particles and settling out, and a filtering effect from the plants growing in the impoundment. There were some active CSOs in 2005 in the downstream end of the Middle Rouge, 3 of which were controlled in December 2005. There are a few CSOs remaining in the Middle Rouge, but all of the outfalls are now controlled upstream of the location where the Middle Rouge crosses Warren Avenue. The following general comments about the trend of conditions along the stream reaches are an interpretation of Table 6 and the detailed data in Appendix I.

Middle Rouge (8 locations sampled). There was an increase in *E. coli* levels in dry and wet weather conditions from Old Novi Road (G03) to King's Mill Farm Park Bridge (G04) and an increase in all weather conditions from Hines Drive at Nankin Lake (D33) to Inkster Road (US2).

Johnson Creek (1 location sampled). E. coli levels increased greatly under wet weather conditions.

Tonquish Creek (2 locations sampled). E. coli exceedances were measured in all weather conditions. There was little change from upstream to downstream.

When elevated *E. coli* levels are measured in the Middle Rouge, Johnson Creek, and Tonquish Creek, in dry or wet weather, upstream sources might include illicit connections, failing OSDS, SSOs, and animal or other waterfowl. Additional sources in wet weather are the CSOs discharging in the downstream end of the Middle Rouge.

Table 6
2005 Middle Rouge Load Duration Curve Evaluation
(Locations are ordered from upstream to downstream)

Middle Rouge River		WET WEATHER (High-flow and Moist Conditions)		Mid-Range Flow		DRY WEATHER (Dry and Low-flow conditions)		Weather Condition associated with target exceedances
Field ID	Location	Percent Greater than Target	Percent Less than or Equal to Target	Percent Greater than Target	Percent Less than or Equal to Target	Percent Greater than Target	Percent Less than or Equal to Target	(Dry, Mid-range, Wet, or All)
G03	Middle Rouge at Old Novi Rd./Baseline Rd.	80	20	63	38	22	78	Wet, Mid
D03	Johnson Creek at Sheldon Rd.	80	20	13	88	11	89	Wet
G04	Middle Rouge at King's Mill Farm, Park Bridge - Northville Area Dr.	100	0	63	38	63	38	All
G05	Middle Rouge at Gunsolly Dr. NE of Edward Hines and Plymouth Rd.	100	0	25	75	13	88	Wet
D21	Middle Rouge at Newburgh Lake Inlet, in river near mouth	100	0	63	38	56	44	All
G13	Middle Rouge at Hines E. Wayne (Upstream Nankin)	50	50	63	38	11	89	Wet, Mid
D33	Middle Rouge at Hines/Nankin Lake opposite canoe livery	67	33	80	20	75	25	All
D62	Tonquish Creek at Joy Rd, W. of Lilley	100	0	88	13	100	0	All
G84	Tonquish Creek at Wayne Rd.	100	0	88	13	88	13	All
US2	Middle Rouge at Inkster Rd.	100	0	88	13	67	33	All
D06	Middle Rouge at Hines/Ford Rd.	100	0	100	0	100	0	All

Shaded rows are tributary to the unshaded row directly below them.

4.1.4 Lower Rouge

4.1.4.1 Overview

E. coli conditions improve just downstream of the Ypsilanti Community Utility Authority (YCUA) WWTP discharge in the upstream end, and worsen downstream of the inflow from Sines Drain, McKinstry Drain, and Fellows Creek. There is an increase in *E. coli* levels downstream where CSOs are still active. Positive results for human sources were obtained in wet weather in the Lower Rouge Branch, Fowler Creek, Sines Drain, and Fellows Creek. Dry weather results were all negative for human sources.

4.1.4.2 Daily Maximum and 30-Day Rolling Geometric Mean

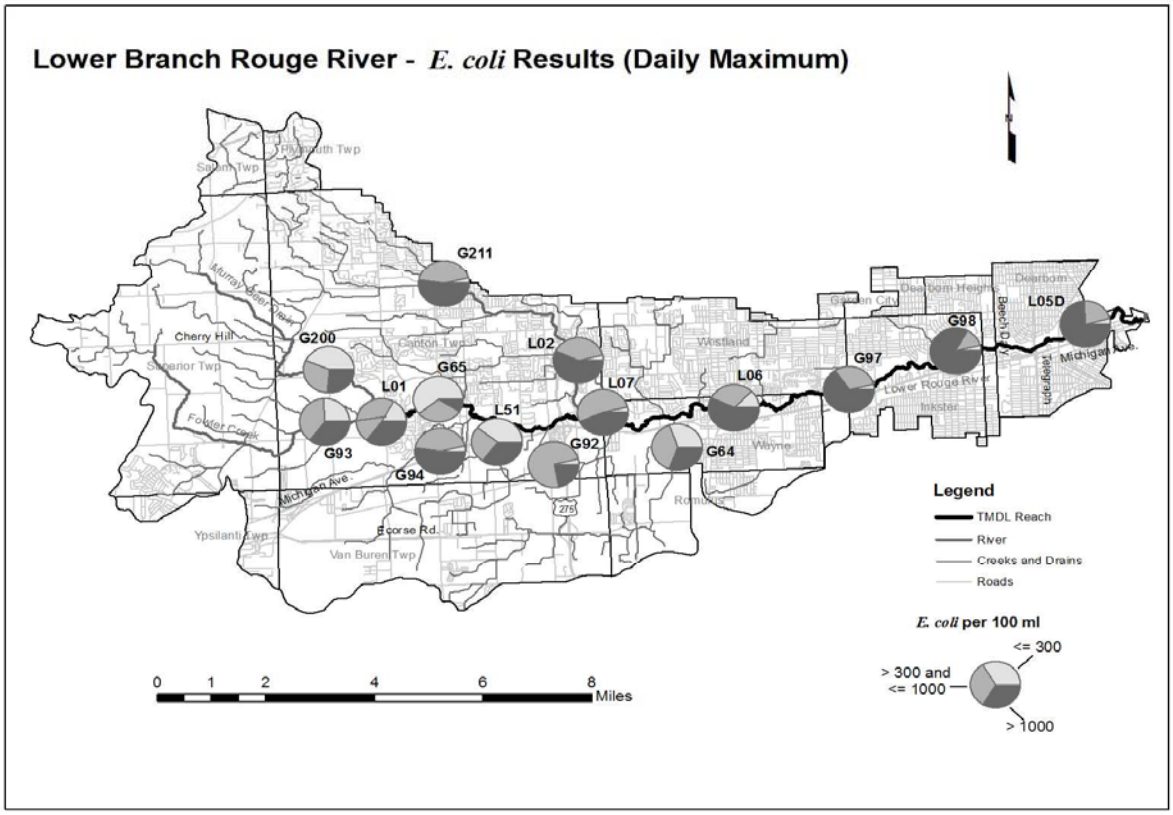
Figure 6 shows, in summarized form, the percentages of the daily maximum *E. coli* concentrations that fall into each of the following numeric ranges for the Lower Rouge:

- Less than or equal to 300 *E. coli* per 100 ml.
- Greater than 300, but less than or equal to 1,000 *E. coli* per 100 ml.
- Greater than 1,000 *E. coli* per 100 ml.

Detailed graphs of the daily maximums for the Lower Rouge are in Figures A-15 through A-20 (Appendix A). Graphs of the 30-day rolling geometric means are in Figures B-15 through B-20 (Appendix B). A detailed tabulation of results, by sampling location, is in Appendix F.

There was compliance with the monthly target only at 2 locations in the Lower Rouge, Denton Road (G200) and Canton Center Road (G65). Both locations complied with the standard 11 percent of the time. Compliance with the daily target ranged from 59 percent at the Lower Rouge at Canton Center Road (G65) to 0 percent at 8 other locations. The percentage of values exceeding 1,000 *E. coli* per 100 ml ranged from 83 percent at the Lower Rouge at John Daly (G98) to 9 percent at the Lower Rouge at Canton Center Road (G65).

Figure 6



4.1.4.3 BST

Tables 7a and 7b list the Lower Rouge locations from which samples were analyzed for human *Bacteroidetes* and/or human *Enterococcus* in 2005 and 2006, with the results and the concurrent *E. coli* values. Positive results suggesting human-associated bacteria were obtained at Beck Road (L01), Fowler Creek at Beck Road (G93), Sines Drain at Sheldon Road (G94), and Fellows Creek at Palmer Road (L02). All of these positive results were observed during wet weather. Wet weather upstream sources might include illicit connections, failing OSDS, and SSOs. All dry weather samples were negative. Negative results obtained using the Human

Bacteroidetes ID™ or Human *Enterococcus* ID™ laboratory methodologies do not necessarily mean that human sources are not present.

Table 7a
2005 Lower Rouge River BST Analyses (Bacteroidetes analyses only)

Lower Rouge River		2005 SAMPLING RESULTS			
Field ID	**Location Description**	**Date**	***E. coli* (cfu/100ml)**	**Human Bacteroidetes**	**Dry/Wet Weather**
L01	Beck Road	8/25/2005	604	Negative	Dry
G94	Sines Drain at Sheldon Rd.	9/29/2005	1,533	**Positive**	Wet
L02	Fellows Creek at Palmer Road	8/25/2005	1,455	Negative	Dry

Table 7b
2006 Lower Rouge River BST Analyses (Bacteroidetes and Entercoccus analyses)

Lower Rouge River		2006 SAMPLING RESULTS							
		Dry Weather				Wet Weather			
Field ID	**Location Description**	**Date**	***E. coli* (cfu/100ml)**	**Human Bacteroidetes**	**Human Enterococcus**	**Date**	***E. coli* (cfu/100ml)**	**Human Bacteroidetes**	**Human Enterococcus**
L01	Beck Road	7/25/2006	710	Negative	Negative	9/13/2006	3,500	Negative	**Positive**
G93	Fowler Creek at Beck Road					9/13/2006	3,000	Negative	**Positive**
L02	Fellows Creek at Palmer Road					9/13/2006	1,000	**Positive**	**Positive**

Note: shading indicates no sample collection.

4.1.4.4 LDCs

Table 8 summarizes the results of the LDC analyses from the 2005 Lower Rouge data; the curves are in Appendix J. Samples were collected in all flow conditions in the Lower Rouge. In the upstream end of the Lower Rouge, the YCUA WWTP discharges downstream of Beck Road (L01). CSOs are controlled upstream of Henry Ruff Road (G97). There are some CSOs upstream of John Daly Road (G98) and several upstream of Military Road (L05D). Table 8 shows results for locations on the Lower Rouge (white rows) and its tributaries (shaded). The locations are listed in order from upstream to downstream. The following general comments about the trend of conditions are an interpretation of Table 8 and the detailed data in Appendix J.

Lower Rouge (9 locations sampled). There was a slight increase in *E. coli* levels in dry and wet weather conditions between Denton Road (G200) and Beck Road (L01), and a decline in levels in all weather conditions between Beck Road (L01) and Canton Center Road (G65). Canton Center Road (G65) is downstream of the YCUA discharge and this apparent improvement may be from dilution with the discharge. The plant uses ultraviolet light for disinfection so die-off from total residual chlorine in the stream is not a consideration. There was an increase in *E. coli* levels in all weather conditions at Haggerty Road (G92), which is downstream of the confluence with both Sines Drain and McKinstry Drain. Although both drains exceeded the daily target, the severity of the exceedances appears worse in Sines Drain. The *E. coli* exceedances persist at all downstream locations in the Lower Rouge; however, the magnitude of the exceedances increases in the CSO area.

Fowler Creek (1 location sampled). E. coli levels exceeded the daily target in all weather conditions.

Sines Drain (1 location sampled). *E. coli* levels exceeded the daily target in all weather conditions. In 2005, samples were collected on 23 days from May through October and the geometric mean of the dry weather samples collected was 1,111 *E. coli* per 100 ml. In 2006, dry weather samples were collected on 6 days from May through October, but only 1 sample was collected on each day of sampling. The geometric mean of the samples collected in 2006 was 759 *E. coli* per 100 ml, which indicates an improvement of 32 percent. A motel was identified in Sines Drain in 2005 that had a failing septic system. The Wayne County Health Department verified the septic system failure using dye testing and required the motel operators to pump and haul the wastewater. Eventually all the buildings were red-tagged (unsafe for human occupation) and the buildings and windows were boarded. The tanks were pumped out and the discharge pipe removed. Follow-up monitoring performed in 2006 indicated an improvement in *E. coli* levels.

McKinstry Drain (1 location sampled). Exceedances of the *E. coli* daily target were found in all weather conditions.

Fellows Creek (2 locations sampled). Exceedances of the *E. coli* daily target were found at both locations in all weather conditions.

McClaughrey Drain (1 location sampled). *E. coli* levels above the daily target appear in all weather conditions.

When elevated *E. coli* levels are measured in the Lower Rouge, Fowler Creek, Sines Drain, McKinstry Drain, Fellows Creek, and McClaughrey Drain, in dry or wet weather, upstream sources might include illicit connections, failing OSDS, SSOs, and animal or other waterfowl. Additional sources in wet weather are the CSOs discharging in the downstream end of the Lower Rouge.

Table 8
2005 Lower Rouge Load Duration Curve Evaluation
(Locations are ordered from upstream to downstream)

Lower Rouge River		WET WEATHER (High-flow and Moist Conditions)		Mid-Range Flow		DRY WEATHER (Dry and Low-flow conditions)		Weather Condition associated with target exceedances
Field ID	Location	Percent Greater than Target	Percent Less than or Equal to Target	Percent Greater than Target	Percent Less than or Equal to Target	Percent Greater than Target	Percent Less than or Equal to Target	(Dry, Mid-range, Wet, or All)
G200	Lower Rouge at Denton Rd	71	29	67	33	46	54	All
L01	Lower Rouge at Beck Rd.	86	14	33	67	77	23	All
G93	Fowler Creek at Beck Rd.	86	14	67	33	83	17	All
G65	Lower Rouge at Canton Center Rd.	57	43	0	100	23	77	Wet
G94	Sines Drain at Sheldon Rd.	86	14	100	0	92	8	All
L51	McKinstry Drain at Michigan Ave, E. of Morton Taylor Rd	57	43	67	33	46	54	All
G92	Lower Rouge at Haggerty Rd.	86	14	100	0	92	8	All
G211	Fellows Creek at Ford Rd, Between Canton Center & Sheldon	100	0	67	33	100	0	All
L02	Fellows Creek at Palmer Rd.	86	14	100	0	100	0	All
US9/L07	Lower Rouge at Hannan Rd.	86	14	100	0	100	0	All
G64	McClaughrey Drain at Annapolis and Treadwell	71	29	100	0	46	54	All
L06	Lower Rouge at Wayne Rd.	86	14	100	0	85	15	All
G97	Lower Rouge at Henry Ruff Rd.	86	14	100	0	100	0	All
G98	Lower Rouge at John Daly Rd.	86	14	100	0	100	0	All
L05D	Lower Rouge at Military Rd.	86	14	100	0	100	0	All

Shaded rows are tributary to the unshaded row directly below them.

4.2 ARC/RPO Data

Congress appropriated money through the USEPA to Wayne County, Michigan, for the creation of the Rouge River National Wet Weather Demonstration Project (Rouge Project) in 1992. The restoration of the Rouge River began by focusing on the primary public health pollutant threat, CSOs. CSO controls are being implemented in the Rouge Project through 3 phases as established by NPDES permit:

Phase I: Elimination of raw sewage and the protection of public health for approximately 40 percent of the combined sewer area.

Phase II: Elimination of raw sewage and the protection of public health for the remaining combined sewer area.

Phase III: Meet WQS in the Rouge River.

Six communities separated their sewers and 8 communities constructed 10 RTBs under Phase I. A CSO work group was formed in 1999 to compile information on the success of the individual RTBs and to propose the level of treatment that would be considered adequate. The CSO work group was comprised of members from the MDEQ, the RPO, and from each jurisdiction that constructed an RTB.

The RTBs capture most wet weather flows for later conveyance to the Detroit Publicly Owned Treatment Works for treatment. CSO pollutant loads to the river have been cut by 90 to 100 percent during most wet weather events. Flows from very large wet weather events that are not captured by the RTBs receive screening, skimming, settling, and disinfection prior to discharge. These CSO control projects have effectively eliminated or controlled the discharge of untreated sewage from approximately half of the watershed CSOs. The completed basins are controlling overflows at a rate of approximately 4 billion gallons per year resulting in improved water quality, aesthetic improvements, and increased recreational usage in the Rouge River.

The RPO and the ARC conduct a sampling and monitoring program of the Rouge River, which includes physical, chemical, and biological monitoring (including *E. coli*). The program began over 10 years ago to measure progress as various projects and activities were implemented throughout the watershed. Sampling and monitoring has been performed every year since the program began and is divided into two monitoring efforts, extensive watershed-wide monitoring from 1994 to 2002 and less extensive monitoring under the five-year monitoring plan that started in 2003 and continues through 2007. Both monitoring efforts include water quality sampling in the 7 SWMAs. The 7 SWMAs are made up of numerous communities (or parts thereof) as follows:

- The Main 1-2 SWMA includes the communities of Auburn Hills, Beverly Hills, Bingham Farms, Birmingham, Bloomfield Hills, Bloomfield Township, Farmington, Farmington Hills, Franklin, Lathrup Village, Oak Park, Orchard Lake, Pontiac, Rochester Hills, Southfield, Southfield Township, Troy, and West Bloomfield (Rouge River Main 1-2 Subwatershed Advisory Group, 2001).

- The Main 3-4 SWMA includes the communities of Allen Park, Dearborn, Dearborn Heights, Detroit, Highland Park, Melvindale, Redford Township, and River Rouge (Rouge River Main 3-4 Subwatershed Advisory Group, 2001).

- The Upper SWMA includes the communities of Commerce Township, Farmington, Farmington Hills, Livonia, Northville Township, Novi, Redford Township, and West Bloomfield Township (Rouge River Upper Subwatershed Advisory Group, 2001).

- The Middle 1 SWMA is located in western Wayne County, eastern Washtenaw County, and southern Oakland County. The area is made up of parts of Canton Township, Commerce Township, Farmington Hills, Livonia, Lyon Township, Northville, Northville Township, Novi, Plymouth, Plymouth Township, Salem Township, Walled Lake, and Wixom (Rouge River Middle 1 Subwatershed Advisory Group, 2001).

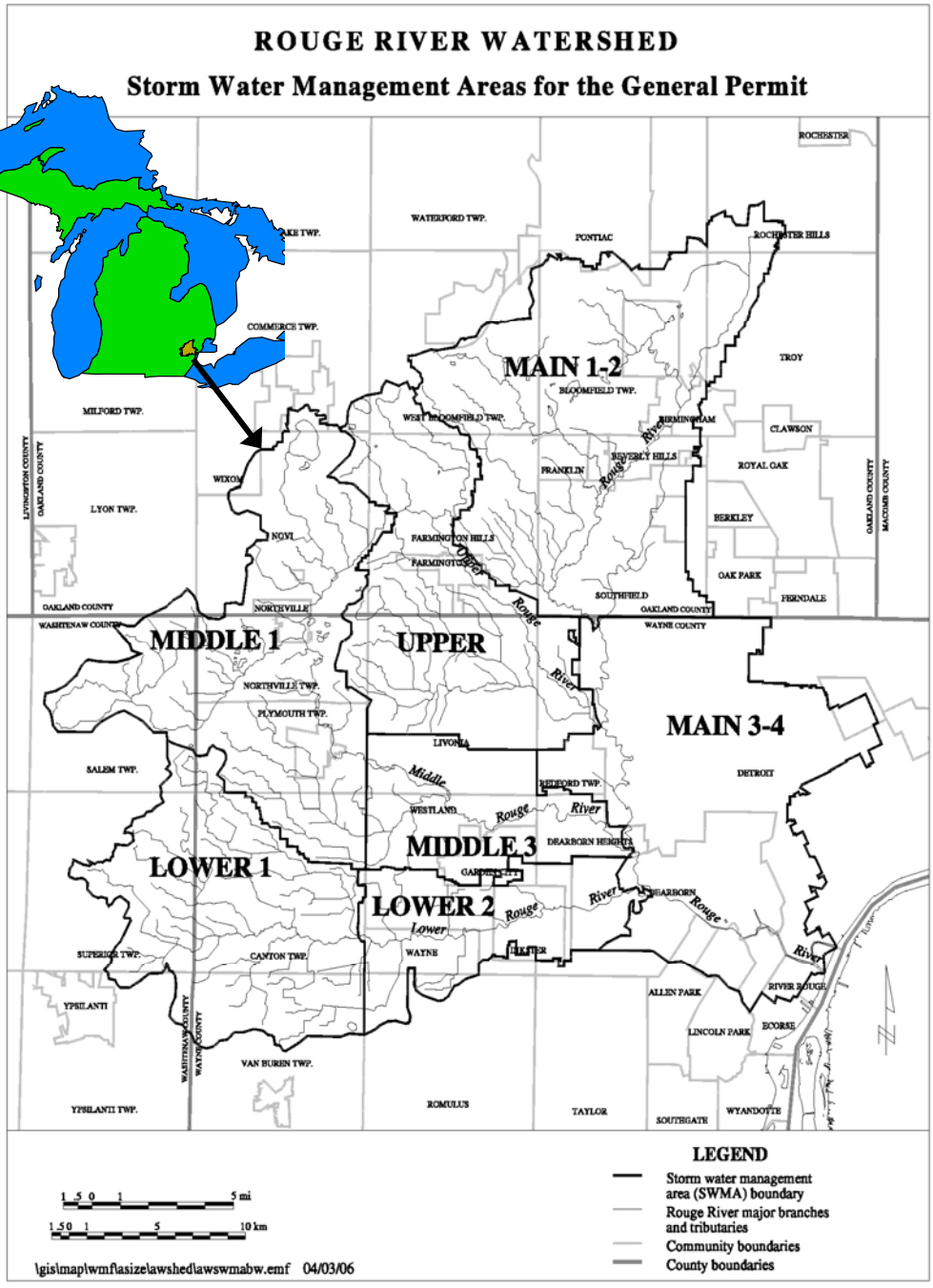
- The Middle 3 SWMA includes the communities of Dearborn Heights, Garden City, Livonia, and Westland (Rouge River Middle 3 Subwatershed Advisory Group, 2001).

- The Lower 1 SWMA includes the communities of Canton, Plymouth Township, Salem Township, Superior Township, Van Buren Township, and Ypsilanti Township (Rouge River Lower 1 Subwatershed Advisory Group, 2001).

- The Lower 2 SWMA includes the communities of Dearborn, Dearborn Heights, Garden City, Inkster, Romulus, Wayne, and Westland (Rouge River Lower 2 Subwatershed Advisory Group, 2001).

Figure 7 shows the Rouge River watershed 7 SWMAs designated as Main 1-2, Main 3-4, Upper, Middle 1, Middle 3, Lower 1, and Lower 2.

Figure 7



The five-year monitoring plan calls for a rotational schedule of intermittent sampling and monitoring of at least 3 dry weather locations and at least 1 wet weather location in each SWMA over this 5-year period. The wet weather location(s) selected is/are not necessarily the same as the dry weather locations and locations may vary from the 1994 to 2002 sampling locations.

Only 1 sample at each location was collected for *E. coli* testing per sampling event, which is not in compliance with state standard sample collection procedures for *E. coli* requiring 3 samples per location. Consequently, although *E. coli* results cannot be directly compared to the targets, they can still provide valuable information indicating improvements or degradation in *E. coli* levels.

4.2.1 ARC/RPO E. coli Data Discussion (1994-2005)

Trend analyses were performed in 2002 on the data collected from 1994-2002. In addition, updated trend analyses were developed where sample sites from the 1994-2002 and five-year monitoring efforts are comparable. The trend analyses performed in 2002 on *E. coli* levels throughout the watershed generally showed improvement directly downstream of most watershed improvement projects, particularly downstream of now-controlled CSOs during wet weather. Additionally, some locations were identified where *E. coli* concentrations may be increasing. These sites are generally located near the headwaters or in areas still influenced by CSOs. Although improving, most locations are still not meeting the targets or the partial body contact recreation standard. A brief summary of the *E. coli* trend analyses for each of the SWMAs, and additional general discussion regarding the data collection from the two monitoring efforts, follows below. Recent data analyses performed by the ARC and the RPO are presented in the *Rouge River Ecosystem Monitoring and Assessment Report,* produced yearly and accessible at http://www.rougeriver.com.

4.2.1.1 Main Rouge (Main 1-2 SWMA and Main 3-4 SWMA)

Main 1-2 SWMA

A sewer separation project in Bloomfield Hills and the construction of the Birmingham (December 1997), Bloomfield Village (December 1997), and Acacia Park (January 1997) RTBs have controlled all known CSOs in the Main 1-2 SWMA. The trend analyses of *E. coli* data collected from 1994-2002 at 10 locations in the Main 1-2 SWMA showed improvement in both dry and wet weather, with substantial improvement occurring directly downstream of now-controlled CSOs, particularly during wet weather. However, analyses of the *E. coli* data at the same locations showed that, in general, the targets and the partial body contact recreation standard were exceeded (RPO, 2004a).

Five-year monitoring plan sampling in 2004 showed that the targets were not met in dry weather conditions that year. In addition, all of the 2004 wet weather event geometric means exceeded the partial body contact standard of 1,000 *E. coli* per 100 ml (RPO, 2005). Trend analyses performed on dry weather data from the combined 1994-2002 and five-year monitoring plan efforts, where comparable stations existed, showed improvement at 2 locations and no statistically significant change at the third location. A trend analysis was not performed on the combined 1994-2002 and five-year wet weather monitoring data because comparable locations were not sampled.

Main 3-4 SWMA

As the most downstream SWMA in the Rouge River watershed, the Main 3-4 SWMA may be influenced by improvement activities completed in all Rouge River SWMAs, in addition to those within the Main 3-4 SWMA. A sewer separation project in Bloomfield Hills and the construction of the Birmingham (December 1997), Bloomfield Village (December 1997), and Acacia Park (January 1997) RTBs have controlled all known CSOs in the Main 1-2 SWMA. Construction of the 7 Mile (December 1998), Puritan Fenkell (February 1999), and Hubbell Southfield (February 1999) RTBs have partially controlled the known CSOs in the Main 3-4 SWMA. Sewer

separation projects in Garden City, Livonia, Plymouth Township, Wayne, and Westland, and the construction of the Redford (January 1997), Dearborn Heights (June 1997), and Inkster (January 1997) RTBs have partially controlled the known CSOs in the Upper, Middle, and Lower SWMAs.

Trend analyses of the *E. coli* geometric means from 1994-2002 at 7 locations in the Main 3-4 SWMA showed improving conditions or no statistically significant change at most sites evaluated under both dry and wet weather conditions. In general, *E. coli* bacteria levels have been above the targets and partial body contact recreation standard. Much of the Main 3-4 SWMA is still influenced by uncontrolled CSOs (RPO, 2004a).

4.2.1.2 Upper Rouge

Construction of the Redford (January 1997) RTB has partially controlled CSOs in the Upper SWMA. However, there are still some uncontrolled CSOs along the Bell Branch. Trend analyses of the *E. coli* geometric means at 8 locations from 1994-2002 showed either no trend or an improving trend in both dry and wet weather conditions. In general, *E. coli* levels were above the targets and partial body contact recreation standard (RPO, 2004a).

Five-year monitoring plan sampling in 2004 showed that in dry weather the total body contact recreation targets were not met. Trend analyses performed on dry weather data from the combined 1994-2002 and five-year monitoring plan efforts, where comparable stations existed, showed no change at 2 locations. A degrading condition was calculated at the third location. This location is in close proximity to a septic system that was discovered in December 2004 and in need of repair. It is not known how long the system was failing or if discharge from it reached the river. Repairs were made in May 2005. A trend analysis using the combined 1994-2002 and five-year monitoring plan wet weather data showed an improving trend for *E. coli* at the one location sampled. However, the *E. coli* wet weather location geometric means in 2004 still exceeded the partial body contact standard (RPO, 2005).

4.2.1.3 Middle Rouge (Middle 1 SWMA and Middle 3 SWMA)

Middle 1 SWMA

Sewer separation projects in Plymouth Township have eliminated all uncontrolled CSOs in the Middle 1 SWMA. Trend analyses of the *E. coli* geometric means from 1994-2002 at 8 locations showed either no trend or an improving trend for both wet and dry weather conditions at most locations; however, even though *E. coli* levels in the Middle 1 were better than for most of the SWMAs in the Rouge River watershed, there were still a substantial percentage of measurements above the targets and partial body contact recreation standard (RPO, 2004a).

Five-year monitoring plan sampling in 2005 showed that in dry weather the state standard for total body contact recreation was not met. Trend analyses of the combined 1994-2002 and five-year monitoring plan data were performed on the dry weather data from 1994-2005 and no change in conditions was calculated at 2 locations. An improving condition was calculated at the third location. A trend analysis performed on the wet weather data showed an improving trend for *E. coli;* however, all of the *E. coli* wet weather location geometric means in 2005 still exceeded the partial body contact standard of 1,000 *E. coli* per 100 ml. Overall, concentrations of *E. coli* bacteria have remained high in the Middle 1 SWMA, although some improvements were observed in wet weather (RPO, 2007).

Middle 3 SWMA

Sewer separation projects in Plymouth Township, Westland, Garden City, and Livonia, and the construction of the Dearborn Heights (June 1997) RTB have partially controlled the CSOs in the Middle 3 SWMA. However, there are still some uncontrolled CSOs towards the downstream end of this SWMA. Trend analyses of the dry and wet weather *E. coli* geometric means at 10 locations from 1994-2002 showed either no trend or an improving trend except at 4 locations. Wayne County Department of the Environment illicit discharge investigation activities indicated that some of these locations were influenced by illicit discharges to storm sewers upstream of the locations and that these discharges have since been addressed. Analyses of the *E. coli* data collected from 1994-2002 at these 10 locations in the Middle 3 SWMA showed that, in general, *E. coli* levels have been above the targets and partial body contact recreation standard (RPO, 2004a).

Five-year monitoring plan sampling in 2005 showed that the total body contact recreation target was not met in dry weather. Trend analyses were performed on the combined 1994-2002 and five-year monitoring plan dry and wet weather data collected between 1994-2005. In dry weather, no change in conditions was calculated at 2 locations and an improving condition was calculated at the third. A trend analysis performed on the wet weather data showed no significant change in *E. coli* levels. All *E. coli* wet weather location event geometric means in 2005 exceeded the partial body contact standard of 1,000 *E. coli* per 100 ml. These locations are downstream of uncontrolled CSOs, some of which were controlled after the 2005 sampling season. Overall, concentrations of *E. coli* bacteria remained high in the Middle 3 SWMA (RPO, 2007).

4.2.1.4 Lower Rouge (Lower 1 SWMA and Lower 2 SWMA)

Lower 1 SWMA

All sampled locations in the Lower 1 SWMA are upstream of known CSOs. Trend analyses of the dry and wet weather *E. coli* geometric means at 5 locations sampled from 1994-2002 showed either no trend or an improving trend, except at 1 upstream location. In general, *E. coli* bacteria levels have been above the targets for both total and partial body contact recreation (RPO, 2004a).

Lower 2 SWMA

Sewer separation projects in Wayne and the construction of the Inkster RTB (January 1997) have partially controlled the CSOs in the Lower 2 SWMA. However, there are still many uncontrolled CSOs towards the downstream end of this SWMA. Trend analyses of the dry and wet weather *E. coli* geometric means at 4 locations from 1994-2002 showed either improving trends or no trends. Three locations showed substantial improvement, particularly during wet weather. Overall, concentrations of *E. coli* bacteria have improved in the Lower 2 SWMA, particularly directly downstream of the sewer separation projects in Wayne and the Inkster RTB; however, levels were generally above the targets for both total and partial body contact recreation (RPO, 2004a).

4.2.2 Load Duration Curves from ARC/RPO 1994–2004 Data

The ARC and RPO collected *E. coli* data suitable for LDC development from 1994-2004. LDCs were prepared using the ARC/RPO *E. coli* data and historical USGS flow data to evaluate progress during significant phases of CSO control and other best management practices (BMPs) in the Rouge River watershed (see Appendix K). The ARC/RPO data were divided into

3 time periods: 1994-1996; 1997-1999; and 2000-2004. A baseline sampling and monitoring program was conducted from 1994-1996, prior to the completion of CSO RTBs and sewer separation projects. This period provides baseline data for the LDCs. During the second period, 1997-1999, most of the Phase I CSO RTBs became operational and sewer separation projects were completed. Therefore, significant progress was made in CSO control. Additionally, illicit discharge correction programs were being implemented, public education and information programs had begun, and other BMPs were being implemented. From 2000-2004, all of the Phase I CSO control projects were completed, with the exception of the Dearborn CSOs, which are currently under construction. Phase II CSO control is currently in various stages of planning, design, and construction. The LDCs prepared using the ARC/RPO data (Appendix K) were compared with the LDCs prepared using the 2005 MDEQ data (Appendix G) to produce Tables 9-12. These tables summarize changes over time that correspond to the time periods in the LDCs at select locations in each branch. Figure 1 in Section 4.1 shows the locations for field IDs in Tables 9-12.

Table 9
Main Rouge River Chronological Summary from ARC/RPO and MDEQ Data LDCs

Main Rouge River					
Field ID	From	To	WET WEATHER (High-flow and Moist Conditions)	Mid-Range Flow	DRY WEATHER (Dry and Low-flow conditions)
Maple Road (G45)	1994-1996	1997-1999	Improvement in all weather conditions, results approaching daily target.		
	1997-1999	2000-2004	Continuing improvement in all weather conditions, most results near the daily target.		
	2000-2004	2005	Little change in all weather conditions, results remain near the daily target		
Lahser (M03)	1994-1996	1997-1999	Too few samples collected from 1994-1996 to compare to 1997-1999.		
	1997-1999	2000-2004	Some improvement from 1997-1999 to 2005 in all weather where most results are near the daily target		
	2000-2004	2005			
Beech Road (US5)	1997-1999		No *E. coli* data were collected.		
	1994-1996	2000-2004	Little change in wet and mid-range conditions where most results do not exceed the daily target		Significant improvement in dry conditions where most results are near the daily target.
	2000-2004	2005	Slight worsening in wet condition, results exceed daily target.	Little change in mid-range and dry conditions, where most results remain near daily target.	
Plymouth Road (US7)	1994-1996	1997-1999	Too few samples collected from 1994-1996 to compare to 1997-1999.		
	1997-1999	2000-2004	Some improvement in wet and mid-range conditions, results are near the daily target.		Little change in dry conditions, where most results approaching daily target.
	2000-2004	2005	Little change in all weather conditions, results approaching daily target		

Table 10
Upper Rouge River Chronological Summary from ARC/RPO and MDEQ Data LDCs

Upper Rouge River					
Field ID	From	To	WET WEATHER (High-flow and Moist Conditions)	Mid-Range Flow	DRY WEATHER (Dry and Low-flow conditions)
Telegraph Road (U05)	1994-1996	1997-1999	No obvious change from 1994-1996 to 1997-1999 in all conditions, results typically exceed daily target.		
	1997-1999	2000-2004	Some improvement in wet conditions, results exceed daily target.	Slight worsening in mid-range and dry conditions, some results exceed daily target, but several results at or below the daily target.	
	2000-2004	2005	Slight worsening in moist and mid-range flow conditions.		Not much change in dry conditions and no previous data to compare in low flow conidtion.

Table 11
Middle Rouge River Chronological Summary from ARC/RPO and MDEQ Data LDCs

Middle Rouge River					
Field ID	From	To	WET WEATHER (High-flow and Moist Conditions)	Mid-Range Flow	DRY WEATHER (Dry and Low-flow conditions)
Hines/Ford Road (D06)	1994-1996	1997-1999	Too few samples collected from 1994-1996 to compare to 1997-1999.		
	1997-1999	2000-2004	Improvement in wet and mid-range conditions from 1997-1999 to 2000-2004, results near daily target.		Not much change in dry condition from 1997-1999 to 2000-2004, results near daily target. .
	2000-2004	2005	Might be slight worsening in wet condition, results exceed daily target.	Little change in mid-range and dry conditions, results approaching daily target.	

Table 12
Lower Rouge River Chronological Summary from ARC/RPO and MDEQ Data LDCs

Lower Rouge River					
Field ID	From	To	WET WEATHER (High-flow and Moist Conditions)	Mid-Range Flow	DRY WEATHER (Dry and Low-flow conditions)
Wayne Road (L06)	1994-1996	1997-1999	Little change in wet and mid-range conditions, results exceed daily target.		Too few samples to compare, results exceed daily target.
	1997-1999	2000-2004	Data not available.		
	2000-2004	2005	Little change in wet and mid-range conditions, results exceed daily target.		Too few samples to compare, results exceed daily target.
John Daly Road (G98)	1994-1996	1997-1999	Some improvement in wet and mid-range conditions, results exceed daily target.		Too few samples to compare
	1997-1999	2000-2004	Continuing improvement in wet and mid-range conditions, results approaching daily target.		Too few samples to compare
	2000-2004	2005	Some worsening in wet conditions, results exceed daily target.	Little change in mid-range conditions, results exceed daily target.	Too few samples to compare
Military Road (L05)	1994-1996	1997-1999	Slight improvement in wet and mid-range condtions, results exceed daily target.		Too few samples to compare
	1997-1999	2000-2004	Continuing improvement in wet conditions, results approaching daily target.	Slight worsening in mid-range conditions, results exceed daily target.	Too few samples to compare
	2000-2004	2005	Worsening in wet conditions, results exceed daily target.	Little change in mid-range conditions, results exceed daily target.	Too few samples to compare

4.3 Summary of Data Discussion

A comparison of *E. coli* data collected from 1994-2005 indicate improvement at some locations in both dry and wet conditions. However, it is evident from the data collected in 2005 by the MDEQ and the data collected by the ARC and RPO, that *E. coli* concentrations are still not meeting the targets and partial body contact standard throughout the watershed. DNA testing in 2005 and 2006 to help identify the source of the bacteria has suggested humans as a source of the high bacteria levels at some locations, but this testing was very limited. The *E. coli* LDCs and the BST data should prove useful to stakeholders when prioritizing efforts to address wet and dry weather sources of the high *E. coli* levels throughout the watershed.

5.0 SOURCE ASSESSMENT

The Section 303(d) listed reach for the Rouge River is approximately 91 miles and includes the Main, Upper, Middle, Lower, Bell, and Franklin Branches and Evans Ditch, in Wayne and Oakland Counties, Michigan. The municipalities in the TMDL watershed are divided into SWMAs, as shown in Figure 2. Table 13 shows the land use distribution for the Rouge River watershed by SWMA (Southeast Michigan Council of Governments [SEMCOG], 2003). Table 14 shows the land distribution for the Rouge River watershed by community.

This TMDL is focused in Wayne and Oakland Counties, which are largely urbanized. Possible sources of *E. coli* include CSOs, SSOs, illicit connections and discharges, failing OSDS,

contributions from tributaries, and wildlife inputs from parks or other recreational areas where animals and waterfowl may congregate.

There are 321 NPDES-permitted discharges in the Rouge River watershed. The discharges include 32 individual permits and 289 certificates of coverage (COCs) under multiple general permits (Appendix L). Section 7.0 contains detailed permit information for each branch of the Rouge River. There are no Concentrated Animal Feeding Operations in the Rouge River watershed.

Subsections in this section focus on CSO and SSO discharges and illicit discharges.

Table 13
Land Use Distribution for the Rouge River Watershed by SWMA, 2000

	Storm Water Management Areas (SWMA) as Percentages of Total Drainage Area							
	MAIN 1-2	MAIN 3-4	UPPER	MIDDLE 1	MIDDLE 3	LOWER 1	LOWER 2	TOTAL
	103	91	64	81	32	62	33	466
Land Use Category	square miles	square miles	square miles	square miles	square miles	square miles	square miles	square miles
Forest/Rural open	5.8	2.1	8.5	19.9	4.0	19.5	4.5	9.5
Urban open	5.4	6.8	7.3	5.5	5.7	5.5	6.1	6.0
Agricultural	0.2	0.0	0.4	9.4	0.1	25.2	2.2	5.2
Medium density residential	63.4	52.1	53.9	31.8	50.4	22.6	51.7	47.2
High density residential	5.2	4.3	5.2	4.1	4.8	1.4	2.7	4.1
Commercial	11.5	15.6	13.8	7.1	14.1	2.5	12.7	10.9
Industrial	1.5	13.8	4.2	8.9	12.1	9.4	8.6	7.8
Highways	2.0	4.0	2.6	2.9	0.7	1.8	1.2	2.5
Water/wetlands	4.9	1.4	4.2	10.4	8.0	12.1	10.3	6.6
TOTALS (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 14
Land Distribution for the Rouge River Watershed by Community

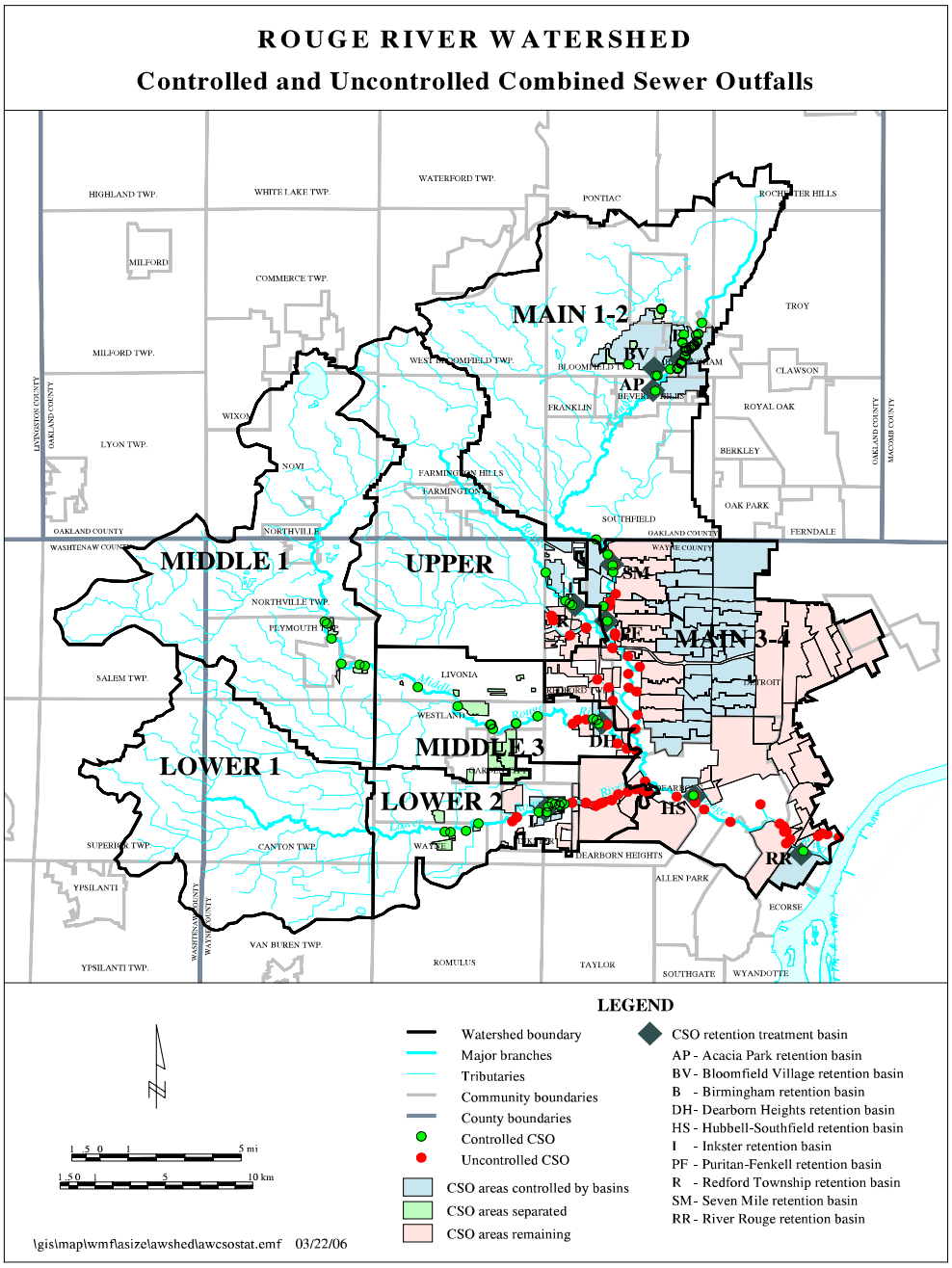
Township	County	Acres (Wayne Co)	Percentage
Lower 1			
Canton Twp	Wayne	18057.223	45.39%
Plymouth Twp	Wayne	846.891	2.13%
Romulus	Wayne	0.042	0.00%
Salem Twp	Washtenaw	1018.258	2.56%
Superior Twp	Washtenaw	10365.402	26.05%
Van Buren Twp	Wayne	8401.586	21.12%
Wayne	Wayne	1.370	0.00%
Westland	Wayne	0.340	0.00%
Ypsilanti Twp	Washtenaw	1093.423	2.75%
TOTAL		**39784.5**	**100.0%**
Lower 2			
Canton Twp	Wayne	284.850	1.33%
Dearborn	Wayne	3831.879	17.96%
Dearborn Heights	Wayne	1028.126	4.82%
Garden City	Wayne	682.916	3.20%
Inkster	Wayne	3694.337	17.31%
Romulus	Wayne	2447.819	11.47%
Van Buren Twp	Wayne	3.634	0.02%
Wayne	Wayne	3851.292	18.05%
Westland	Wayne	5516.271	25.85%
TOTAL		**21341.1**	**100.0%**
Main 1-2			
Auburn Hills	Oakland	188.992	0.29%
Beverly Hills	Oakland	2386.851	3.62%
Bingham Farms	Oakland	774.884	1.18%
Birmingham	Oakland	2014.671	3.06%
Bloomfield Hills	Oakland	3218.320	4.89%
Bloomfield Twp	Oakland	16193.290	24.58%
Detroit	Wayne	83.338	0.13%
Farmington	Oakland	61.186	0.09%
Farmington Hills	Oakland	7685.433	11.67%
Franklin	Oakland	1705.212	2.59%
Lathrup Village	Oakland	963.650	1.46%
Livonia	Wayne	0.014	0.00%
Oak Park	Oakland	79.411	0.12%
Orchard Lake Village	Oakland	165.524	0.25%
Pontiac	Oakland	510.888	0.78%
Redford Twp	Wayne	9.369	0.01%
Rochester Hills	Oakland	1966.139	2.98%
Southfield	Oakland	14958.660	22.71%
Southfield Twp	Oakland	108.147	0.16%
Troy	Oakland	3850.415	5.84%
West Bloomfield Twp	Oakland	8954.125	13.59%
TOTAL		**65878.5**	**100.0%**
Main 3-4			
Allen Park	Wayne	868.300	1.48%
Dearborn	Wayne	11862.911	20.29%
Dearborn Heights	Wayne	554.742	0.95%
Detroit	Wayne	38591.903	66.00%
Ecorse	Wayne	1.504	0.00%
Highland Park	Wayne	892.445	1.53%
Livonia	Wayne	0.112	0.00%
Melvindale	Wayne	1694.667	2.90%
Redford Twp	Wayne	2640.130	4.52%
River Rouge	Wayne	1367.844	2.34%
Southfield	Oakland	0.003	0.00%
TOTAL		**58474.6**	**100.0%**
Middle 1			
Canton Twp	Wayne	4785.401	9.28%
Commerce Twp	Oakland	57.859	0.11%
Farmington Hills	Oakland	592.390	1.15%
Livonia	Wayne	21.320	0.04%
Lyon Twp	Oakland	471.583	0.91%
Northville (Oakland)	Oakland	637.923	1.24%
Northville (Wayne)	Wayne	679.764	1.32%
Northville Twp	Wayne	9174.256	17.78%
Novi	Oakland	13807.329	26.76%
Novi Twp	Oakland	68.567	0.13%
Plymouth	Wayne	1416.494	2.75%
Plymouth Twp	Wayne	9413.501	18.25%
Salem Twp	Washtenaw	9320.486	18.07%
Walled Lake	Oakland	585.099	1.13%
Westland	Wayne	5.652	0.01%
Wixom	Oakland	550.905	1.07%
TOTAL		**51588.5**	**100.0%**
Middle 3			
Dearborn	Wayne	1.128	0.01%
Dearborn Heights	Wayne	3764.827	18.16%
Detroit	Wayne	28.131	0.14%
Garden City	Wayne	3068.514	14.80%
Inkster	Wayne	0.417	0.00%
Livonia	Wayne	6815.288	32.88%
Plymouth Twp	Wayne	0.032	0.00%
Redford Twp	Wayne	128.154	0.62%
Westland	Wayne	6920.664	33.39%
TOTAL		**20727.2**	**100.0%**
Upper			
Commerce Twp	Oakland	557.516	1.37%
Detroit	Wayne	58.660	0.14%
Farmington	Oakland	1639.408	4.02%
Farmington Hills	Oakland	13030.333	31.96%
Livonia	Wayne	16107.636	39.51%
Northville Twp	Wayne	1380.410	3.39%
Novi	Oakland	1440.923	3.53%
Plymouth Twp	Wayne	0.000	0.00%
Redford Twp	Wayne	4420.245	10.84%
Southfield	Oakland	0.020	0.00%
West Bloomfield Twp	Oakland	2132.856	5.23%
TOTAL		**40768.0**	**100.0%**
WATERSHED TOTAL (acres)		***298562.4***	

5.1 Recent CSO and SSO Discharges

5.1.1 Discharges by Subwatershed Management Area

Controlled and uncontrolled CSOs are shown in Figure 8. A summary of the recent CSO and SSO discharges for each of the SWMAs is presented below (MDEQ, 2005).

Figure 8



Main 1-2 SWMA

CSO Discharges. Although all CSOs are controlled, some may still discharge to the Rouge River during very large rain events. This discharge receives screening, primary treatment, and disinfection. In 2005, 10 treated CSO discharges to the Rouge River were reported by the Main 1-2 SWMA communities to the MDEQ.

SSO Discharges. In 2005, 5 SSOs to the Rouge River were reported by the communities in the Main 1-2 SWMA to the MDEQ.

Main 3-4 SWMA

CSO Discharges. In 2005 there were several discharges to the Rouge River from the remaining uncontrolled CSOs in the cities of Detroit and Dearborn. Additionally, the city of River Rouge reported 8 treated CSO discharges in 2005.

SSO Discharges. One SSO to the Rouge River was reported by the Main 3-4 SWMA communities to the MDEQ in 2005.

Upper SWMA

CSO Discharges. Three treated CSO discharges to the Rouge River were reported by the Upper SWMA communities to the MDEQ in 2005.

SSO Discharges. No SSOs to the Rouge River were reported by the communities in the Upper SWMA to the MDEQ in 2005.

Middle 1 SWMA

CSO Discharges. No CSOs were reported to the MDEQ by the Middle 1 SWMA communities in 2005.

SSO Discharges. In 2005, 4 SSOs to the Middle Branch of the Rouge River were reported to the MDEQ by the Middle 1 communities.

Middle 3 SWMA

CSO Discharges. In 2005, 2 treated CSO discharges to the Rouge River were reported by the Middle 3 SWMA communities to the MDEQ.

SSO Discharges. No SSOs to the Rouge River were reported by the communities in the Middle 3 SWMA to the MDEQ in 2005.

Lower 1 SWMA

CSO Discharges. No CSOs were reported by the Lower 1 SWMA communities to the MDEQ in 2005.

SSO Discharges. One SSO was reported by the Lower 1 SWMA communities in 2005.

Lower 2 SWMA

CSO Discharges. In 2005 there were several untreated discharges to the Rouge River from the

remaining uncontrolled CSOs in the city of Dearborn and 3 treated discharges from the city of Inkster reported to the MDEQ.

SSO Discharges. No SSOs to the Rouge River were reported by the communities in the Lower 2 SWMA to the MDEQ in 2005.

5.1.2 Impact of CSO and SSO Discharges on In-stream E. coli Levels

5.1.2.1 CSO Impact on In-stream *E. coli* Levels (May-October 2005)

An assessment of the 2005 MDEQ-collected *E. coli* data was performed to evaluate the CSO impact on in-stream *E. coli* levels. Note that the samples were collected on the same day and time each week regardless of a CSO discharge event and the study was not designed for the purpose of the assessment. To make this assessment, an in-stream velocity during wet weather events of 2.5 feet per second was assumed to predict the time of passage between sampling locations, which was estimated to be from 1-3 hours. In 2005, in the Main and Lower Branches of the Rouge River, CSOs discharged from several minutes to several hours, resulting in a range of total discharge volumes. Based on estimated times of passage and discharge durations, the planned sample collection dates did not typically align with the time period during which sampling would likely reflect a contribution from the CSO discharges to in-stream *E. coli* levels. It should be noted that some of the *E. coli* samples collected in 2005 might have been collected during wet weather conditions when CSOs were not discharging, but might have been affected by overland flow. Figures were prepared to evaluate the contribution of CSO discharges in the lower portion of the Main Branch and in the Lower Branch on in-stream *E. coli* levels (Appendix M).

The following describes the results of the assessment:

Main Branch. No CSOs were reported downstream of Bonnie Brook Golf Course (M15) that aligned with sampling activities from May-June and from August-October. However, downstream of Ann Arbor Trail (G42) there were 3 days in July when CSOs discharged and routine sampling might have measured their influence on *E. coli* levels. On 2 of the sampling dates there were CSO discharges prior to sampling, but due to time of passage it was considered unlikely that the discharge influenced *E. coli* levels and the downstream levels were not always greater than or less than upstream levels. On the sampling date when there were CSO discharges prior to sampling and it was considered likely, due to time of passage, that the discharge influenced the levels, the *E. coli* levels decreased from upstream to downstream.

Lower Branch. On 5 of the sampling dates when there were CSO discharges prior to sampling, downstream impact was considered unlikely due to time of passage; however, downstream *E. coli* levels were 1.5-3.5 times the upstream levels. On 2 of the sampling dates when there were CSO discharges prior to sampling and it was considered likely, due to time of passage, that the discharge influenced the levels, the downstream *E. coli* levels were less than the upstream levels.

In summary no conclusions regarding the impact of CSOs on in-stream *E. coli* levels can be made based on the data collected in 2005. To measure the impact of CSOs on *E. coli* levels, a specific sampling program would have to be designed.

5.1.2.2 SSO Impact on In-stream *E. coli* Levels (May-October 2005)

There were SSO discharges to the Main, Middle, and Lower Branches of the Rouge River in 2005. Only 1 of these discharges occurred on a day that coincided with the 2005 MDEQ TMDL

routine sampling program. This discharge occurred in the Lower Rouge on May 13, 2005. Figure M-9 in Appendix M shows the *E. coli* levels at upstream and downstream locations from the point of the SSO discharge. Also shown are other inflows from creeks, tributaries, etc., that might influence the upstream and downstream *E. coli* levels. The duration of the SSO discharge was only 70 minutes, the volume was small, and it does not appear to have influenced in-stream *E. coli* levels where samples were collected.

6.0 LOADING CAPACITY (LC) DEVELOPMENT

The LC represents the maximum daily loading that can be assimilated by the water body while still achieving WQS. As indicated in the Numeric Target section, the targets for this pathogen TMDL are the 30-day geometric mean WQS of 130 *E. coli* per 100 ml expressed as a concentration, and daily maximum of 300 *E. coli* per 100 ml expressed as a daily load and concentration. An additional target is the partial body contact standard of 1,000 *E. coli* per 100 mL as a daily maximum concentration year-round.

Concurrent with the selection of numeric endpoints, development of the LC requires identification of the critical conditions. The critical conditions are the set of environmental conditions (e.g., flow) used in developing the TMDL that result in attaining WQS and have an acceptably low frequency of occurrence. The critical conditions for the applicability of WQS in Michigan are given in Rule 323.1090 (Applicability of WQS). Rule 323.1090 requires that the WQS apply at all flows equal to or exceeding the water body design flow. In general, the lowest monthly 95 percent exceedance flow is used as the design condition for developing pollutant loadings. As described further in Section 7.0, this TMDL provides allowable *E. coli* loadings under a variety of flow conditions, including the 95 percent exceedance flow. However, the daily maximum and monthly geometric mean WQS concentration levels for *E. coli* presented in the Numeric Target section or alternative endpoints that assure attainment of the *E. coli* standards (e.g., fecal coliform) will be used to establish any necessary NPDES permit limitations and nonpoint source goals for the purpose of determining compliance with this TMDL.

7.0 LC

The LC is the sum of individual WLAs for point sources, and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the LC must include a margin of safety (MOS), either implicitly within the WLA or LA, or explicitly, that accounts for uncertainty in the relation between pollutant loads and the quality of the receiving water body. Conceptually, this definition is denoted by the equation:

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

The LC represents the maximum loading that can be assimilated by the receiving water while still achieving WQS. The overall LC is subsequently allocated into WLAs for point sources, LAs for nonpoint sources, and the MOS.

The LC is equal to:

Criteria x Flow x Y;

Where:
Criteria = WQS (300 *E. coli* per 100 ml)
Flow = cubic feet per second (cfs)
Y = conversion factor [(28,317 ml/cubic feet)/100] x 60 seconds/minute x 60 minutes/hour x 24 hours/day

The LCs, along with the MOS, WLAs, and LAs for each individual branch of the Rouge River are presented in Tables 15, 17, 19, and 21. In addition to the LC tables, a rationale table for each branch is provided to give detailed information used in the calculations (Tables 16, 18, 20, and 22). Currently uncontrolled CSOs (i.e., no treatment prior to discharge) have been assigned WLAs based on future treatment facility construction. Note that CSO discharges are expected to discharge under high, moist, and mid flow duration intervals only; therefore, these discharges are not allocated under low and dry flow duration intervals.

The LCs, WLAs, LAs, and MOS are calculated based on the formula above using flow data from USGS gages within the watershed. Stream discharge for the TMDL watershed was developed using the drainage area ratio (DAR) method. The DAR method is a simple, widely used analytical approach to developing discharge for areas of the watershed that are downstream of the gage. The DAR method assumes flow is proportional to drainage area and is defined in the following equation:

$$DAR = \frac{A_{ungaged}}{A_{gaged}}$$

Where:

Aungaged = Area of ungaged watershed/site
Agaged = Area of gaged watershed/site

Using the DAR method, discharge can be estimated for ungaged watersheds/sites using the following equation:

$$Q_{ungaged} = DAR \times Q_{gaged}$$

Where:

DAR = Drainage Area Ratio
Qgaged = Discharge at gaged watershed/site
Qungaged = Discharge at ungaged watershed/site

Normally, DARs are based on USGS drainage areas; however, the natural drainage in the Rouge River watershed has been altered due to urbanization. To account for the modifications to the watershed, drainage areas were obtained from the Wayne County draft Rouge River watershed management plan (ARC, 2009). Gage information and assumptions used to develop the flows are contained in Appendix N.

The loads are presented under a variety of flow conditions, each of which assures attainment of the targets. The Rouge River flow conditions range from 5-95 percent exceedance flows. An exceedance flow is a statistically determined flow that is exceeded a specific percentage of time. For example, the 95 percent exceedance flow represents a flow expected to be exceeded 95 percent of the time, and therefore represents low flow conditions. A 5 percent exceedance flow would be expected to be exceeded only 5 percent of the time, and therefore represents high flow conditions. Five flows (i.e., 5, 25, 50, 75, and 95 percent) were selected to develop LCs based upon the approach developed by Cleland (2006). Flows along a gradient of 0-100 percent were partitioned into flow zones (e.g., high, moist, midrange, dry, and low, respectively) and the 5 exceedance flows represent the midpoint of their respective flow conditions (i.e., 5 percent is the midpoint of the high flow zone).

The LCs for all 4 branches were determined using the LC formula with allocation assignments made in the following order: MOS, WLAs for individual NPDES permits, WLAs for general industrial storm water permits, and general municipal separate storm sewer system (MS4) permits. Any remaining capacity was assigned to the LAs. Additional flow has been added for outfalls or CSO discharges that are either located downstream of the respective gage or scheduled for future construction (e.g., the Dearborn CSO discharges downstream of USGS gage 4168400; therefore, 15 cfs has been added to the calculated exceedance flows).

In the 2007 TMDL, the WLAs for the general industrial storm water permits were calculated using the Long-Term Hydrological Impact Assessment Web application developed by Purdue University. In determining the industrial storm water WLAs for the modified TMDL, a more straight forward approach using land use data was applied. Additional details regarding the calculation of the WLAs for the general industrial storm water permits are presented in the WLA sections below. In addition, Appendix M (Notices of Coverage under Permit by Rule) has been removed from the modified TMDL. This change was made due to the temporary nature of these permits; however, when a facility or individual applies for coverage, there are mechanisms in place to control construction storm water during the project.

Consideration was given to WWTPs where large differences occur between the facility design flow and the actual average daily flow. WWTP allocations are based on permitted design flows; however, the USGS gage flows only reflect the actual average daily flows from the facilities. Therefore, the difference between the design flow and average daily flow has been added to the calculated exceedance flows. For example, the Commerce Township WWTP has a facility design flow of 13 cfs and an average daily flow of 2.5 cfs; therefore, an additional flow of 10.5 cfs was added to the calculated exceedance gage flow. Details on the calculations are provided in the sections below.

7.1 Main Rouge

7.1.1 Main Rouge LC

In order to calculate the Main Branch Rouge River LC, the LC for the Upper, Middle, and Lower Branches had to be calculated and subtracted from the LC of the entire Rouge River watershed. The LC for the watershed was calculated using the equation above and flows from the following USGS gages: 4166500 (Main Branch), 4167000 (Middle), and 4168400 (Lower) (Appendix N). Flows from each gage were added together and the DAR method applied to determine the calculated exceedance flows for the entire Rouge River watershed (Table 15).

As explained above, flows were added for the YCUA Regional WWTP (48.9 cfs) and Commerce Township WWTP (10.5 cfs) to account for the differences between the facility design flows and the actual average daily flows. In addition, the following flows were added to account for CSO discharges that are located downstream of USGS gages: Dearborn CSO-Lower Rouge (14 cfs), Dearborn CSO-Main Rouge (34 cfs), River Rouge CSO RTB (14 cfs), Detroit CSOs (983 cfs). Note that the flow contribution added from the Detroit CSOs (983 cfs – asterisked in Table 16) was derived by summing those flows authorized to discharge under permit MI0022802 that are located downstream of the USGS gages.

7.1.2 Main Rouge WLAs

There are 93 permitted NPDES discharges to the Main Branch of the Rouge River including 14 individual permits and 79 COCs under 9 general permits (Figure 9). Appendix L contains the list of permits and permit categories. Permits known or believed to contain *E. coli* (i.e., municipal or industrial general storm water permits, individual permits authorizing discharge of

storm water, WWTPs, or CSO RTBs) were assigned a WLA calculated using the WQS of 300 *E. coli* per 100 mL and facility design flow for WWTPs. For CSO discharges, WLAs were calculated using the WQS and the flows and rationales outlined in Table 16. The remaining permits with discharges that are not considered a source of *E. coli* (i.e., noncontact cooling water discharges) were assigned a WLA of zero.

There are 14 individual permits in the watershed. The first individual permit (MI0057364) is for storm water discharge for the Michigan Department of Transportation (MDOT) for statewide coverage of their MS4. This individual permit is included in the aggregate WLA for the general municipal storm water permits.

There is one individual permit for the Detroit WWTP. This TMDL will cover CSO discharges only. The receiving water for the Detroit WWTP treated sanitary wastewater discharge is the Detroit River.

There are 6 CSO discharges authorized by individual permits (which include CSOs under the Detroit WWTP). In the 2007 TMDL, discharge flows for the CSOs were based on average or estimated flow data. The modified TMDL used 75th percentile flows or modeling results for the future basins. This approach more appropriately reflects discharge conditions in the watershed. Additional details for the CSO WLAs are presented in Table 16.

In determining the industrial storm water WLAs (MIS210000, MIS220000, MIS310000), the drainage area associated with industrial land use (15.3 percent of the total watershed) was assumed to be the same as that associated with the general industrial permits. The WLAs for the MS4 permits (MIG619000, MIS040000) in the Main Rouge River were calculated based on the municipal jurisdictions covered by the MS4 permits. It was assumed that 100 percent of the watershed drains to MS4 covered areas. It should be noted that these percentages do not add up to 100 percent. This occurs because the industrial WLA is based on land use data (i.e., forest, row crop, commercial, etc.) while the WLA for MS4s is based on the area of the watershed that falls within municipal boundaries covered by MS4 permits.

The remaining permits (MI0004243, MI0043524, MI0044415, MI0056235, MI0057126, MI0057738, MI0057886, MIG080000, MIG250000, MIG760000, and MIG679000) are not expected to discharge *E. coli* and have been assigned a WLA of zero.

7.1.3 Main Rouge LA

A LA is assigned to non-regulated sources of *E. coli*. Non-regulated sources are those that are not covered under an NPDES permit. Based upon review of the impaired watershed, it was determined that all land in the impaired watershed drains to a regulated MS4; therefore, no LA was assigned.

7.1.4 Main Rouge MOS

The MOS accounts for any uncertainty or lack of knowledge concerning the relationship between pollutant loading and water quality, including the pollutant decay rate if applicable. The MOS can be either implicit (i.e., incorporated into the WLA or LA through conservative assumptions) or explicit (i.e., expressed in the TMDL as a portion of the loadings). An explicit MOS was calculated for the Main Branch of the Rouge River.

Following the approach developed by Cleland (2006), the MOS for the high (5 percent) moist (25 percent), mid (50 percent), and low (75 percent) flow duration intervals were based on the difference between the LC as calculated at the midpoint of each of these flow zones and the LC

calculated at the minimum flow in each zone. In the modified TMDL, there was not sufficient capacity to fully allocate to all permitted discharges and still allow for an adequate MOS in the moist (25 percent) and the mid (50 percent) flow duration intervals. Therefore, the WLA for the Detroit WWTP CSOs under the moist (25 percent) and mid (50 percent) flow duration intervals was set equal to the flows established downstream of the USGS gage (983 cfs). This adjustment allows for an adequate MOS and is based on the assumption that the Detroit CSOs do not all discharge at the same time under these two flow duration intervals.

The MOS for the dry flow zone was based on the difference between the LC as calculated at the midpoint of the dry flow duration intervals (i.e., the 95 percent exceedance flow) and the LC calculated at the 99 percent exceedance flow duration interval (rather than at the minimum drought flow in the dry zone). The minimum drought flow (i.e., the 100 percent exceedance flow) was not deemed appropriate to use as this flow represents the lowest flow of record for the respective water body and is therefore not representative of typical drought flow conditions. An adequate MOS is provided because the LC is typically much less at the minimum flow of each flow duration interval as compared to the midpoint. The MOS ensures that allocations will not exceed the load associated with the minimum flow in each flow duration interval.

Finally, existing and future CSO discharges are, or will be, required to meet Michigan's concentration-based WQS for *E. coli* as described in the Numeric Target section (Section 3.0). This requirement applies at the point of discharge (i.e., dilution is not allowed) and provides additional confidence that the WQS will be met in CSO discharges.

7.2 Upper Rouge

7.2.1 Upper Rouge LC

The Upper Rouge LC was calculated as described above. In order to account for the difference between the Commerce Township WWTP facility design flow (13 cfs) and an actual average daily flow (2.5 cfs), 10.5 cfs was added to the calculated exceedance flows under all duration intervals.

The Wayne Co/RDFrd/Livionia CSO discharges downstream of USGS gage 4166470; therefore, 4.0 cfs was added to the calculated exceedance flows under the high, moist, and mid flow duration intervals (Table 17). Note, no additional flows associated with CSOs were added to the low and dry flow duration intervals.

7.2.2 Upper Rouge WLAs

There are 74 permitted NPDES discharges to the Upper Branch of the Rouge River, including 3 individual permits and 71 COCs under four general permits (Figure 10). Appendix L contains the permits and general permit categories. Permits with discharges known or believed to contain *E. coli* were assigned a WLA. The remaining permits with discharges that are not considered a source of *E. coli* (i.e., noncontact cooling water discharges) were assigned a WLA of zero. Specific details for allocations can be found in Table 18. Note that three general permits contained in the 2007 TMDL (MIS710004, MIG081070, MIG081086) have been terminated, retired, or revoked.

There are three individual permits in the watershed. The first individual permit (MI0057364) is for storm water discharge for the MDOT for statewide coverage of their MS4. This individual permit is included in the aggregate WLA for the general municipal storm water permits.

There is one individual permit for treated sanitary wastewater (Commerce Township WWTP). The WLA for this facility was calculated using the facility design flow of 13.5 cfs and the WQS of 300 *E. coli* per 100 mL. Note that the design flow for Commerce Township WWTP (13.5 cfs) is higher than that used in the 2007 TMDL because of a plant expansion in 2008.

There is one CSO in the watershed (Wayne Co/RDFrd/Livonia CSO). The WLA for this facility was calculated using the 75th percentile flow based on available data. In the 2007 TMDL, the Wayne Co/RDFrd/Livionia CSO discharge was based on average flow data. The modified TMDL used the 75th percentile flow as a more appropriate reflection of discharge conditions.

In determining the industrial storm water WLAs (MIS210000), the drainage area associated with industrial land use (4.2 percent of the total watershed) was assumed to be the same as that associated with the general industrial permits. The WLAs for the MS4 permits (MIG619000, MIS040000) were calculated based on the municipal jurisdictions covered by the MS4 permits or approximately 99.4 percent of the remaining allocation. It should be noted that these percentages do not add up to 100 percent because the industrial WLA is based on land use data (i.e., forest, row crop, commercial, etc.) and the WLA for MS4s is based on the area of the watershed that falls within municipal boundaries covered by MS4 permits. In the 2007 TMDL, the municipal jurisdictions covered by the MS4 permits were assumed to be 100 percent of the Upper Rouge River watershed. A more thorough analysis indicated that 0.6 percent of the watershed does not fall under MS4 permits. This 0.6 percent was subsequently allocated under the LA (see below).

The remaining permits (MIG250000) are not expected to discharge *E.coli* and have been assigned a WLA of zero.

7.2.3 Upper Rouge LA

The Upper Rouge LA is the remaining LC after all other allocations are assigned.

7.2.4 Upper Rouge MOS

The MOS accounts for any uncertainty or lack of knowledge concerning the relationship between pollutant loading and water quality, including the pollutant decay rate if applicable. The MOS can be either implicit (i.e., incorporated into the WLA or LA through conservative assumptions) or explicit (i.e., expressed in the TMDL as a portion of the loadings). An explicit MOS was calculated for the Upper Branch of the Rouge River.

Following the approach developed by Cleland (2006), the MOS for the high, moist, mid, and low flow zones were based on the difference between the LC as calculated at the midpoint of each of these 4 flow zones and the LC calculated at the minimum flow in each zone. The MOS for the dry flow zone was based on the difference between the LC as calculated at the midpoint of the dry flow zone (i.e., the 95 percent exceedance flow) and the LC calculated at the 99 percent exceedance flow (rather than at the minimum drought flow in the dry zone). The minimum drought flow (i.e., the 100 percent exceedance flow) was not deemed appropriate to use as this flow represents the lowest flow of record for the respective water body and is therefore not representative of typical drought flow conditions. An adequate MOS is provided because the LC is typically much less at the minimum flow of each zone as compared to the midpoint. The MOS ensures that allocations will not exceed the load associated with the minimum flow in each zone.

7.3 Middle Rouge

7.3.1 Middle Rouge LC

The Middle Rouge LC was calculated consistent with the equation in Section 7.0. There were no CSOs located downstream of USGS gages and no large differences between WWTP design flows and actual average daily flows; therefore, no additional flows were added to the calculated exceedance flows. It should be noted that calculated exceedance flows did increase slightly from the 2007 TMDL as a result of the additional two years of USGS flow data available. The LCs for the Middle Rouge are presented in Table 19.

7.3.2 Middle Rouge WLAs

There are 94 permitted NPDES discharges to the Middle Branch of the Rouge River including 6 individual permits and 88 COCs under 6 general permits (Figure 11). Appendix L contains the permits and permit categories. Permits known or believed to contain *E. coli* were assigned a WLA and calculated as described above in the Upper Rouge. All allocation details can be found in Table 20. Note that four general permits contained in the 2007 TMDL (MIS710020, MIG080782, MIG081027, and MIG081077) have been terminated, retired, or revoked.

There are six individual permits. The first individual permit (MI0057364) is for storm water discharge and is held by the MDOT for statewide coverage of their MS4. This individual permit is included in the aggregate WLA for the general municipal storm water permits.

There are two individual permits for treated sanitary wastewater (Oakland Co. Walled Lake/Novi WWTP and Salem Twp. WWTP). The WLAs for these facilities were calculated using the facility design flows of 5.4 cfs and 0.2 cfs, respectively.

There is one CSO in the watershed (Wayne Co/Dearborn Heights CSO). The WLA for this facility was calculated using the daily 75th percentile flow based on available data (rather than the average flow previously used in the 2007 TMDL).

In determining the industrial storm water WLAs (MIS210000, MIS220000, and MIS310000), the drainage area associated with industrial land use (21 percent of the total watershed) was assumed to be the same as that associated with the general industrial permits. The WLAs for the MS4 permits (MIG619000, MIS040000) in the Middle Rouge River were calculated based on the municipal jurisdictions covered by the MS4 permits or approximately 86.8 percent of the remaining allocation. It should be noted that these percentages do not add up to 100 percent. This occurs because the industrial WLA is based on land use data (i.e., forest, row crop, commercial, etc.). The WLA for MS4s is based on the percent area of the watershed that falls within municipal boundaries covered by MS4 permits (e.g., Novi and Salem Townships are part of the watershed; however, they are not covered in the WLA because they do not hold an MS4 permit).

The remaining permits (MI0026123, MI0045713, and MIG250000) are not expected to discharge *E. coli* and have been assigned a WLA of zero.

7.3.3 Middle Rouge LA

The Middle Rouge LA is the remaining LC after all other allocations are assigned.

7.3.4 Middle Rouge MOS

An explicit MOS was calculated for the Middle Branch of the Rouge River as described for the Upper Rouge.

Table 15

LC for the Main Branch of the Rouge River (loads expressed as colony forming units [cfu] per day)

	NPDES permit #	High	Moist	Mid	Low	Dry
Flow duration interval		5%	25%	50%	75%	95%
Calculated exceedance flows (cfs)[1]		1380.0	486.3	272.7	170.3	107.4
YCUA WWTP- Adjusted flow (cfs)[2]		48.9	48.9	48.9	48.9	48.9
Commerce Twp WWTP (cfs)[3]		10.5	10.5	10.5	10.5	10.5
Dearborn CSO from Lower (cfs)[4]		15.0	15.0	15.0	0	0
Detroit CSO's (cfs)[5]		983	983	983	0	0
River Rouge CSO RTB (cfs)[5]		14.0	14.0	14.0	0	0
Dearborn CSO from Main (cfs)[5]		34.0	34.0	34.0	0	0
Adjusted Flow - Rouge River (cfs)		2485.4	1591.7	1378.1	229.7	166.8
Loading Capacity (LC) - Rouge River		1.82E+13	1.17E+13	1.01E+13	1.69E+12	1.22E+12
Upper Rouge LC		1.46E+12	4.98E+11	3.17E+11	1.97E+11	1.48E+11
Middle Rouge LC		2.29E+12	7.66E+11	3.89E+11	2.07E+11	9.11E+10
Lower Rouge LC		2.88E+12	1.27E+12	9.31E+11	6.97E+11	6.20E+11
Main Branch LC		1.16E+13	9.15E+12	8.48E+12	5.84E+11	3.65E+11
Margin of Safety (MOS) - Rouge River		3.38E+12	1.09E+12	3.35E+11	3.53E+11	1.36E+11
Upper Rouge MOS		5.57E+11	1.28E+11	3.76E+10	3.76E+10	1.88E+10
Middle Rouge MOS		8.28E+11	2.61E+11	8.28E+10	8.28E+10	4.47E+10
Lower Rouge MOS		8.70E+11	2.38E+11	6.92E+10	5.38E+10	1.18E+10
Main Branch MOS		1.13E+12	4.60E+11	1.46E+11	1.79E+11	6.05E+10
Waste Load Allocation (WLA)						
Detroit CSO's (1252 cfs)[6]	MI0022802	9.19E+12	7.21E+12*	7.21E+12*	0	0
River Rouge CSO RTB (14 cfs)	MI0028819	1.03E+11	1.03E+11	1.03E+11	0	0
Dearborn CSO (34 cfs)	MI0025542	2.72E+11	2.72E+11	2.72E+11	0	0
Birmingham CSO/RTB (7 cfs)	MI0025534	5.14E+10	5.14E+10	5.14E+10	0	0
Oakland Co. Acacia Park CSO/RTB (7 cfs)	MI0037427	5.14E+10	5.14E+10	5.14E+10	0	0
Bloomfield Village CSO/RTB (6 cfs)	MI0048046	4.40E+10	4.40E+10	4.40E+10	0	0

	NPDES permit #		High	Moist	Mid	Low	Dry
Remaining capacity for MS4 and Industrial Permits			7.69E+11	9.54E+11	5.96E+11	4.05E+11	3.04E+11
WLA - General Industrial Stormwater Permits[7]	MIS210000 MIS220000 MIS310000		1.18E+11	1.46E+11	9.12E+10	6.20E+10	0
WLA - General MS4 (including MDOT)[8]	MI0057364 MIS040000	MIG619000	6.51E+11	8.08E+11	5.05E+11	3.43E+11	0
WLA - Permits not authorized to discharge *E. coli*	MIG080000 MIG250000 MIG760000 MIG679000 MI0004243	MI0043524 MI0044415 MI0056235 MI0057126 MI0057738 MI0057886	0	0	0	0	0
Load Allocation (LA)							
LA			0	0	0	0	0

[1] Based on USGS gage flows and drainage areas provided by Wayne County

[2] Based on difference between avg. daily flow (34 cfs) and design flow (82.9 cfs)

[3] Based on difference between avg. daily flow (2.5 cfs) and design flow (13 cfs)

[4] Based on 75th percentile of discharge flow

[5] Based on future and existing retention basin facilities listed in Table 16

[6] Detroit CSO Moist and Mid WLAs are based on 983 cfs

[7] Based on 15.3% industrial land use

[8] Based on 100% municipalities covered by MS4 permits

[*] Based on 983 cfs

Table 16
Main Branch Rouge River Allocation Rationale

Allocations	Rationale
WLA - Sum of Detroit WWTP-RRO2 and associated CSO's (1252 cfs)	Sum of facilities discharging under permit MI0022802
Detroit WWTP-RRO2 (464 cfs)*	Calculated daily 75% exceedence flow based on CSO available data
Hubbell/Southfield RTB (154 cfs)*	
Puritan/Fenkell RTB (0 cfs)	
7 Mile RTB (0 cfs)	
Baby Creek CSO (203 cfs)*	
Oakwood RTB (56 cfs)*	Estimate of daily 75% exceedence flow from Oakwood CSO discharge data in 2009-10, subtracting the 9 MG storage volume of the yet to be completed RTB. Facility currently under construction.
Pembroke (21 cfs)	Estimate of daily 75% exceedence flow from DWSD Supplemental Report on Alternative CSO Controls for Upper Rouge River Outfalls, Calculated Overflow Volume Based on Modified GDRSS Model Inflow Simulations (1994 - 1998). Note, these facilities are planned for future construction.
7 Mile East (7cfs)	
Six Mile, Six Mile Relief (100 cfs)	
Riverdale, Puritan East (10 cfs)	
Lyndon, Brammel (31 cfs)	
W. Parkway (8 cfs)	
Lahser (47 cfs)	
Glendale (45 cfs)	
W. Chicago (W) (2 cfs)*	
W. Chicago (E) (71 cfs)*	
Tireman (28 cfs)*	
Warren (5 cfs)*	
WLA - Dearborn -117 (20 cfs)	Estimate of daily 75% exceedence flow from using Dearborn CSO Control Program, CSO Control Facility Design Summary 2 (Projected Annual Discharge Volume/Projected Annual Number of Discharge Events). Our analysis has shown that 75% exceedance is roughly equivalent to average discharge flow. Facility currently under construction.
WLA - Dearborn -113 (14 cfs)	
WLA - River Rouge CSO RTB (14 cfs)	Calculated daily 75% exceedence flow based on available data
WLA - Birmingham CSO/RTB (7 cfs)	
WLA - Oakland Co. Acacia Park CSO/RTB (7 cfs)	
WLA - Bloomfield Village CSO/RTB (6 cfs)	
WLA - General/Industrial Stormwater Permits	Based on industrial land use data of 15.3%
WLA - MS4	80.6% of remaining allocation (minus MOS) based on MS4 coverage in watershed
LA	Remainder of allocation

Shaded facilities discharge under permit MI0022802.

* Facility located downstream of USGS Gage 4166500. Sum of these facilities is 983 cfs

Table 17
LC for the Upper Branch of the Rouge River (loads expressed as cfu/day)

	NPDES permit #	High	Moist	Mid	Low	Dry
Flow duration interval		5%	25%	50%	75%	95%
Calculated exceedance flows (cfs)[1]		184.5	53.3	28.7	16.4	9.6
Commerce Twp. WWTP - Adjusted flow (cfs)[2]		10.5	10.5	10.5	10.5	10.5
Wayne Co/RDFrd/Livionia CSO[3]		4.0	4.0	4.0		
Adjusted Flow (cfs)		199	67.8	43.2	26.9	20.1
Loading Capacity (LC)		1.46E+12	4.98E+11	3.17E+11	1.97E+11	1.48E+11
Margin of Safety (MOS)		5.57E+11	1.28E+11	3.76E+10	3.76E+10	1.88E+10
Waste Load Allocation (WLA)						
WLA - Commerce Twp WWTP (13.5 cfs)	MI0025071	9.54E+10	9.54E+10	9.54E+10	9.54E+10	9.54E+10
WLA - Wayne Co/RDFrd/Livonia CSO (4.0 cfs)	MI0051535	2.94E+10	2.94E+10	2.94E+10	0	0
Remaining capacity for MS4 and Industrial permits		7.79E+11	2.45E+11	1.55E+11	6.44E+10	3.36E+10
WLA - General Industrial Stormwater Permits[4]	MIS210000	3.27E+10	1.03E+10	6.50E+09	2.71E+09	0
WLA - General MS4 (including MDOT)[5]	MI0057364 MIG619000 MIS040000	7.42E+11	2.33E+11	1.47E+11	6.14E+10	0
WLA - General permits not authorized to discharge *E. coli*	MIG250000	0	0	0	0	0
Load Allocation (LA)						
LA		4.48E+09	1.41E+09	8.89E+08	3.70E+08	3.36E+10

[1]Based on USGS gage flows and Drainage areas provided by Wayne County

[2] Based on difference between avg. daily flow (2.5 cfs) and design flow (13 cfs)

[3] Based on 75th percentile of discharge flow (cfs)

[4] Based on 4.2% industrial land use

[5] Based on 99.4% municipalities covered by MS4 permits

Table 18
Upper Branch Rouge River Allocation Rationale

Allocations	Rationale
WLA - Commerce WWTP (13.0 cfs)	Based on anticipated NPDES design flow after plant expansion
Wayne Co/RDFrd/Livionia CSO (4.0 cfs)	Based on 75th percentile of discharge flow (cfs)
WLA - General/Industrial Stormwater Permits	Based on SEMCOG industrial land use data of 4.2%
WLA - MS4	99.4% of remaining allocation (minus MOS) based on MS4 coverage in watershed
LA	Remainder of allocation

Table 19
LC for the Middle Branch of the Rouge River (loads expressed as cfu/day)

	NPDES permit #	High	Moist	Mid	Low	Dry
Flow duration interval		5%	25%	50%	75%	95%
Calculated exceedance flows (cfs)[1]		313	104.4	53.0	28.2	12.4
Loading Capacity (LC)		2.29E+12	7.66E+11	3.89E+11	2.07E+11	9.11E+10
Margin of Safety (MOS)		8.28E+11	2.61E+11	8.28E+10	8.28E+10	4.47E+10
Waste Load Allocation (WLA)						
WLA - Salem Twp WWTP (0.2 cfs)	MI0054798	1.47E+09	1.47E+09	1.47E+09	1.47E+09	1.47E+09
WLA - Oakland Co Walled Lake/Novi WWTP (5.4 cfs)	MI0024287	3.97E+10	3.97E+10	3.97E+10	3.97E+10	3.97E+10
WLA - Wayne Co/Dearborn Heights CSO (14.0 cfs)	MI0051489	1.03E+11	1.03E+11	1.03E+11	0	0
Remaining capacity for MS4s and Industrial permits		1.32E+12	3.61E+11	1.62E+11	8.30E+10	5.20E+09
WLA - General Industrial Stormwater Permits[2]	MIS210000 MIS220000 MIS310000	2.78E+11	7.59E+10	3.41E+10	1.74E+10	0
WLA - General MS4 (including MDOT)[3]	MI0057364 MIG619000 MIS040000	9.06E+11	2.48E+11	1.11E+11	5.69E+10	0
WLA - Permits not authorized to discharge *E. coli*	MI0026123 MI0045713 MIG250000	0	0	0	0	0
Load Allocation (LA)						
LA		1.38E+11	3.77E+10	1.69E+10	8.66E+09	5.20E+09

[1]Based on USGS gage flows and Drainage areas provided by Wayne County

[2] Based on 21% industrial land use

[3] Based on 86.8% municipalities covered by MS4 permits

Table 20
Middle Branch Rouge River Allocation Rationale

Allocations	Rationale
WLA – Salem WWTP (0.2 cfs)	Based on NPDES design flow
WLA - Oakland Co Walled Lake/Novi WWTP (5.4 cfs)	Based on NPDES design flow
WLA – Wayne Co/Dearborn Heights CSO (14.0 cfs)	Based on 75th percentile of discharge flow (cfs)
WLA - General/Industrial Stormwater Permits	Based on SEMCOG industrial land use data of 21%
WLA - MS4	86.8% of remaining allocation (minus MOS) based on MS4 coverage in watershed
LA	Remainder of allocation

Table 21
LC for the Lower Branch of the Rouge River (loads expressed as cfu/day)

	NPDES permit #	High	Moist	Mid	Low	Dry
Flow duration interval		5%	25%	50%	75%	95%
Calculated exceedance flows (cfs)[1]		328.8	109	66.0	46.1	35.6
YCUA WWTP- Adjusted flow (cfs)[2]		48.9	48.9	48.9	48.9	48.9
Dearborn CSO (cfs)[3]		15	15	12	0	0
Adjusted Flow (cfs)		392.7	172.8	126.9	95.0	84.5
Loading Capacity (LC)		2.88E+12	1.27E+12	9.31E+11	6.97E+11	6.20E+11
Margin of Safety (MOS)		8.70E+11	2.38E+11	6.92E+10	5.38E+10	1.18E+10
Waste Load Allocation (WLA)						
WLA – YCUA WWTP (82.9 cfs)	MI0042676	6.08E+11	6.08E+11	6.08E+11	6.08E+11	6.08E+11
WLA – Wayne Inkster RTB/CSO - East (8 cfs)[3]	MI0051471	4.70E+10	4.70E+10	4.70E+10*	0	0
WLA – Wayne Inkster RTB/CSO - West (10 cfs)[4]	MI0051471	5.87E+10	5.87E+10	5.87E+10*	0	0
WLA - Dearborn CSO (15 cfs)[5]	MI0025542	8.81E+10	8.81E+10	8.81E+10*	0	0
WLA - Wayne Co/Dearborn Hts CSO/Wayne Co/Inkster/Dearborn Hts (10.0 cfs)[6]	MI0051489 MI0051462	5.87E+10	5.87E+10	5.87E+10*	0	0
Remaining capacity for MS4 and Industrial Permits		1.15E+12	1.69E+11	1.12E+09	3.49E+10	0
WLA - General Industrial Stormwater Permits[7]	MIS210000 MIS220000 MIS310000 MIS410000	2.07E+11	3.05E+10	2.01E+08	6.27E+09	0
WLA - General MS4 (including MDOT)[8]	MI0057364 MIG619000 MIS040000	7.61E+11	1.12E+11	7.37E+08	2.30E+10	0
WLA - Permits not authorized to discharge *E. coli*	MI0046183 MI0057156 MIG250000 MIG670000	0	0	0	0	0
Load Allocation (LA)						
LA		3.90E+11	5.74E+10	3.78E+08	1.18E+10	0

[1] Based on USGS gage flows and drainage areas provided by Wayne County
[2] Based on difference between avg. daily flow (34 cfs) and design flow (82.9 cfs)
[3] Based on 75th percentile of discharge flow
[4] Based on estimate of daily 75th percentile flow using the Inkster West RTB basis of Design Report
[5] Based on estimate of daily 75th percentile flow using Dearborn CSO Control Program
[6] Based on estimate of daily 75% exceedence flow based on combined drainage area and comparison to existing Rouge RTBs.
[7] Based on 18% industrial land use
[8] Based on 80.6% municipalities covered by MS4 permits
*Based on 20% of reduction of CSO design flow

Table 22
Lower Branch Rouge River Allocation Rationale

Allocations	Rationale
WLA - YCUA (53.6 MGD = 82.9 cfs)	Based on NPDES design flow
WLA - Wayne Inkster RTB/CSO - East (8 cfs)	Based on 75th percentile of discharge flow
WLA - Wayne Inkster RTB/CSO - West (10 cfs)	Estimate of daily 75th percentile flow using the Inkster West RTB basis of Design Report (3) (Projected Annual Discharge Volume/Projected Annual Number of Discharge Events). Our analysis has shown that 75th percentile is roughly equivalent to average discharge flow.
WLA - Dearborn CSO (15 cfs)	Estimate of daily 75th percentile flow using Dearborn CSO Control Program, CSO Facility Design Summary 2 (Projected Annual Discharge Volume/Projected number of Discharge Events). Our analysis has shown that 75th percentile is roughly equivalent to average discharge flow.
WLA - Wayne Co/Dearborn Hts/Wayne Co/Inkster/Dearborn Hts (10.0 cfs)	Estimate of daily 75th percentile flow based on combined drainage area and comparison to existing Rouge RTBs. Dearborn Height's plan for controlling these outfalls (L41, L42, L43) is due March 2011, so this estimate assumes treatment. Separation is an option.
WLA - General/Industrial Stormwater Permits	Based on SEMCOG industrial land use data of 18%
WLA - MS4	80.6% of remaining allocation (minus MOS) based on MS4 coverage in watershed
LA	Remainder of allocation

Figure 9
NPDES permitted discharges to the Main Branch of the Rouge River (Note: boxes are not necessarily the outfall locations).

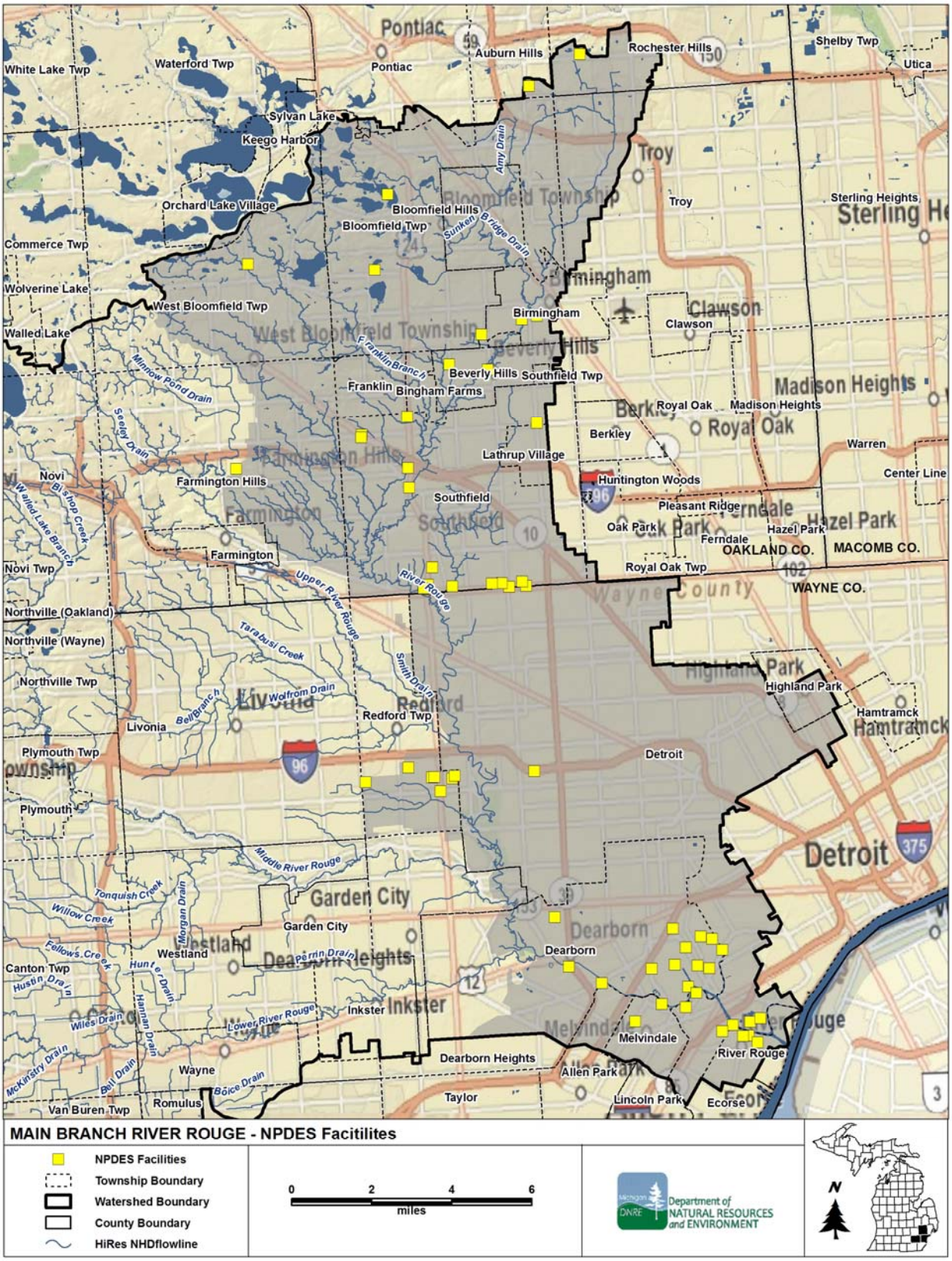


Figure 10
NPDES permitted discharges to the Upper Branch of the Rouge River (Note: boxes are not necessarily the outfall locations).

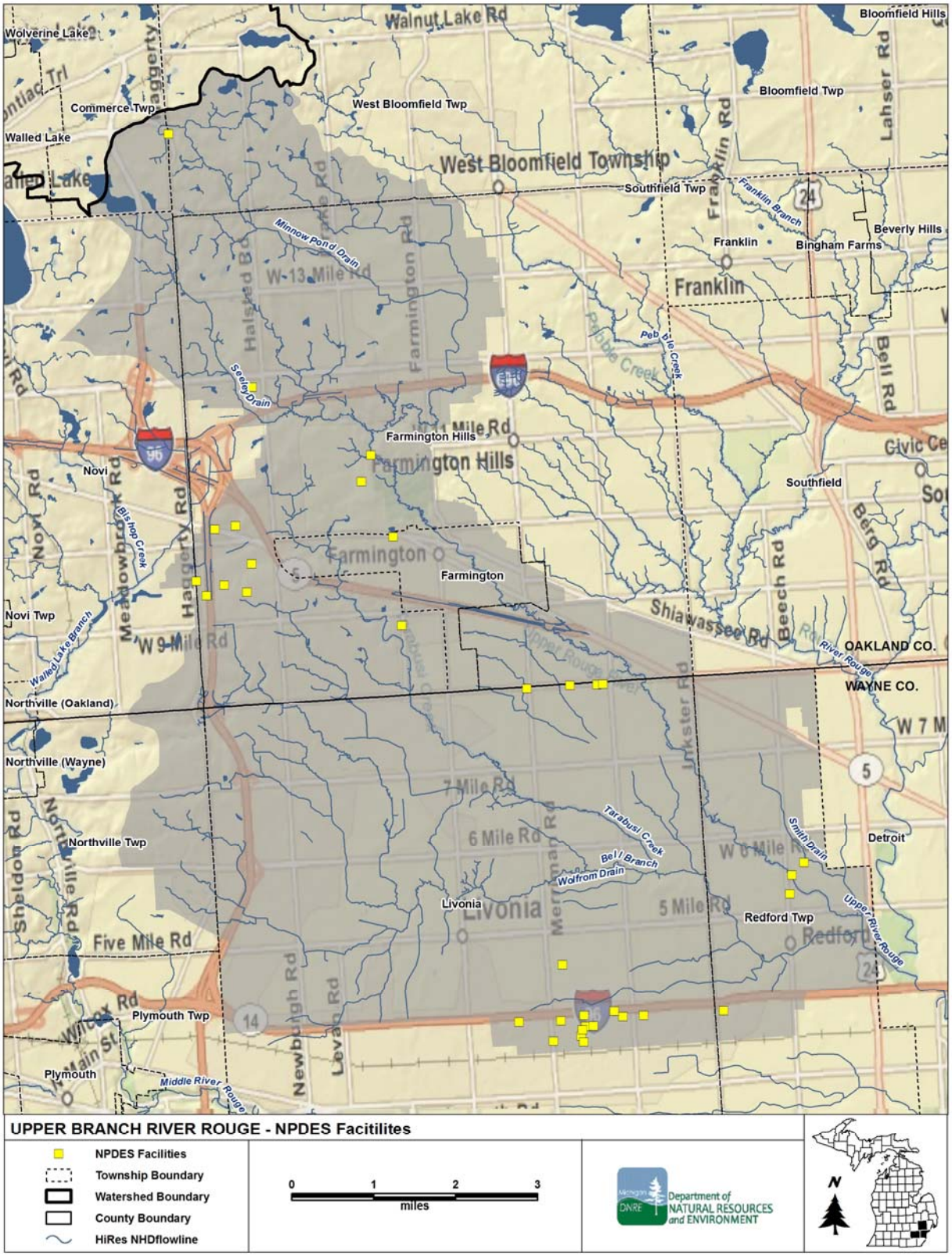
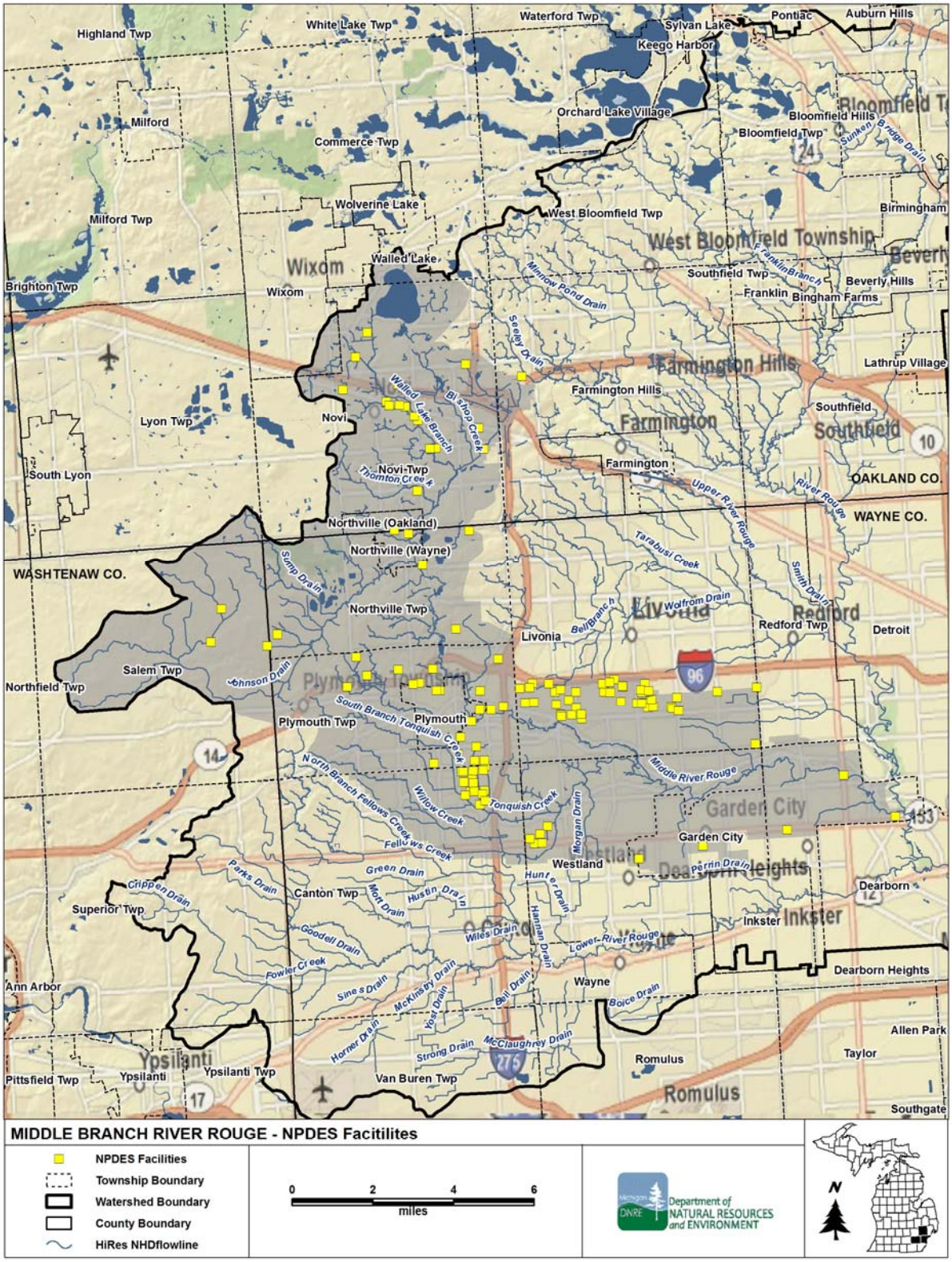


Figure 11
NPDES permitted discharges to the Middle Branch of the Rouge River (Note: boxes are not necessarily the outfall locations).



7.4 Lower Rouge

7.4.1 Lower Rouge LC

As previously discussed in Section 7.0, flows were added where large differences occur between the facility design flow and the actual average daily flow. The YCUA Regional WWTP has a facility design flow of 82.9 cfs and an actual average daily flow of 34 cfs. Therefore, an adjusted flow of 48.9 cfs was added to the calculated exceedance flows under all flow duration intervals. In addition, the Dearborn CSO discharges downstream of USGS gage 4168400; therefore,15 cfs has been added to the calculated exceedance flows under the high, moist, and mid flow duration intervals (Table 21).

7.4.2 Lower Rouge WLAs

There are 64 permitted NPDES discharges to the Lower Branch of the Rouge River including 9 individual permits and 57 COCs under 7 general permits (Figure 12). Appendix L contains the permits and permit categories. Permits known or believed to contain *E. coli* were assigned a WLA calculated using the WQS of 300 *E. coli* per 100 mL and facility design flow in the case of WWTPs or 75th percentile flows for CSO discharges. All allocation details can be found in Table 22. Note that one general permit contained in the 2007 TMDL (MIS310398) has been retired.

There are nine individual permits in the watershed. The first individual permit (MI0057364) is for storm water discharge for the MDOT for statewide coverage of their MS4. This individual permit is included in the aggregate WLA for the general municipal storm water permits.

There is one individual permit for treated sanitary wastewater (YCUA Regional WWTP). The WLA for this facility was calculated using the facility design flow of 82.9 cfs. Note that the design flow for YCUA Regional WWTP (82.9 cfs) is higher than that used in the 2007 TMDL because of a plant expansion in 2008.

There are four CSO discharges in the watershed. In the 2007 TMDL, the CSO discharge flows were based on average or estimated data. In the modified TMDL the WLAs for these facilities were calculated using 75th percentile flows as more appropriate approximations of discharge conditions. Additional details for the WLAs are presented in Table 22.

In determining the industrial storm water WLAs (MIS210000, MIS220000, MIS310000, MIS410000), the drainage area associated with industrial land use (18 percent of the total watershed) was assumed to be the same as that associated with the general industrial permits. The WLAs for the MS4 permits (MIG619000 and MIS040000) in the Lower Rouge River were calculated based on the municipal jurisdictions covered by the MS4 permits or approximately 80.6 percent of the remaining allocation.

The remaining permits (MI0046183, MI0057156, MIG250000, MIG670000) are not expected to discharge *E. coli* and have been assigned a WLA of zero.

7.4.3 Lower Rouge LAs

The Lower Rouge LA is the remaining LC after all other allocations are assigned. Capacity was available under the low flow duration interval to account for the difference between the actual

average daily flow and the design flow of YCUA Regional WWTP. Therefore, the modified TMDL includes an allocation under the low flow duration interval.

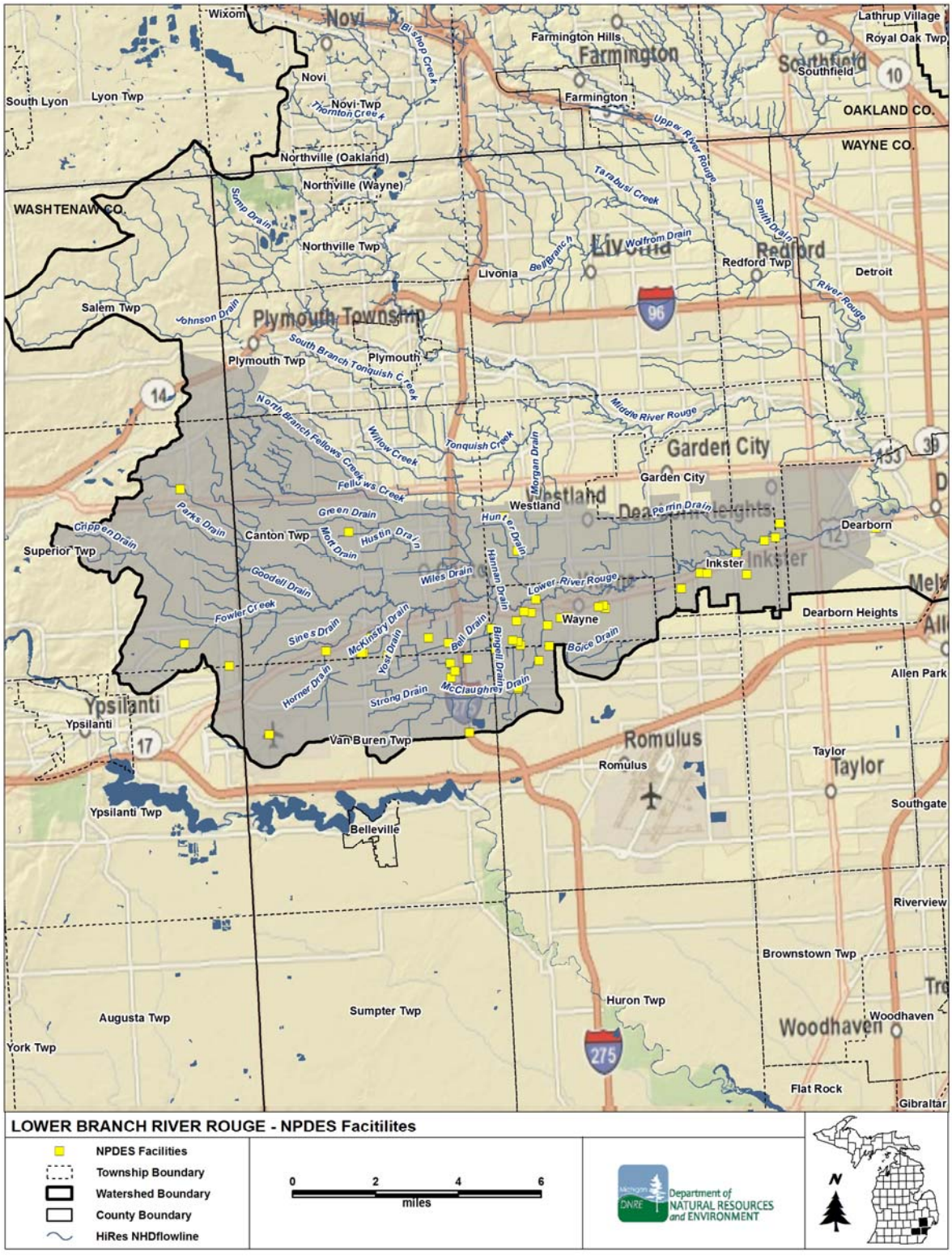
7.4.4 Lower Rouge MOS

In the 2007 TMDL, an implicit MOS was assumed for the mid, low, and dry flow duration intervals because the Lower Rouge River is dominated by the YCUA Regional WWTP discharge. The modified TMDL incorporated two years of additional flow records, accounted for the difference between the average daily flow and the design flow of the YCUA Regional WWTP, and added discharges downstream of the USGS gage. This approach allowed for the allocation of an explicit MOS for the mid, low, and dry flow duration intervals, and more accurately represents flow conditions in the Lower Rouge River during the various flow duration intervals. An implicit MOS was assumed for the dry flow duration interval.

For the modified TMDL, an explicit MOS was developed for the high (5 percent) and moist (25 percent) flow duration intervals using the approach described for the Upper and Middle Rouge River. The flow in the Lower Rouge River is dominated by the YCUA Regional WWTP under the mid (50 percent), low (75 percent) and dry (95 percent) flow duration intervals. Under the mid (50 percent) flow duration interval, there is not sufficient capacity to fully allocate to all permitted discharges and still allow for an adequate MOS. To address this, the WLA to the CSOs under the mid (50 percent) flow duration interval was reduced by 20 percent (i.e., from 43 cfs to 34.4 cfs). This reduction is based on the assumption that the 4 CSOs in the Lower Rouge will not all discharge at the same time, at the assumed 75th percentile flow under the 50 percent flow duration interval. This 20 percent reduction in CSO flow allows for a MOS to be calculated in the same manner as was done for the high (5 percent) and moist (25 percent) flow duration intervals. Under the low (75 percent) flow duration interval, there is sufficient capacity available to develop an explicit MOS because the CSOs do not receive an allocation. Because of insufficient capacity, the explicit MOS could not be fully allocated for the dry (95 percent) flow duration interval; therefore, an implicit MOS was also assumed.

An implicit MOS for the dry (95 percent) flow duration interval is based on the limited capability of pathogen organisms to ordinarily survive outside of their hosts and therefore organism counts are expected to be lower than the allocations. As mentioned above, the flow of the Lower Rouge is dominated by the YCUA Regional WWTP discharge during lower flow duration intervals. This facility is required to meet its NPDES permit limits for fecal coliform, which as discussed in Section 3, will ensure that the *E. coli* WQSs are also met. In addition, there is a small amount of LC available under the dry (95 percent) flow duration interval due to the difference between the average daily flow for the YCUA Regional WWTP (34 cfs) and the 95 percent exceedance flow (35.6 cfs) as reported by the USGS gage. This remaining LC has been allocated to the MOS under the dry (95 percent) flow duration interval.

Figure 12
NPDES permitted discharges to the Lower Branch of the Rouge River (Note: boxes are not necessarily the outfall locations).



8.0 SEASONALITY

Seasonality in the TMDL is addressed by expressing the TMDL in terms of a total body contact recreation season that is defined as May 1 through October 31 by R 323.1100 of the WQS. It is expected that there is no total body contact during the remainder of the year due to cold weather; however, there is a separate WQS maximum of 1,000 *E. coli* per 100 ml for the partial body contact season. *E. coli* allocations developed to protect during the total body contact season are also expected to assure attainment of the partial body contact standard.

9.0 MONITORING

E. coli was monitored weekly at 62 stations on the Rouge River and tributaries from May through October 2005. Future monitoring will take place as part of the 5-year rotating basin monitoring as resources allow, and when corrective actions have occurred to suggest that WQS may be met. When these results indicate that the water body may be meeting WQS, sampling will be conducted at the appropriate frequency (as defined in the Numeric Target section) to determine if the targets are being met.

10.0 REASONABLE ASSURANCE ACTIVITIES

The Rouge River has suffered from typical urban watershed stressors including CSOs, SSOs, nonpoint sources, and industrial discharges, all of which influence the water quality and natural flow regime. The restoration of the Rouge River began by focusing on the primary public health pollutant threat, CSOs. At the start of the Rouge Project in 1992, 168 CSOs were identified, with a tributary service area of approximately 59,300 acres (approximately 20 percent of the watershed). The CSO control program, while at the heart of the Rouge Project, is only 1 element of the overall Rouge River restoration effort. The impressive improvements in water quality and recreational use in the Rouge River can also be attributed to the multitude of other Rouge Project programs including illicit connection elimination, storm water management activities, and developing better public, industry, and community awareness of pollution control and prevention (Cave, 1999; Cave, 2001; RPO, 2002; RPO, 2003; RPO, 2004b; RPO, 2005; and RPO, 2006). These programs and others are all part of the watershed approach being successfully implemented in the Rouge River watershed.

The permittees listed in Appendix L are responsible for meeting their NPDES permit limits. The WWTPs and CSO RTBs are responsible for meeting their fecal coliform limits. Compliance is determined based on reviews of discharge monitoring report data by the MDEQ. As already discussed, CSO elimination efforts are ongoing. The requirement to meet Michigan's concentration based WQS for *E. coli*, at the point of discharge and regardless of flow condition, will continue to reduce *E. coli* contributions to the Rouge River. The statewide MDOT MS4 permit requires the permittee to reduce the discharge of pollutants to the maximum extent practicable and employ BMPs to comply with TMDL requirements. In addition, the general permits for noncontact cooling water and wastewater from cleanup of water contaminated with gasoline and related petroleum products require that Michigan's WQS are not violated as a result of the discharge. The MDEQ may require the permittee to provide additional sampling or monitoring as deemed necessary to assure adequate operation of the treatment system.

10.1 Industrial Storm Water

Federal regulations require certain industries to apply for an NPDES permit if storm water associated with industrial activity at the facility discharges into a separate storm sewer system or directly into surface water. A storm water permit is not required if storm water does not

discharge from the facility or is discharged into a sewer system that leads to a WWTP. The industrial storm water permits identified in Appendix L require that if there is a TMDL established by the MDEQ for the receiving water that restricts a material that could impair or degrade water quality, then the required storm water pollution prevention plan shall identify the level of control for those materials necessary to comply with the TMDL and an estimate of the current annual load of those materials via storm water discharges to the receiving stream.

The State of Michigan began issuing industrial storm water permit coverage in 1994. There are 3 types of permits available in Michigan: a generic baseline general permit, a generic general permit with monitoring requirements, or a site-specific individual permit. Michigan's storm water permit authorization requires facilities to obtain a certified operator who will have supervision and control over the control structures at the facility, eliminate any unauthorized non-storm water discharges, and develop and implement a storm water pollution prevention plan for their facility that includes structural and nonstructural control measures. Prior to obtaining permit coverage, applicants must certify that they do not have any unauthorized discharges.

MDEQ staff conduct inspections of a percentage of permitted industrial facilities annually. Inspections are utilized to ensure that facilities comply with the regulations, and they result in a further reduction in unauthorized discharges and illicit connections. Additionally, as additional facilities obtain industrial storm water permits, more illicit discharges will be eliminated.

10.2 Municipal Storm Water

The USEPA and most water resources professionals advocate holistic and adaptive watershed management approaches for the protection and restoration of aquatic ecosystems by encouraging pollution control strategies that are developed through collaborative partnerships within a hydrologic boundary. Michigan was one of the first states to embrace and help develop the concept of watershed-based general storm water permitting.

The USEPA's Storm Water Phase II Rules require that all municipalities operating MS4s within urbanized areas obtain municipal storm water permits, unless this requirement is waived by the NPDES permitting authority. As of February 2007, 48 local municipalities within the Rouge River watershed have obtained Phase II MS4 permit coverage, either by obtaining their own permit or becoming nested under a county, city, village, or township, if allowable. Counties, cities, villages, and townships are not permitted to become nested, and thus must obtain their own permits, if subject to MS4 regulation. The Rouge River municipalities that currently have permit coverage include counties, cities, villages, townships, school districts, colleges and universities, airport authorities, and the MDOT. The majority of these municipalities have had permit coverage since 1997 (voluntary permit between 1997 and mid-2003; nonvoluntary permit from 2003 to present), and have developed extensive illicit discharge elimination programs. A number of additional school districts and 1 city (River Rouge) within the watershed are currently in the process of obtaining MS4 permit coverage. As mentioned, these permits require activities that reduce *E. coli* inputs to surface waters through public education, a storm water management plan, and illicit connection identification and elimination requirements.

In 1997, as part of the Rouge Project, stakeholders in southeastern Michigan worked with the MDEQ to develop a voluntary watershed-based general permit for storm water discharges. The permit was originally voluntary because there was no legal requirement for the storm sewer operators in the Rouge River watershed to have a permit. Now a regulatory requirement, the MDEQ offers a watershed-based general permit as one of two options for compliance with the NPDES Phase I and II storm water regulations (MDEQ, 2006). The other option is a jurisdictional permit.

In the Rouge River watershed, 48 individual municipal entities and 3 counties selected the watershed-based general storm water permit. Additionally, in August 2003, the communities and counties in the Rouge River watershed formed the Rouge River Watershed Local Management Assembly (Assembly of Rouge Communities) to continue the restoration of the Rouge River watershed into the future.

In 2004, the ARC supported the passage of state legislation to authorize local governments to form watershed alliances. This legislation was subsequently signed into law as the Watershed Alliance Act, 2004 PA 517 (Watershed Alliance Act). In November 2005, the Assembly of Rouge Communities became the public entity, ARC, when 20 eligible members approved bylaws (modeled after the former Memorandum of Agreement for operation of the assembly) developed under the Watershed Alliance Act. As of April 30, 2006, 41 ARC members had approved the bylaws. The ARC collaborates on storm water management planning and permitting commitments to develop integrated plans that take advantage of economies of scale and produce more cost-effective solutions. Each member contributes financial support for storm water management compliance activities such as public involvement and education, water quality monitoring, and illicit discharge elimination programs. For more information about the ARC, see the Web site http://www.rougeriver.com/alliance/.

The Rouge River watershed is approximately 466 square miles and includes all or parts of 48 communities and 3 counties. To manage this large area more effectively under the MS4 watershed permit, local units of government decided to divide the Rouge River watershed into subwatersheds (SWMAs) based on the 4 branches (Main, Upper, Middle, and Lower Branches) of the Rouge River and certain political jurisdictions.

Long-term watershed management plans have been developed for all 7 SWMAs, and implementation of BMPs and other pollution prevention activities have been underway under these plans since 2001. All 7 watershed management plans include at least 1 goal that addresses pathogens, including:

- Remove sources of pollution that threaten public health.
- Reduce sanitary wastewater pollution.
- Increase opportunities for passive and active recreational uses.

Selected CSO and SSO control projects, illicit discharge elimination activities, OSDS programs, public education and involvement activities, and other watershed projects are summarized in the following subsections to demonstrate the holistic approach being taken to improve water quality and reduce *E. coli* levels in the Rouge River watershed.

10.2.1 CSO Control

CSO controls are being implemented in the Rouge River watershed through 3 phases as established by NPDES permits applicable to the Rouge River watershed:

- Phase I: Elimination of raw sewage and the protection of public health for approximately 40 percent of the combined sewer area.

- Phase II: Elimination of raw sewage and the protection of public health for the remaining combined sewer area.

- Phase III: Meet state WQS in the Rouge River for dissolved oxygen, physical characteristics, total residual chlorine, and biological health.

Under the original Phase I, 6 communities separated their sewers and 8 communities constructed 10 RTBs. The RTBs capture most wet weather flows for later conveyance to the Detroit Publicly Owned Treatment Works for treatment. Flows from very large wet weather events that are not captured by the RTBs receive screening, skimming, settling, and disinfection prior to discharge. These CSO control projects have effectively eliminated or controlled the discharge of untreated sewage from approximately half of the watershed CSOs. The completed RTBs control overflows at a rate of about 4 billion gallons per year with a commensurate improvement in water quality, improvements in the aesthetics of the river, and increased recreational use. Since these Phase 1 projects, a large Screening/Disinfection CSO treatment facility in Detroit (i.e., Baby Creek), a storage shaft in Dearborn, and several separation or other CSO elimination projects have been completed. In addition, expansion of the primary treatment capacity in 2005 at the Detroit WWTP has brought additional wet weather flow to the WWTP for primary treatment that would have otherwise been discharged untreated from existing CSOs to the Rouge and Detroit Rivers. The MDEQ estimates that this increased WWTP capacity alone has resulted in an 11 billion gallon reduction (annual average) in CSO from the collection system to the Rouge and Detroit Rivers.

Currently, at the end of 2010, 58 untreated CSOs of the original 168 remain to be controlled. Several of the planned future controls are now intended to address Phase II and Phase III controls simultaneously. Phase III of the CSO control program will include additional controls if state WQS for dissolved oxygen, physical characteristics, total residual chlorine, and biological health are not yet met after the completion of Phases I and II. By the end of 2012, 44 untreated CSOs will likely remain. Specifically, in 2011, 7 CSOs are planned to be eliminated by completion of construction of 2 storage/treatment shafts in Dearborn, another RTB in Inkster, and separation projects in Dearborn. In 2012, 7 CSOs are planned to be eliminated through elimination projects in Detroit, completion of construction of a new RTB in Detroit (i.e., Oakwood) and 2 additional storage/treatment shafts in Dearborn.

Due to difficult economic challenges in southeast Michigan, the city of Detroit terminated two large and costly projects in 2009; the Upper Rouge Tunnel set to control 17 city and 11 suburban CSOs by 2015, and the second Detroit River Outfall (DRO-2) from the WWTP (set to disinfect and dechlorinate excess primary treated flow during wet weather). The city verified that these projects would result in a “high financial burden” as determined by USEPA affordability criteria. In 2010, the MDEQ approved an amended long-term control plan for Detroit, which substituted 9 first flush treatment basins for the Upper Rouge Tunnel and agreed to their phased completion between 2015 and 2035. These first flush treatment basins are intended to control 17 Detroit CSOs and 11 suburban CSOs. The amended long-term control plan also substituted a less costly second Rouge River Outfall (RRO-2) for the previously planned DRO-2. This RRO-2 will also meet state WQS by disinfecting and dechlorinating excess primary treated flow at the WWTP, and is required to be completed by 2018. Dearborn also successfully submitted a financial capability assessment, and its amended long-term control plan calls for phased elimination or treatment of its remaining 15 CSOs between now and 2030. All remaining CSOs to the Rouge River will thus be eliminated or treated to meet WQS, in defined phases, between now and 2035.

10.2.2 SSO Control

Separate sanitary sewers are designed to carry only sanitary sewage to a WWTP while storm water is directed to a nearby river, lake, or stream via storm sewers. SSOs are releases of raw

sewage from a sanitary sewer collection system. Like CSOs, SSO events discharge untreated human and industrial waste, toxic materials, sanitary debris, and disease causing organisms into our rivers, lakes, or streams. The State of Michigan began to address water quality and public health issues related to SSOs by adopting an SSO control strategy in 2000. This strategy was followed by an SSO Policy (2002) and SSO Clarification Statement (2003).

The corrective action to address SSOs is to eliminate the discharge up to a large specified rain event by preventing excess water from entering the system, installing storage facilities, and/or to increase transportation capacity to the WWTP. The large specified rain event is defined in the SSO Policy as the remedial design storm. Because SSOs are illegal discharges under state and federal requirements, their correction programs must be included in enforcement documents (i.e., SSOs cannot be authorized in NPDES permits).

The MDEQ has used enforcement to establish several Administrative Consent Orders (or consent judgments) with municipalities that have SSO discharges to the Rouge River. These enforceable documents contain phased correction programs and schedules for completion of SSO correction programs that eliminate SSOs up to the large remedial design storm requirements and included up-front and stipulated penalties. Since the SSO initiative in 2000, Administrative Consent Orders have been entered with the following municipalities in the Rouge River watershed related to inadequate systems: Oakland County's Evergreen Farmington District (including additional Administrative Consent Orders for the individual communities of Farmington Hills, Troy, Beverly Hills, West Bloomfield, Farmington, Bloomfield Township, Bloomfield Hills, and Lathrup Village), Melvindale, Allen Park (consent judgment), Wayne County's North Huron Valley/Rouge Valley District (including additional Administrative Consent Orders for the individual communities of Inkster, Garden City, Westland, Plymouth, and Northville) and Western Townships Utility Authority. Some of these correction programs have been completed while others are nearing completion. The remaining communities are continuing with their correction programs with varying completion dates through 2020.

10.2.3 Illicit Discharge Elimination

Under municipal storm water permits, permittees are required to develop and implement illicit discharge elimination plans to prohibit and effectively eliminate illicit discharges (including discharges of sanitary wastewater) to the permittee's separate storm water drainage system for the regulated area. Municipalities are also required to implement storm water education programs for the public, municipal staff, contractors, and the business/industrial community.

Most communities in the Rouge River watershed have been implementing their illicit discharge elimination plans for several years. Typical activities include outfall surveys, sampling of storm sewer discharges and receiving waters, dye testing of facilities, inspection of OSDS, inspecting/televising the storm sewer system, inspecting/televising the sanitary sewer system, sanitary sewer lining, review of construction plans to prevent misconnection, and complaint hotlines. Most communities in the watershed have also been implementing storm water education programs for several years. Municipalities have developed education programs that teach people within the watershed about stewardship of the Rouge River, proper disposal of waste materials (including pet waste), and maintenance of septic systems, among other topics. Many municipalities have also posted signs at road stream crossings noting the name of the stream and have implemented storm drain marking programs. Counties are collaborating with local municipalities to conduct illicit discharge investigations. The city of Plymouth and Wayne County, for example, worked cooperatively to identify and eliminate illicit connections throughout the community, while Northville Township and Wayne County jointly investigated the Highland Lakes development for possible illicit connections (none were found), and dye-tested new

township facilities within Wayne County. As the illicit discharge elimination and public education programs continue to mature within the Rouge River watershed, pathogen input to the watershed will continue to be reduced. Table 23 is not meant to be all-inclusive, but represents the types of illicit discharge elimination activities occurring throughout the watershed. For additional information on the activities identified below, as well as other activities, see the Rouge River watershed Web site at http://www.rougeriver.com, or the individual annual reports submitted to the MDEQ by the permittees.

Table 23
Illicit Discharge Elimination Progress

Illicit Discharge Elimination Progress, 1998-2006	
Illicit Discharge Elimination Plan Activity	**Examples in the Rouge River watershed**
Visual Inspection of Streams	Washtenaw County has inspected all Rouge River watershed drains in the county
	Approximately 174 miles of drains were visually inspected by the Wayne County Department of Public Works in 1999
	Oakland County has completed an inventory of all Oakland County Drain Commission (OCDC) drains in the Rouge River watershed (approximately 450 outfalls)
Water Quality Monitoring	Washtenaw County quarterly monitoring of 19 Rouge River locations for *E. coli*, surfactants, and other parameters. Detected and eliminated discharges.
	Wayne County staff supported illicit discharge elimination efforts in the communities of Canton, Livonia, and Westland by collecting of over 160 *E. coli* samples. OCDC sampled *E. coli* in 31 county drain outfalls in 2005.
Complaint Hotline Reporting	In 2006 complaints led the city of Livonia to two illicit connections that were eliminated.
	Wayne County Compliance and Public Affairs "24-Hour Hot Line" (888-223-2363) handled over 590 calls in 1999.
	OCDC investigated 43 complaints in 2005, identified 28 illicit discharges, and eliminated 14 (10 were pending further investigation and 4 were spills or no known source).
Dry Weather Outfall Screening	Most communities have completed at least one round of screening, which led to the detection and elimination of a number of illicit discharges (e.g. In 2003 in Northville Township, two suspected illicit discharges were investigated and eliminated).
	Inkster examined 9 outfalls and 19 storm drain laterals in 2000. Testing showed 11 of the 19 laterals had *E. coli* levels above 2,200 *E. coli* per 100 ml, but none of the outfalls were above 2,000 *E. coli* per 100 ml. Range in laterals was 2,220 to 793,000 *E. coli* per 100 ml. The city was working on finding the sources of the high *E. coli*.
	In 1999, the city of Westland inspected, photographed, and numbered 209 outfalls and had signs installed at the outfalls. They used television equipment to look for illicit discharges. Two sources of illicit discharges were found and eliminated.
Combined Approach (based on monitoring results, complaints, problems found during routine field operations, or community partnership)	Wayne County has conducted advanced illicit discharge investigations since 1987 and has inspected 7,173 facilities countywide and identified 1,922 illicit connections in 525 facilities. Confirmation of corrective action has occurred at 480 of these facilities. Confirmation of corrective action is pending at 45 facilities.
	The city of Northville corrected 70 improper connections.
	The city of Wayne documented and corrected 4 illicit discharges within its boundaries.
	The city of Inkster eliminated 12 illicit discharges and 3 failing septic tanks.
Geographic Information System (GIS)/ Mapping	Livonia updated their GIS to support their illicit discharge elimination plans.
	Storm water drainage paper maps have been updated by many municipalities, such as Garden City, to assist in illicit discharge investigation and public education.
Illicit Discharge Elimination Training Program	Wayne County developed a modular training program in 1999 to provide training for county and local community staff for locating and eliminating illicit discharges to surface waters. 5 modules and 2 specialty sessions have been developed and presented to 1,300 municipal staff (including many from within the Rouge River watershed and over 75 Wayne County staff) and other interested parties.
"Working for Clean Water---It Begins with You" Video	Developed by Wayne County and used by municipalities to educate field staff about the importance of clean water and how to recognize signs of illegal/inappropriate discharges. Over 300 copies were distributed in 2005, with an estimated audience of 1,300. In 1999 4 referrals by Wayne County Roads staff were confirmed to be illicit discharges.
Building Inspections/ Review of Construction Plans	County staff tested all community-owned facilities to ensure that these facilities do not have illicit connections. Construction plans to prevent misconnection are also utilized for this purpose.
Inspecting/Televising of Storm/Sanitary Sewers	Led the city of Wayne to slip-line over a mile of aging sanitary sewer to prevent seepage of sanitary sewage into storm sewer systems in 2004.
Software for Tracking Illicit Discharges	Developed by the RPO and modified by Canton Township and Washtenaw County in 1999 is currently being used by many counties and local communities.

10.2.4 On-Site Sewage Disposal System Management

Under the MS4 permits, municipalities are required to minimize seepage from on-site sewage disposal systems into their storm water drainage systems. Many Rouge municipalities have established comprehensive programs to achieve this goal and fulfill permit requirements in a variety of ways, some of which are summarized in Table 24. Table 24 is not meant to be all-inclusive, but representative of the types of OSDS management activities occurring throughout the watershed. For additional information on the activities identified below, as well as other activities, see the Rouge River watershed Web site at http://www.rougeriver.com, or the individual annual reports submitted to the MDEQ by the permittees.

Table 24
On-Site Disposal System Management

OSDS Management, 1998-2006	
OSDS Activity	**Examples in the Rouge River watershed**
Septic-Related Ordinances	Washtenaw County and Wayne County enacted new ordinances in 1999 for the managements of OSDS (effective January 1, 2000), which require the inspection of all residential OSDS by private evaluators at the time of sale of a property. These regulations require that OSDS be repaired or connected to sanitary sewer prior to property transfer.
	In Wayne County from 2001-2005, inspectors found an average of 29% of septic systems (179 of 616 inspected) to be failing at the time of property transfer.
	The Washtenaw County Environmental Health Department inspected, at the point of property transfer, 407 septic systems from 2001-2002 and 2004-2005 within the Rouge River watershed portion of Washtenaw County. 82 (19%) were determined to be failing. A surprising finding was that some of the surface discharges were from new plumbing.
	The OCDC drafted a regulation for regular inspection of OSDS in 2002; however, this regulation has not yet been passed.
Regulating Systems	Westland passed an ordinance prohibiting septic systems **within** the city.
	Southfield passed an ordinance requiring landowners with septic systems to either convert to sanitary sewer or have an inspection of the septic system every 3 years.
	Several other municipalities, including Bloomfield Township, require connection to the sanitary sewer if the septic system is found to be failing and the sanitary sewer runs within 200 feet of the property.
Inspections of Septic Systems	The city of Livonia inspected all septic systems and updated their locations using GIS mapping. 10 septic systems were eliminated and connected to a sanitary sewer.
	The city of Southfield contracted with the Oakland County Health Department to conduct evaluations of the septic tanks and septic fields in the city. Since 1999, 983 sites have been inspected. Of those that did not pass, 133 have corrected the failure by connecting to a sanitary sewer, 43 are pending legal action, and 15 are considered to be illicit discharges into the Rouge River watershed.
Tools to Assist in OSDS Program Implementation	Septic evaluation tools, inspection technique guides, and evaluation profiles.
	Training of inspectors.
	Databases identifying OSDS locations in communities.
	GIS is being used to track septic systems in a number of communities.
Sanitary Sewer Line Extension	Several communities, including Inkster, Westland, Southfield, and others have extended their sanitary sewer lines to areas that were previously on septic systems, resulting in the abandonment of existing failing septic systems.
Public Education to Identify Signs of Failing Septic Systems	Septic maintenance workshops in 2006 in the city of Northville and Bloomfield Township. Several others planned in 2007.
	Brochures on septic system maintenance, such as the one developed by Bloomfield Township, have been distributed within some municipalities.
	Some permittees, such as Plymouth Township, have posted septic maintenance materials on their Web sites.

10.2.5 Public Education and Involvement

Under the MS4 permits, municipalities are required to develop a public education plan for the purpose of encouraging the public to reduce the discharge of pollutants in storm water to the maximum extent practicable. Many Rouge River municipalities have established comprehensive programs to achieve this goal and fulfill permit requirements in a variety of ways, some of which are summarized below. The following discussion is not meant to be all-inclusive, but representative of the types of activities occurring throughout the watershed. For additional information on the activities identified below, as well as other activities, see the Rouge River watershed Web site at http://www.rougeriver.com, or the individual annual reports submitted to the MDEQ by the permittees.

10.2.6 1998-2006 Public Education and Involvement

Municipalities are undertaking efforts, using various types of media, to educate the public about water quality. Water quality and/or riparian protection brochures are distributed to new residents in many communities, including Northville and Bloomfield Townships. Communities within the Main 1-2 SWMA periodically publish a newsletter titled, “Waterside Living,” and distribute it to riparian landowners throughout the watershed. Several communities have undertaken outreach efforts to educate homeowner associations about water quality. For example, the Washtenaw County Drain Commissioner's "Homeowner's Association Handbook, A Guide to Water Quality Protection for Homeowner Associations and Households" was distributed to Rouge River watershed townships as a water quality education tool for homeowner associations. The city of Westland had several posters designed and displayed in city buildings and in shopping malls to educate the public about the Rouge River. In addition, they also mailed a brochure to all homeowners and commercial and industrial establishments sharing information on how to improve water quality in the Rouge River.

The Southeast Michigan Partners for Clean Water was formed to protect and improve the quality of water resources through a coordinated and consistent storm water management effort. This organization includes representatives from counties, municipalities, watershed councils, the private sector, and water quality professionals in Southeast Michigan. The partners promote picking up pet waste and keeping pollutants out of storm drains, among other topics, using numerous materials that have been developed as part of the Regional 7 Simple Steps to Clean Water Campaign.

Many municipalities are also utilizing cable and radio public service announcements to educate the public about water quality. The OCDC, for example, has been airing cable shows for 3 years that provide tips on how to improve water quality and protect the environment. The Van Buren Township Environmental Department, as well as many other communities, also use the municipal Web site, newsletter, and/or community newspaper to further education on environmental issues. In 2002, Van Buren Township published articles on many topics including septic system maintenance. Among Web sites developed to increase storm water education within the watershed, the Rouge River project Web site was developed with the intent of being a primary tool for information dissemination about watershed activities.

Among several videos that have been produced within the watershed for watershed education, the Rouge River Public Involvement Team developed a 10-minute video titled, “Reclaiming the Rouge: A Partnership in Restoration and Preservation.” This video was produced by the RPO to describe the Rouge Project and to highlight the many successes throughout the Rouge River watershed. Featured projects included educational activities in Salem Township, downspout disconnection in Livonia, stream bank restoration in Dearborn, the construction of CSO RTBs in Oakland and Wayne Counties, activities of the Friends of the Rouge (FOTR), and many other projects and programs. A 15-minute public education video, “Storm Sewers Are Not Garbage Cans,” was also developed by Farmington Hills that covers how the actions of homeowners can

impact the river. Guidelines for car washing, environmentally friendly lawn and garden care, preservation of streamside buffers, proper hazardous waste disposal, and other homeowner activities that can affect the river are reviewed in the video. Two copies were distributed to each Upper Subwatershed Advisory Group member with the intent that it would be shown on local cable television channels, distributed for public viewing through area libraries, and presented at meetings of local service clubs and neighborhood associations.

Most municipalities also display and distribute educational information within municipal buildings and at municipal events. The Wayne County Department of Environment, for example, distributed approximately 65,000 pieces of public information materials and information relating to water pollution issues at community events or festivals, staff training sessions, workshops, leadership presentations, departmental presentations, or office display racks.

A number of festivals that include water quality protection themes are held annually within the watershed. The Rouge River Water Festival is held annually for fifth grade students, where students visit exhibits and sessions related to water quality, native plants, composting, the water cycle, wetlands, and stream bank erosion. The Wayne County Festival, hosted annually at the University of Michigan-Dearborn, hosted 3,600 fifth grade students from 66 elementary schools in 12 Rouge River watershed communities and 3 downriver communities in 2005. The Oakland County Festival, hosted annually at Cranbrook Institute of Science, hosted approximately 1,300 students in 2005. An annual festival is also hosted in the Johnson Creek subwatershed by Northville Township and the Johnson Creek Protection Group. In 2005, native plantings were demonstrated at Johnson Creek Day.

Rouge Rescue, an annual river cleanup day, is hosted on the first Saturday in June by the FOTR, a nonprofit organization that, since 1986, has been dedicated to promoting restoration and stewardship of the Rouge River through education and citizen involvement. FOTR programs also include volunteer watershedwide monitoring (volunteers conduct frog and toad surveys twice per month at several hundred one-quarter sections in the watershed); volunteer macroinvertebrate surveys 3 times per year at approximately 30 sites watershedwide; information and outreach workshops; and restoration projects. The FOTR also coordinates the Rouge Education Project, a program that promotes awareness and stewardship of the Rouge River watershed through school-based water quality monitoring, investigation, and problem solving. Schools collect and analyze river data and encourage taking action to improve the health of the Rouge River watershed based on their findings. Another example of a Rouge River watershed education and monitoring effort is that initiated with lake association groups in Bloomfield Township. The Forest Lake Outlet Watershed, a group of riparian landowners from multiple area lakes, in conjunction with Bloomfield Township, developed management strategies and set long- and short-term goals in an effort to improve water quality. The Forest Lake Outlet Watershed group also conducts water quality testing on several open water bodies.

The FOTR also coordinated a watershedwide storm drain marking program that enabled the marking of thousands of storm drains watershedwide through 2006 (individual communities have subsequently taken over program management). In 2004, for example, more than 280 volunteers, organized by the FOTR, marked a total of 2,250 storm drains in 8 communities during 22 projects.

Several environmental incentive programs have also been developed. The RiverSafe Homes program, for example, is under development by the Washtenaw County Drain Commissioner's Office to provide homeowners the opportunity to self assess their water quality protection practices and be awarded a "RiverSafe Home" plaque for display. A Rouge Friendly Business program was also developed and implemented within the watershed.

Several Rouge River municipalities have instituted unique programs to reduce pathogen input to storm water. The city of Plymouth provides "Mutt Mitts" in public parks to assist with proper

disposal of pet waste. A number of municipalities have also passed ordinances that require proper pet waste disposal.

A number of surveys have been conducted to gage public knowledge of storm water issues, including a 2004 survey by SEMCOG of 3,720 households within southeast Michigan concerning their knowledge of sources of pollution, watershed awareness, and other similar topics. This survey indicated a large percentage (43 percent) of those surveyed didn't know where storm water goes after it enters a storm drain or roadside ditch. Only 14 percent of those surveyed knew that they lived in a watershed. However, the survey did indicate that the majority of residents are willing to take action to improve water quality, such as promptly picking up their pet's waste (79 percent), implying that water quality improvements may be realized if educational efforts are implemented. Results from a Public Involvement Survey of 1999 showed that public involvement techniques being used in the watershed were working. Almost half of the respondents indicated that they knew of the Rouge Project, a majority said that they were changing their practices on lawn fertilizing, and a majority felt that continuing actions by government would be needed to sustain the restoration. Future surveys will determine the effectiveness of current education efforts.

10.3 Other Projects

Reasonable assurance activities that are not included in the above categories are discussed in this subsection. The following discussion is not meant to be all-inclusive, but representative of the types of activities occurring throughout the watershed. For additional information on the activities identified below, as well as other activities, see the Rouge River watershed Web site at http://www.rougeriver.com or the individual annual reports submitted to the MDEQ by the permittees.

10.4 2006 Other Projects

Wayne County established a grant program to support activities by communities and agencies that obtained MS4 permits in the Rouge River. This program allocated several million federal dollars to the 7 subwatersheds for illicit discharge elimination, public education, and subwatershed management plans.

Additionally, a number of projects have been implemented within the Rouge River watershed to improve water quality and provide storm water detention. These projects include:

- Detention pond retrofits in Northville Township to provide outlet control, wetland plantings, prairie seeding, and wet pond creation.

- Establishment of a regional storm water detention facility in the city of Livonia, constructed to manage storm water and provide significant pollutant removal from a 2,700-acre watershed, which is approximately 65 percent developed.

- Riparian zone improvement in Canton. In April, roughly 150 students, parents, teachers, and friends volunteered their time to plant native trees, flowers, and seeds along the banks of Truesdell Creek; a site on the grounds of Field Elementary School in Canton that is used as an outdoor classroom over the school year.

- Construction of a swale with an underdrain on a gravel road as an alternative to constructing enclosed storm drains in the city of Beverly Hills to provide system storage, storm water attenuation, groundwater recharge, and solid and nutrient removal through vegetative linings.

- Construction of rain gardens at Comcast Communications in Plymouth Township. The rain gardens provide benefits such as groundwater recharge, wildlife habitat, chemical filtration of phosphates and nitrates, sediment removal, and reduction of runoff and erosion.

- Retrofitting 4 detention basins in Canton Township. The designs included a combination of regrading, dredging, wetland plantings, tree and shrub plantings, habitat improvements, and outlet structure modifications. Canton's Public Works Division completed the grading work, while community staff and residents installed the plantings during volunteer planting days in the spring.

- Construction of the Fellows Creek Naturalization and Flow Reduction regional storm water wetland. In addition to reducing flashiness, this wetland also filters pollutants in the storm water runoff, thus improving the storm water quality. A walking path was constructed around the perimeter of the wetland with access points to areas of the stream where in-stream habitat is enhanced. Educational signage was installed describing in-stream habitat enhancements, descriptions of fish and macroinvertebrates species that might be observed, wetland features, and other habitat that may exist in the wetland.

- Wayne County Parks and the Department of Environment Watershed Management Division implemented of a variety of stream bank stabilization methods to improve the aesthetics, recreational desirability, and water quality of the Nankin Mill race.

- Van Buren Township constructed a recreational and interpretive area within a historically important wooded wetland complex. The township also worked with Visteon Corporation to design and construct a wetland fringe for an existing 36-acre (former gravel pit) lake. This project was completed in order to protect water quality, mitigate the impact of storm water pollutants on the lake, and provide fish and wildlife habitat for the lake.

- Oakland County Parks and Recreation grounds maintenance staff at Glen Oaks Park have maintained and expanded vegetative buffers and planted shade trees along the stream to enhance riparian habitat and provide thermal protection for the stream.

Several municipalities within the Rouge River watershed have adopted storm water ordinances. These municipalities include:

- *Wayne County.* The Wayne County Commission adopted the Wayne County Storm Water Management Ordinance and Administrative Rules in October 2000. These documents, along with the Wayne County Storm Water Standards Manual, are now being fully implemented to address storm water issues in the county. The ordinance requires that storm water management measures be incorporated into new development or redevelopment projects.

- *Washtenaw County.* Washtenaw County has developed model ordinances for local units of government for regulating storm water, natural features, storm water system use (what can be discharged to a storm sewer), and reduction of phosphorus from new developments.

- *The city of Novi.* The city of Novi adopted a storm water ordinance that not only manages increased storm water runoff from new developments, but also addresses the water quality aspect of storm water runoff.

Inventory projects have been undertaken in several portions of the Rouge River watershed, including:

- *The Lower 1 SWMA.* Assessment of 125 wetlands in the 6 communities of the Lower 1 SWMA was completed. Communities were provided with maps, reports, and digital information so that the analysis of the project, as well as recommendations for protecting wetland functions, could be accessed as needed.

- *The Main 1-2 SWMA.* The OCDC completed an inventory of detention ponds in the Main 1-2 SWMA, and made recommendations for improvements to the existing detention facilities to increase their pollutant removal efficiency.

- *The Main 1-2 SWMA.* The OCDC performed a stream bank inventory of the Rouge River and its tributaries in the area of the Main 1-2 SWMA, including open county drains. The inventory sites were located using a global positioning system, photographed, and surveyed to include the following parameters: condition of the bank, apparent cause of erosion, amount of erosion, slope ratio, river conditions, and soil texture.

- *Northville Township.* Northville Township inspected all privately-owned detention basins in 2003 and required maintenance to be performed as needed.

- *Westland, Livonia, and Bloomfield Townships.* These communities have also completed detention basin inventory projects.

Acknowledgements:

This report was prepared in partnership with Camp, Dresser, and McKee and the MDEQ, Water Resources Division. Additional contributions to this document were provided by Phil Argiroff, Hae-Jin Yoon, and Betsy Nightingale, of the MDEQ's Water Resources Division, Southeast Michigan District Office.

Modifications completed by:

Christine Alexander, Aquatic Biologist
Matt Staron, Environmental Engineer

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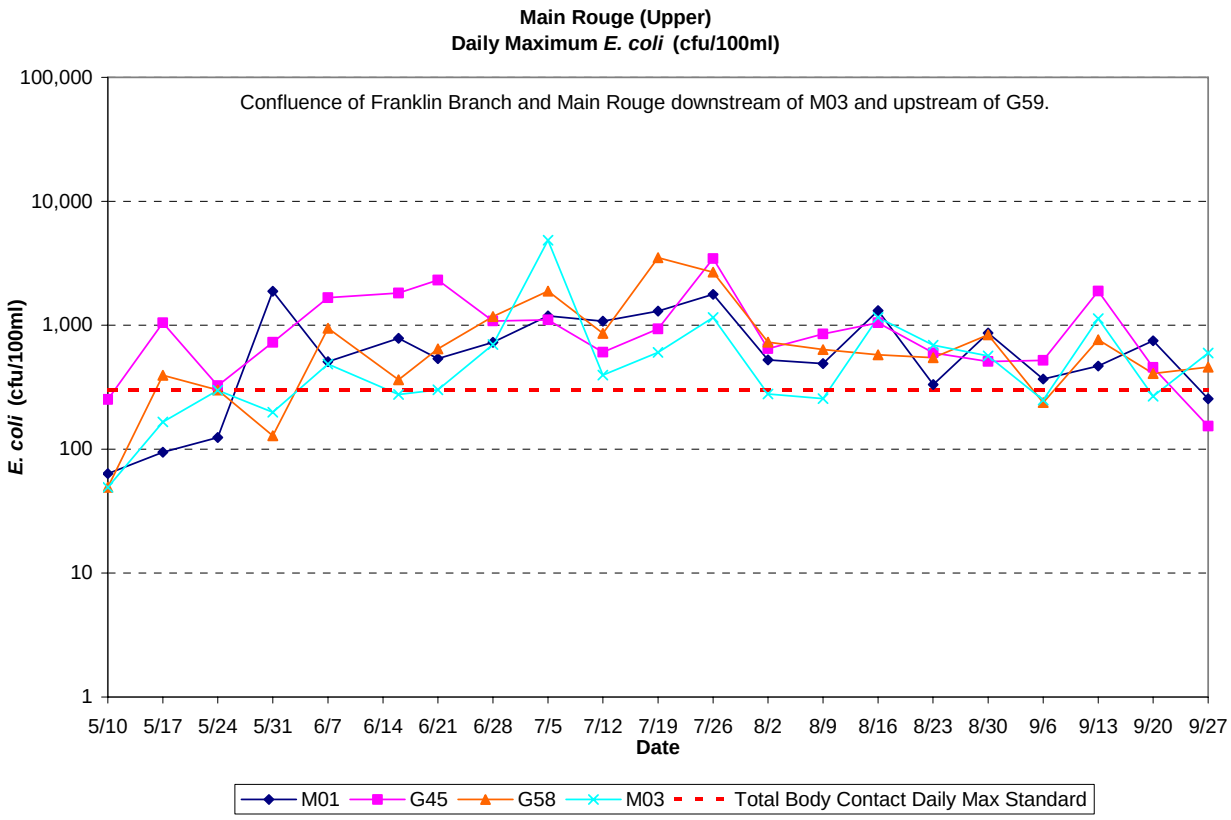
APPENDIX A

GRAPHICAL DEPICTIONS OF THE DAILY MAXIMUMS

Figure A-1



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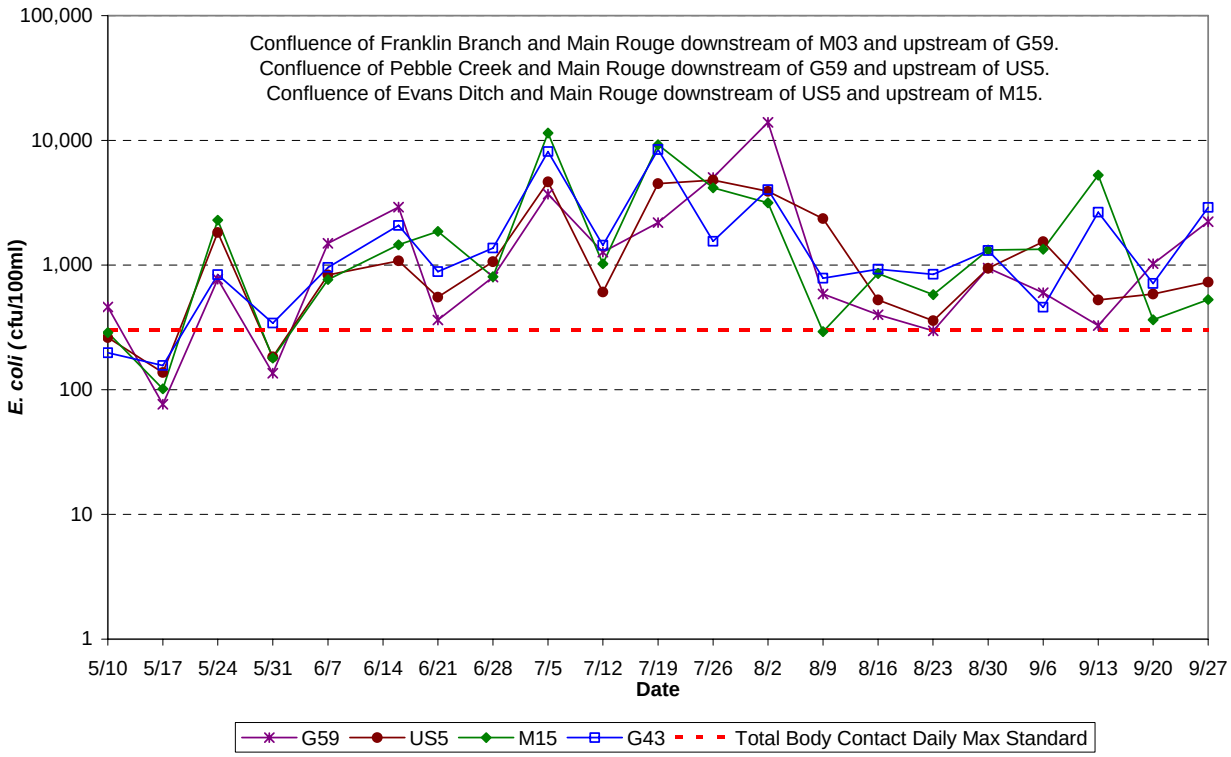

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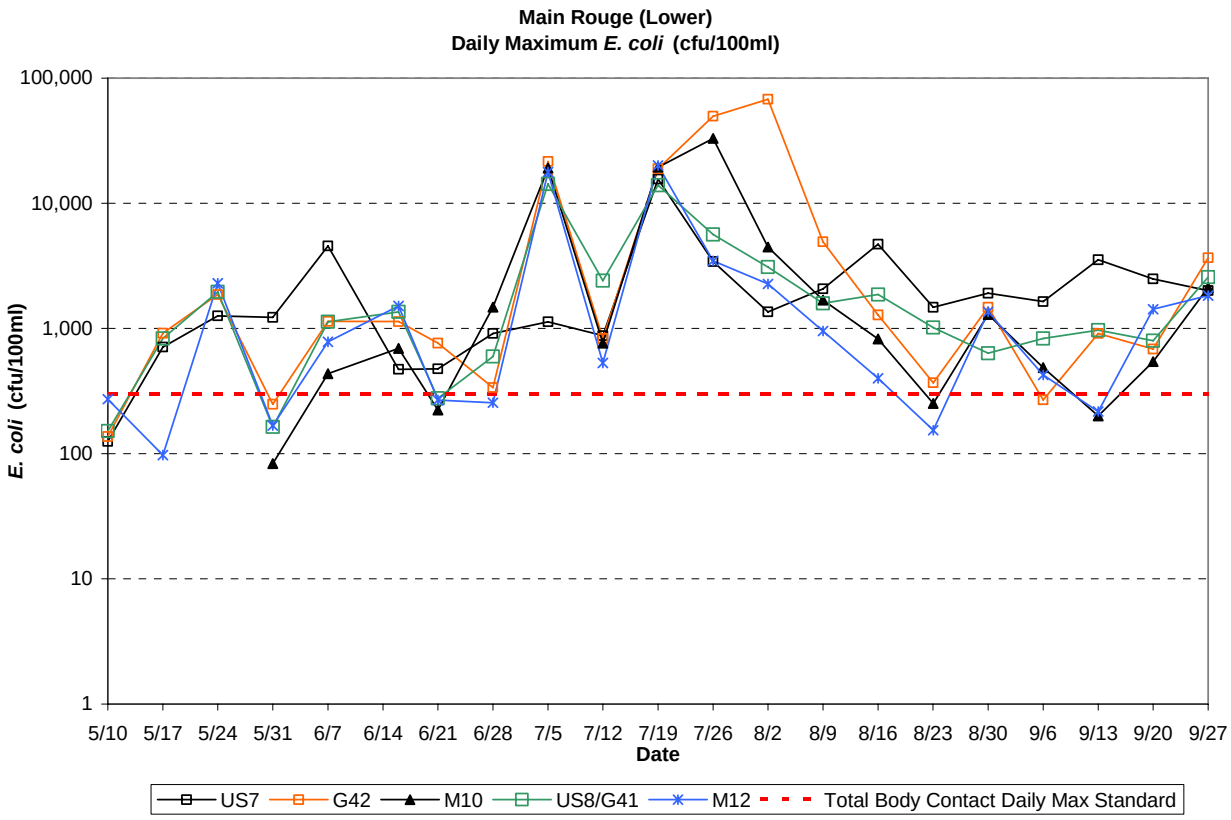

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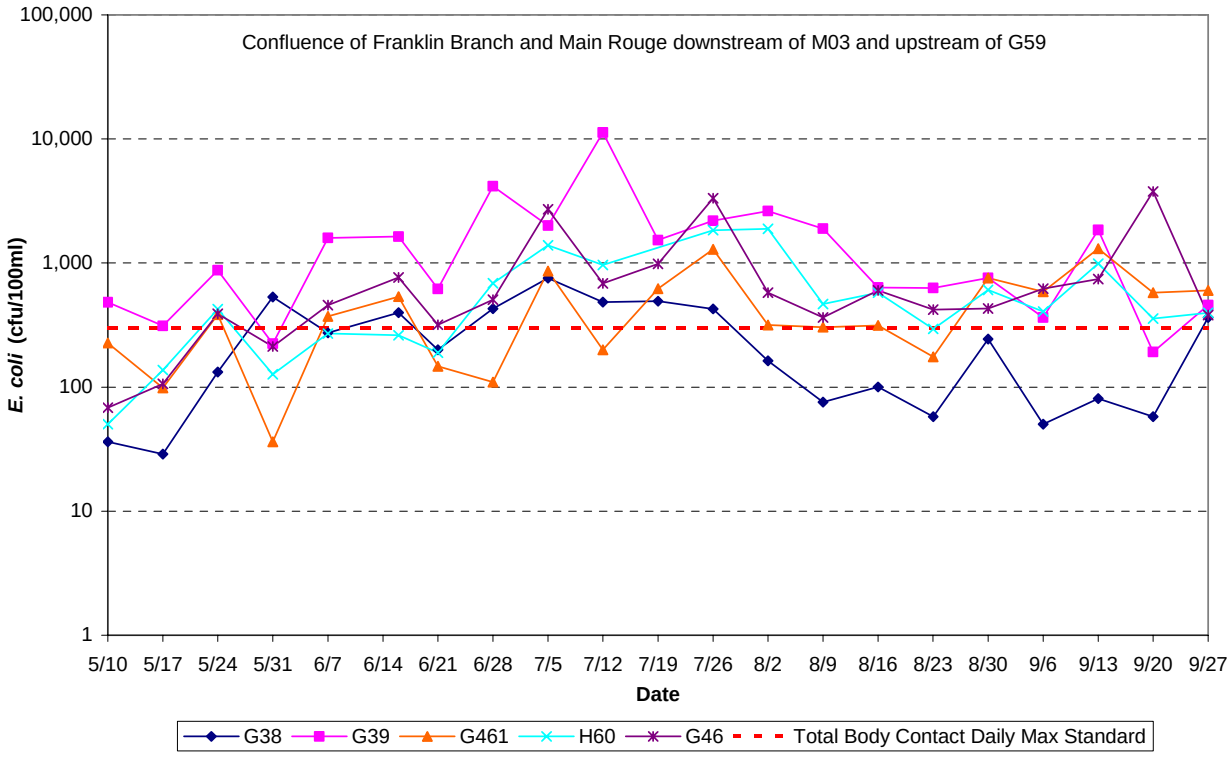

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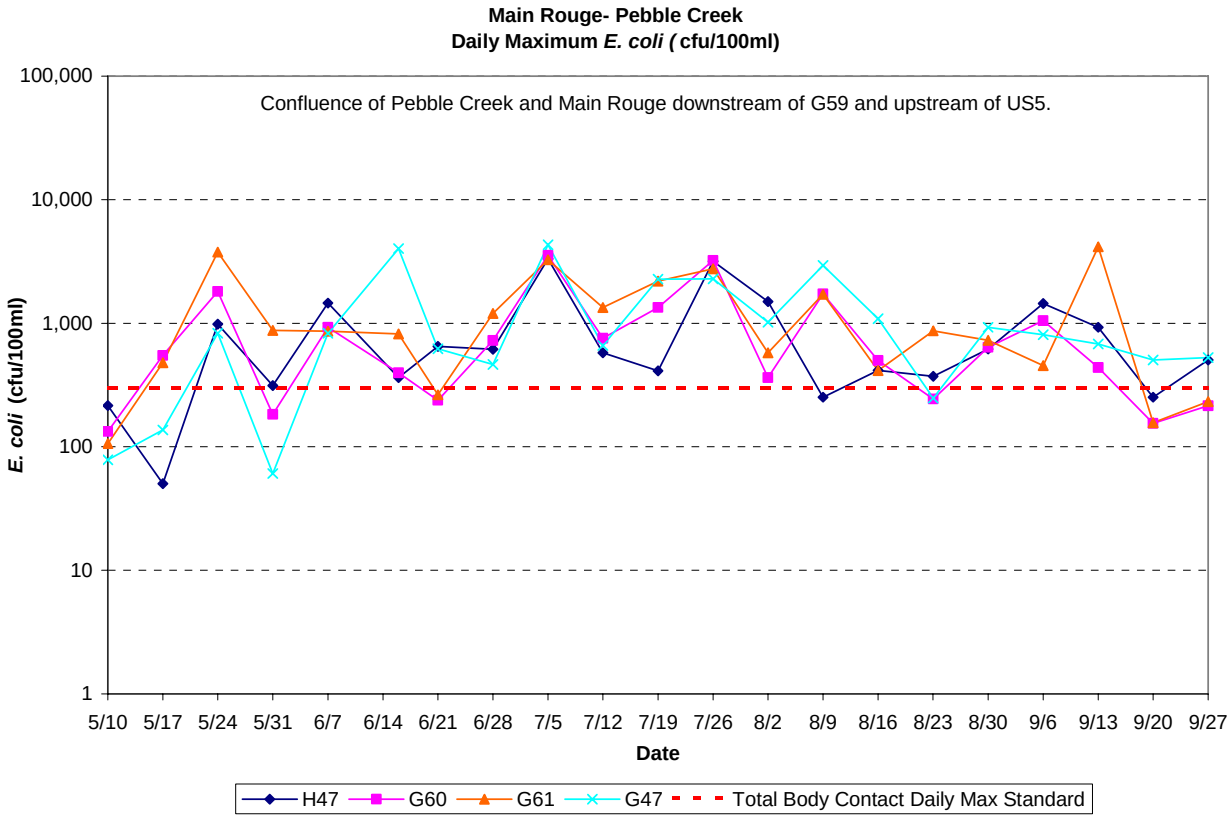

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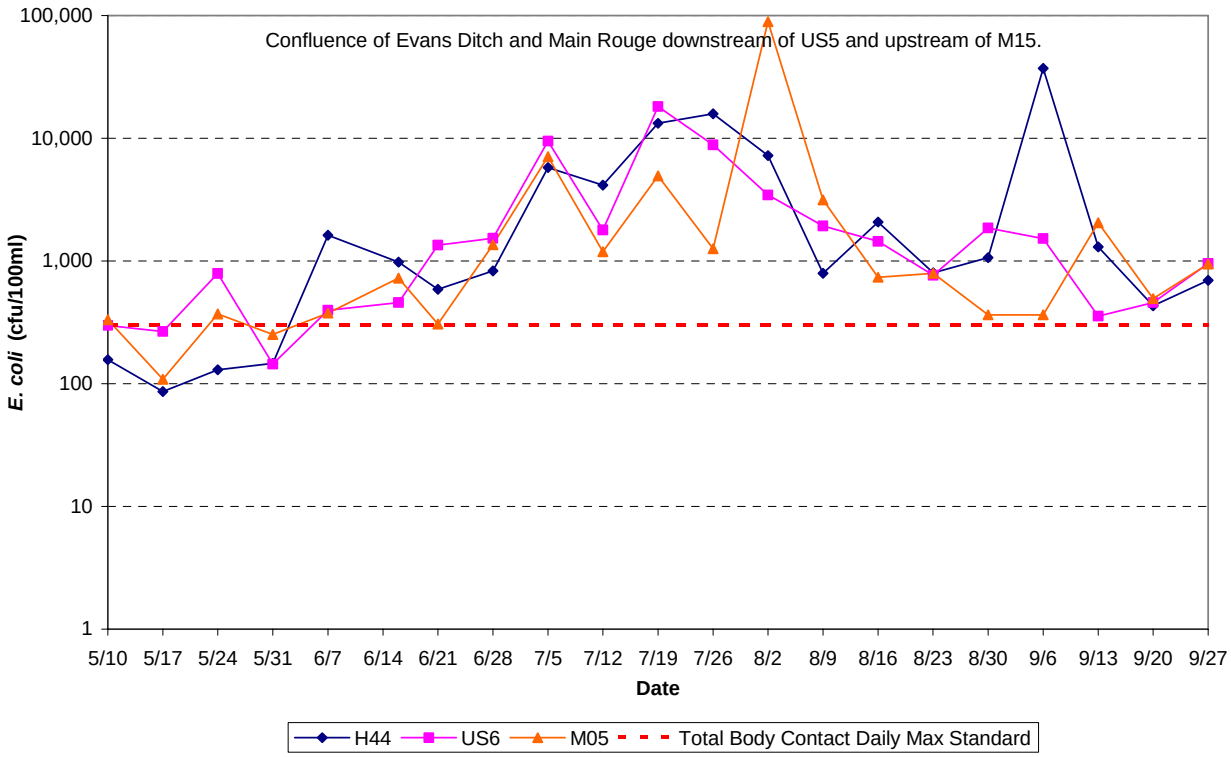

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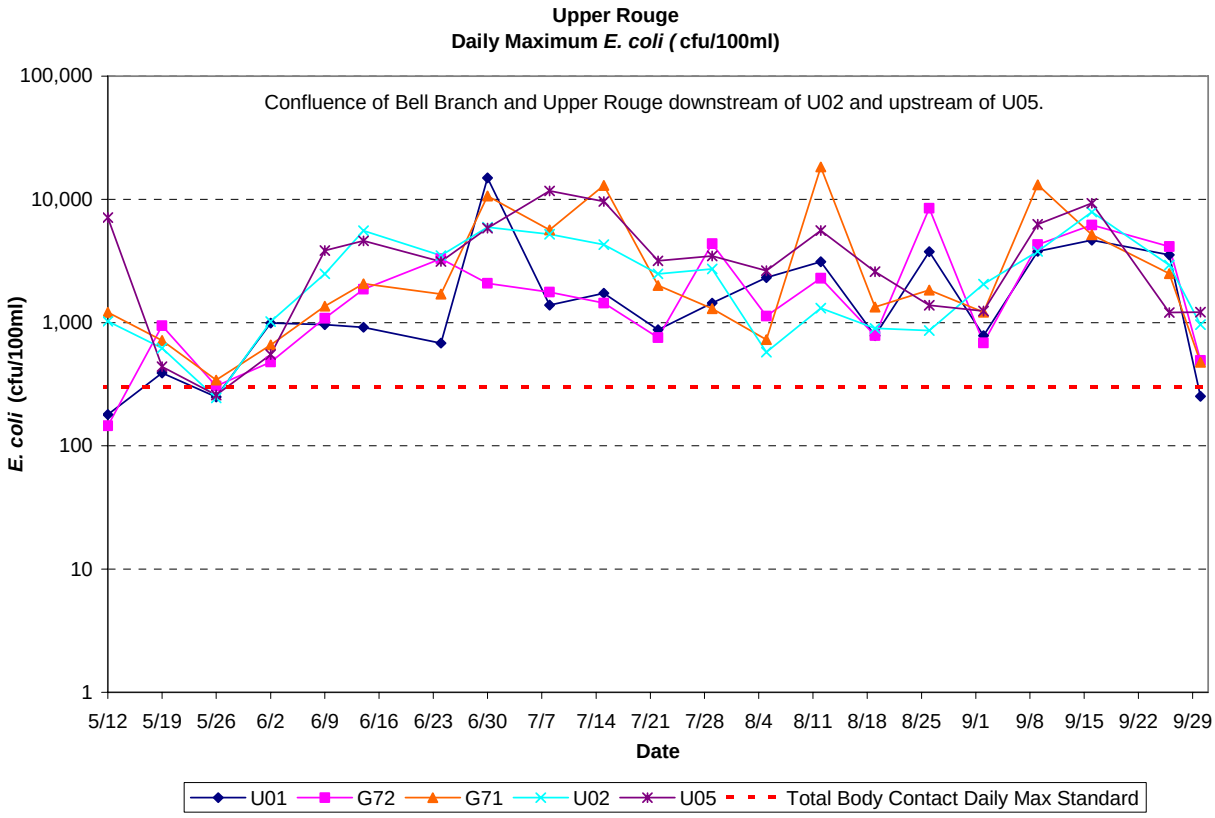

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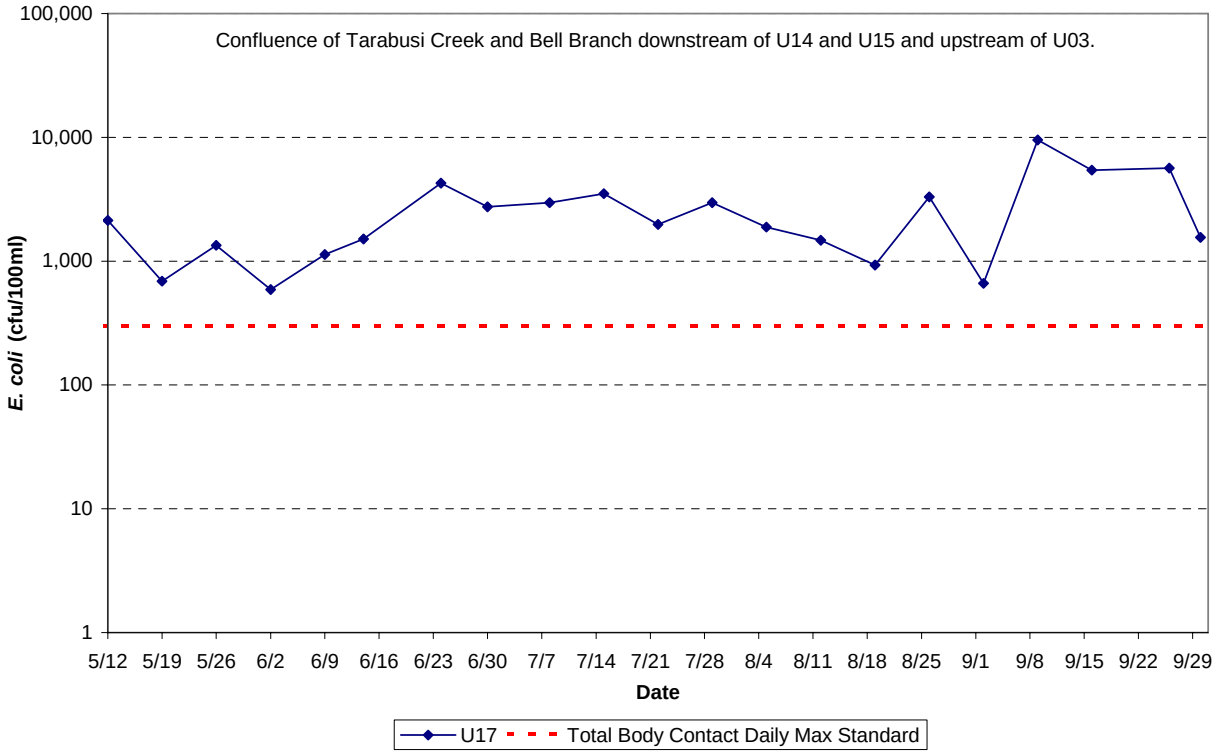

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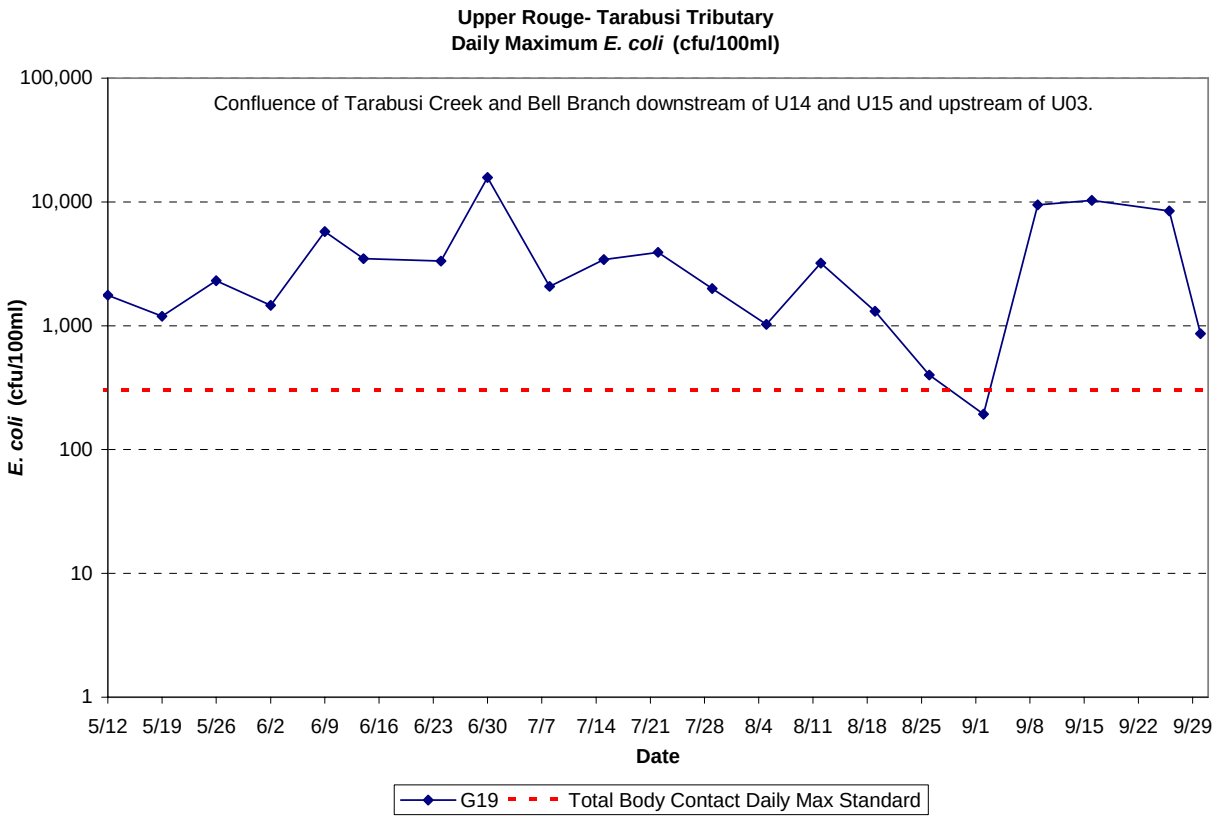

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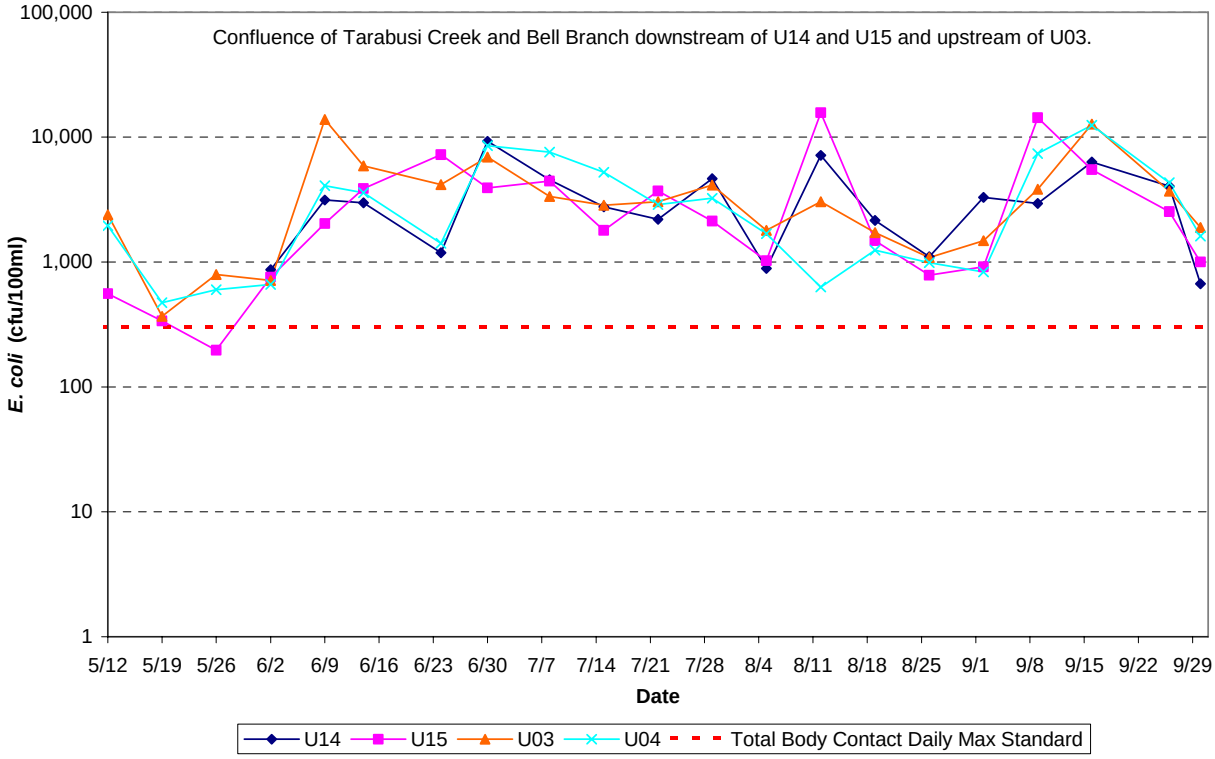

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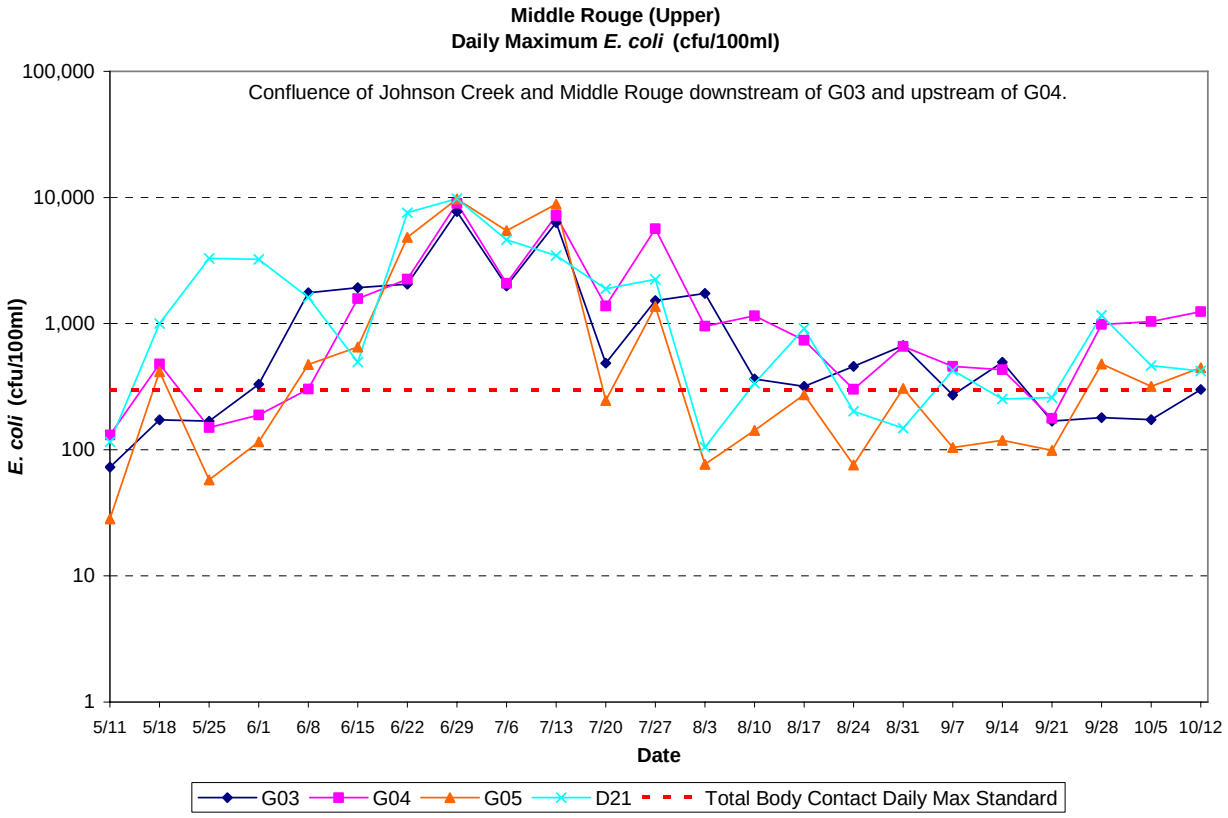

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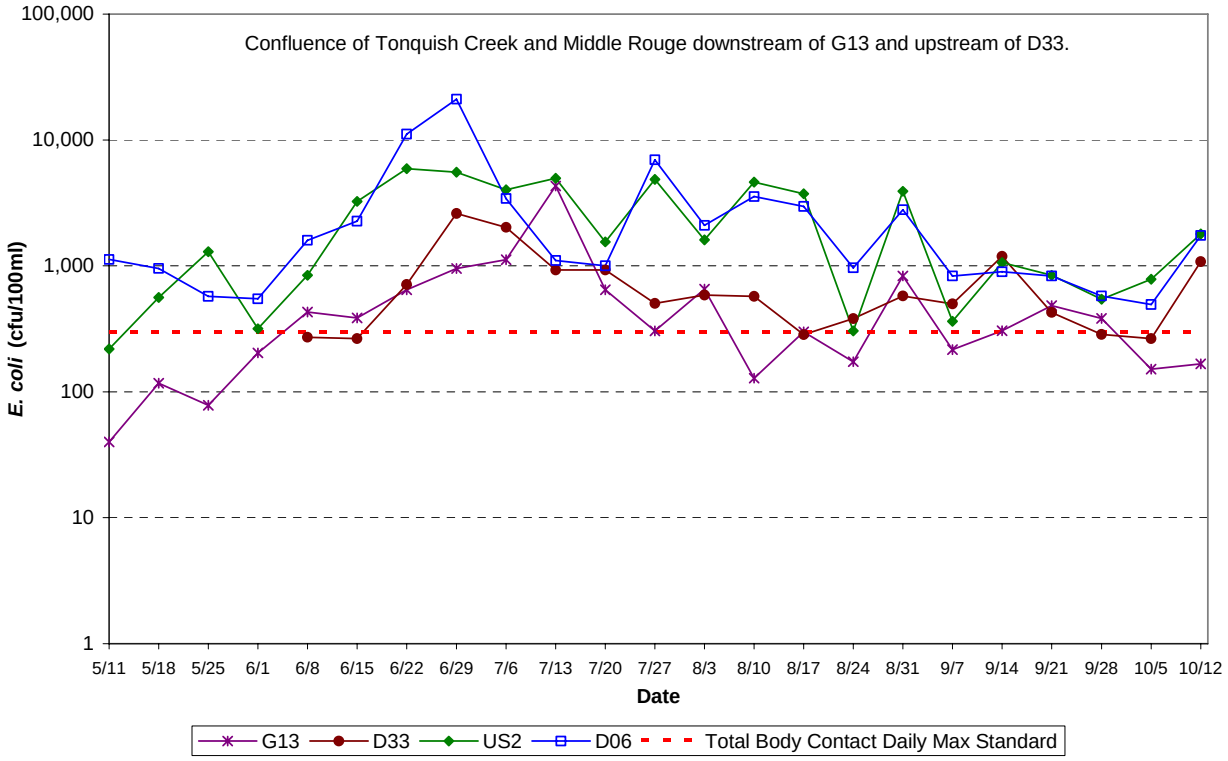

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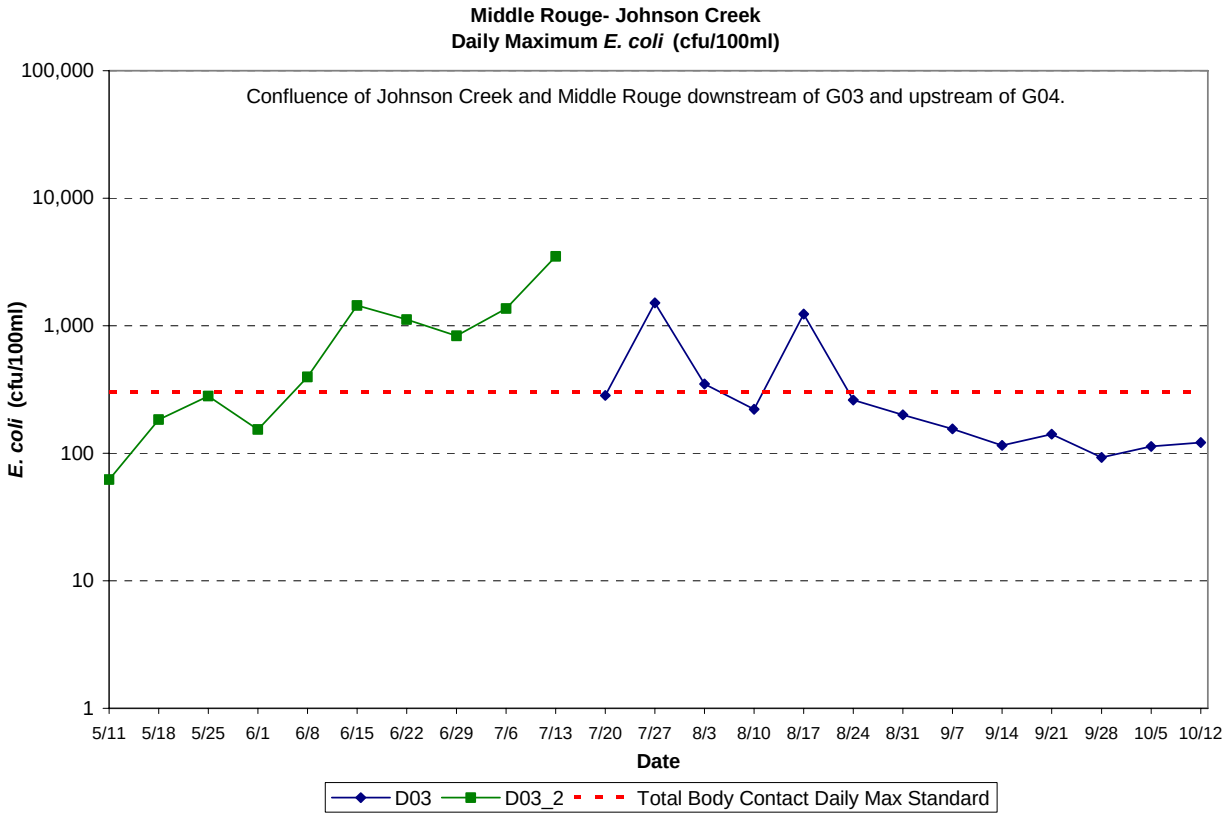

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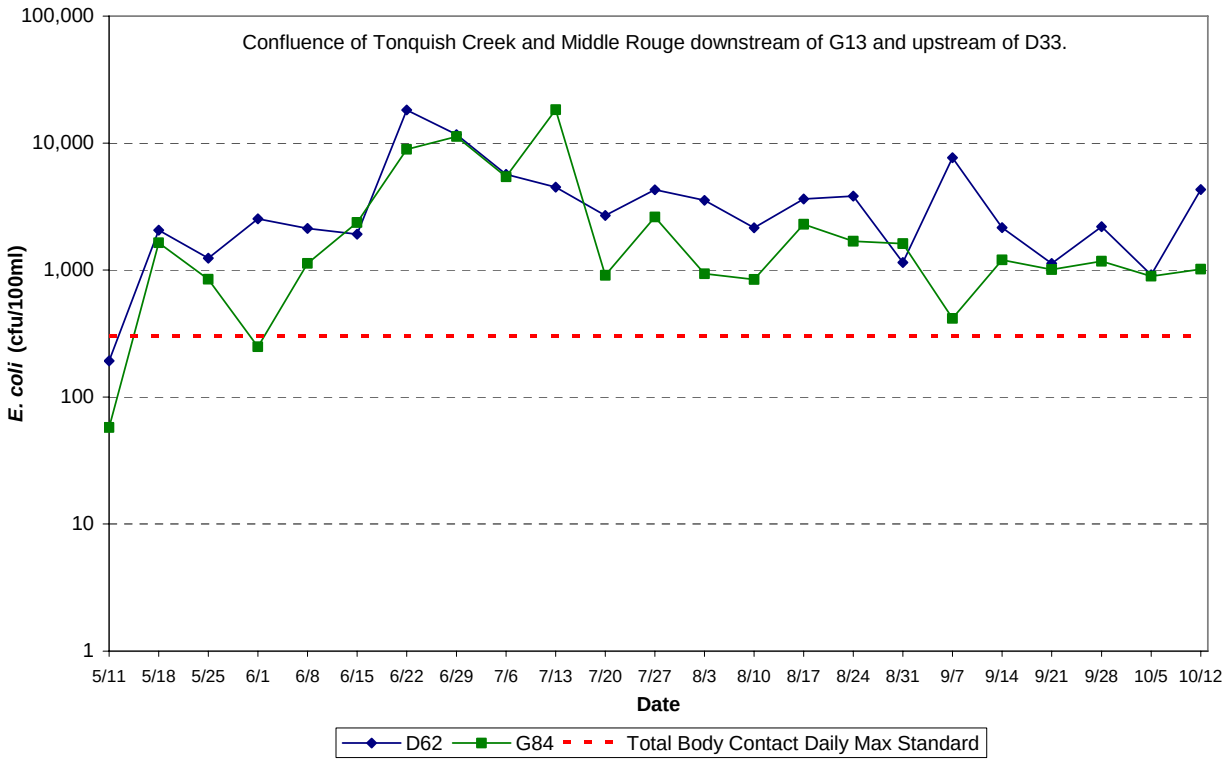

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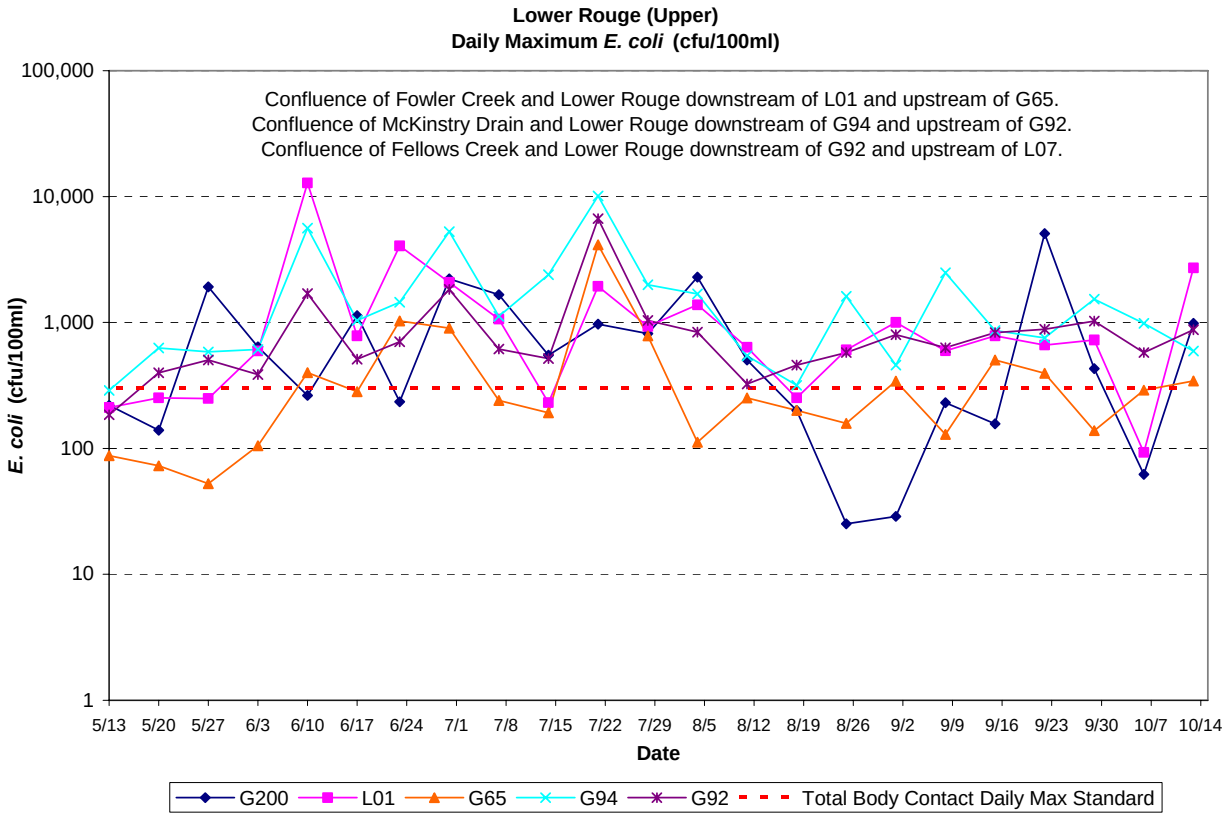

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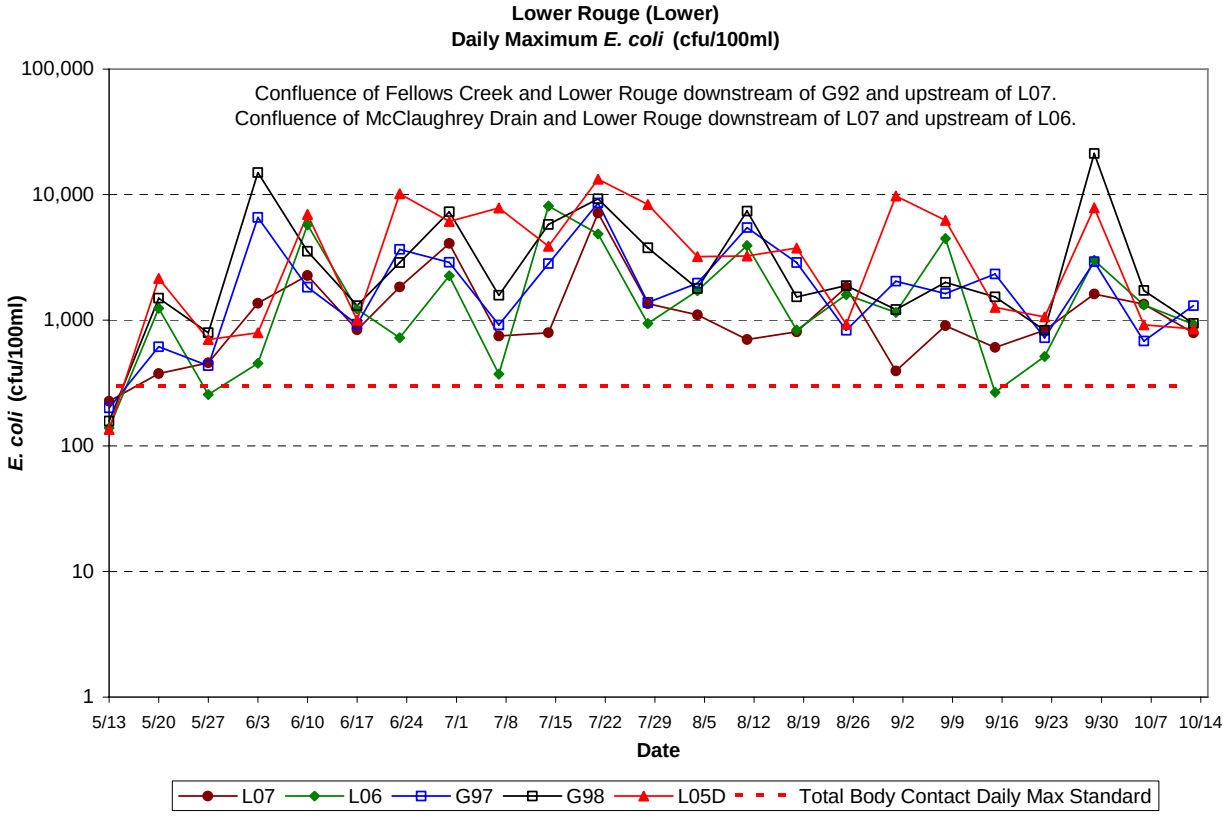

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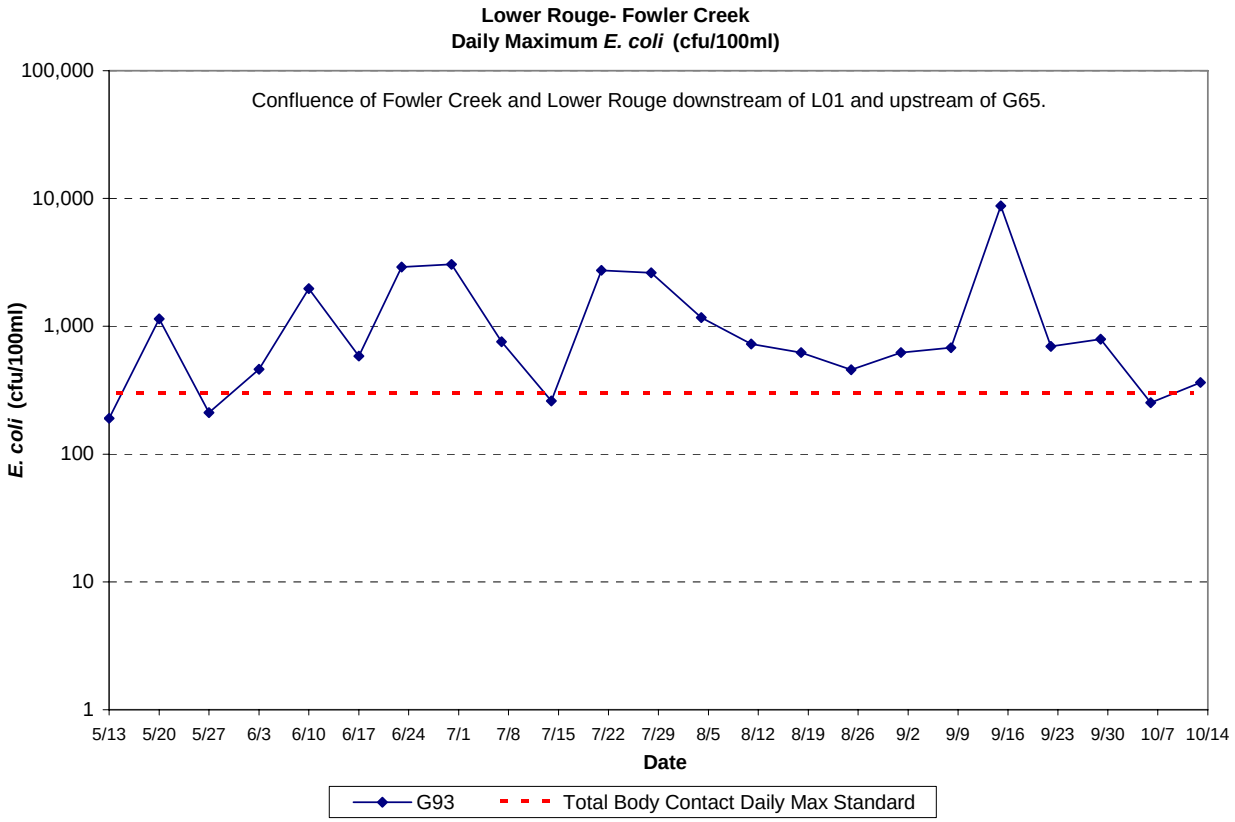

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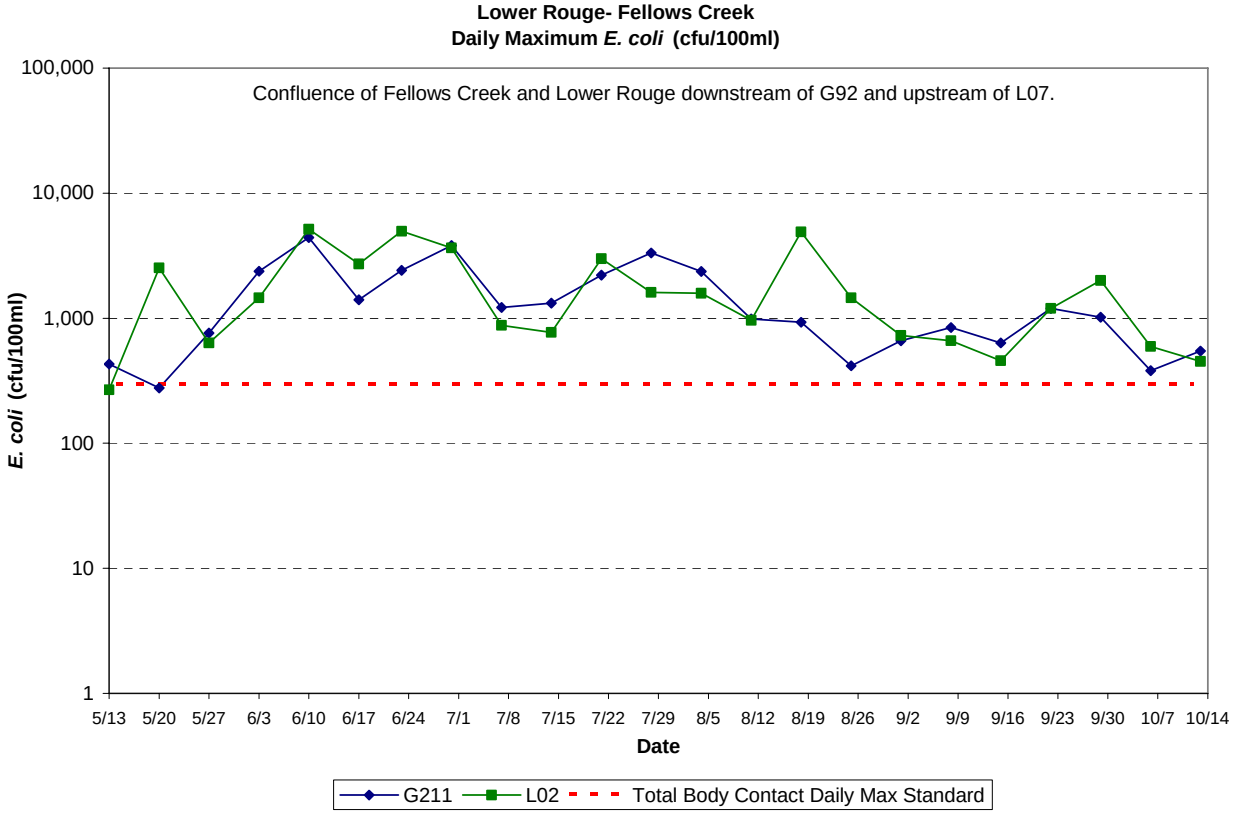

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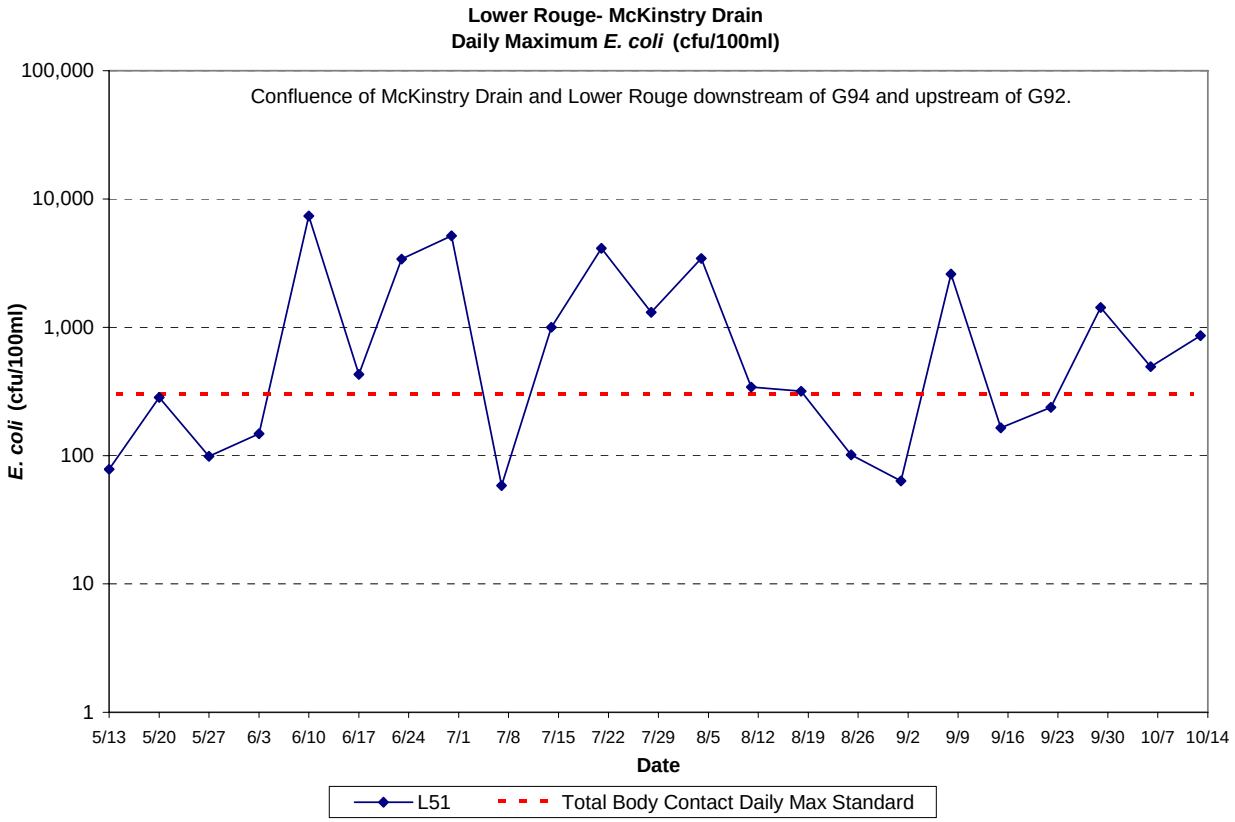

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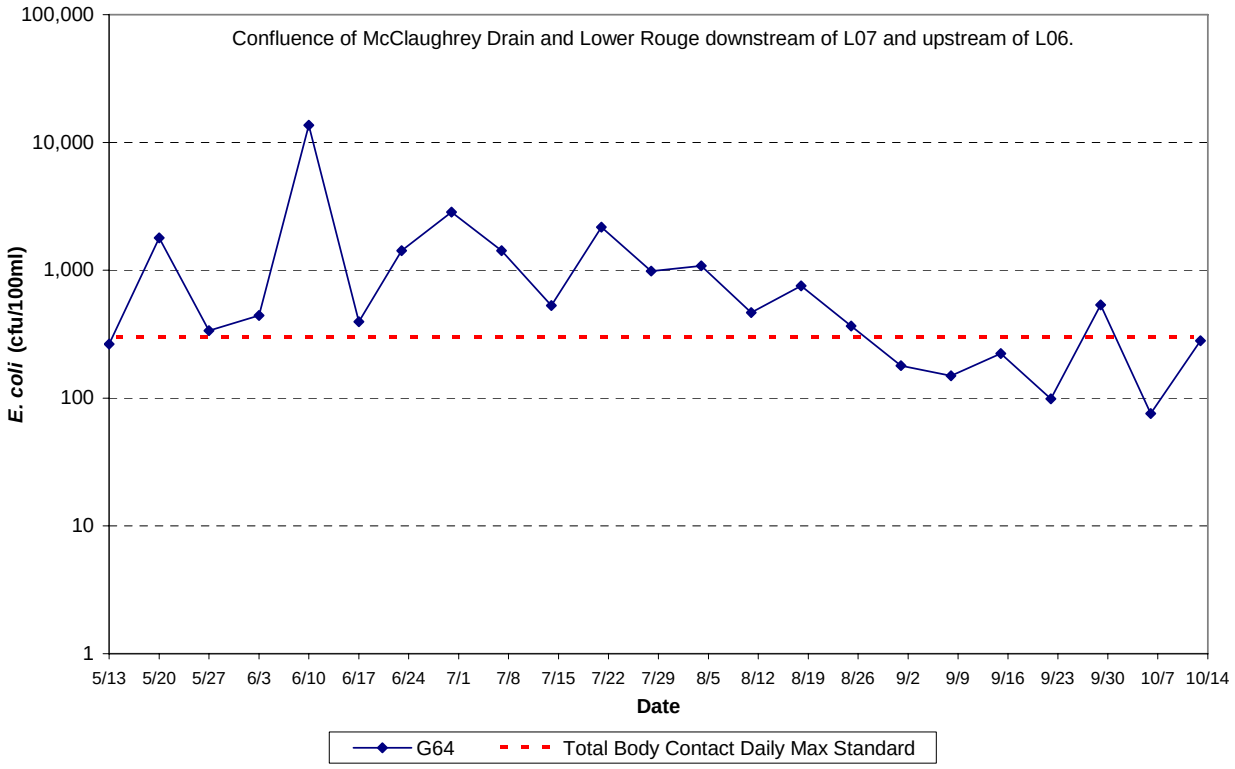


APPENDIX B

GRAPHICAL DEPICTIONS OF THE 30-DAY ROLLING GEOMETRIC MEANS

Figure B-1

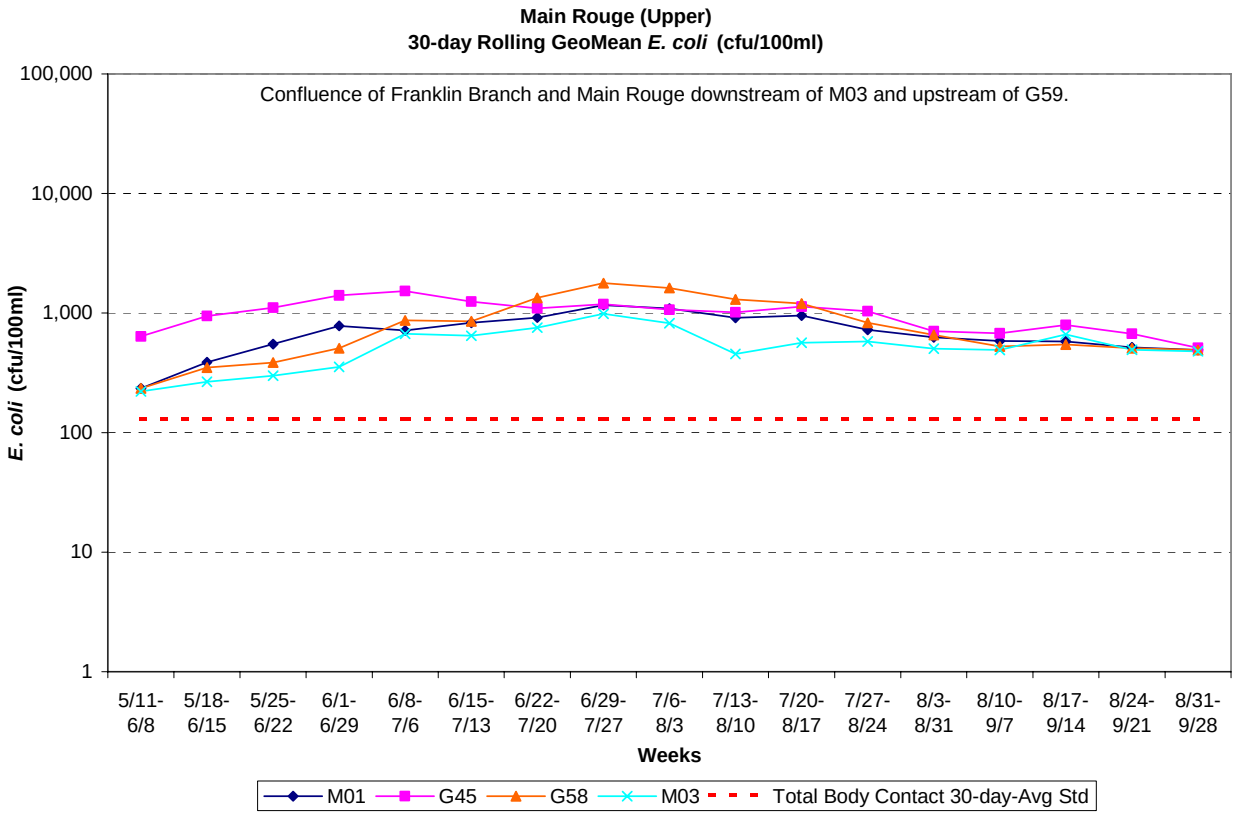


Figure B-2

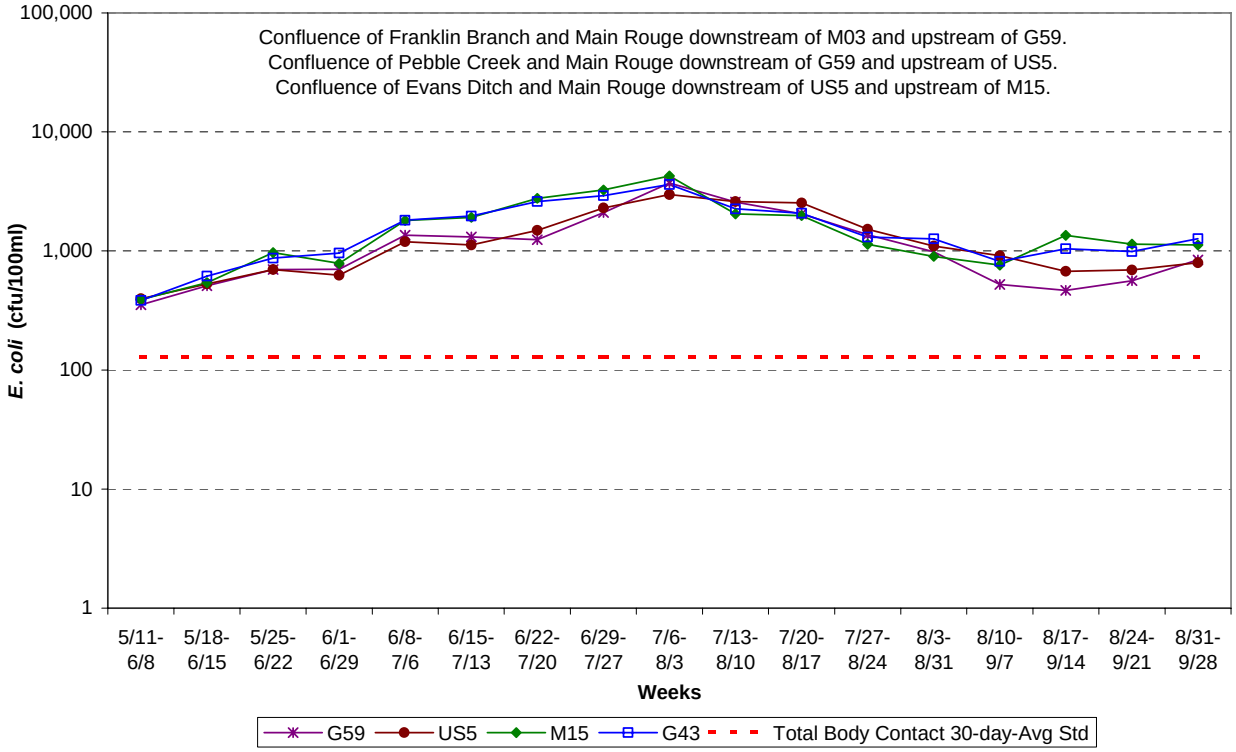


Figure B-3

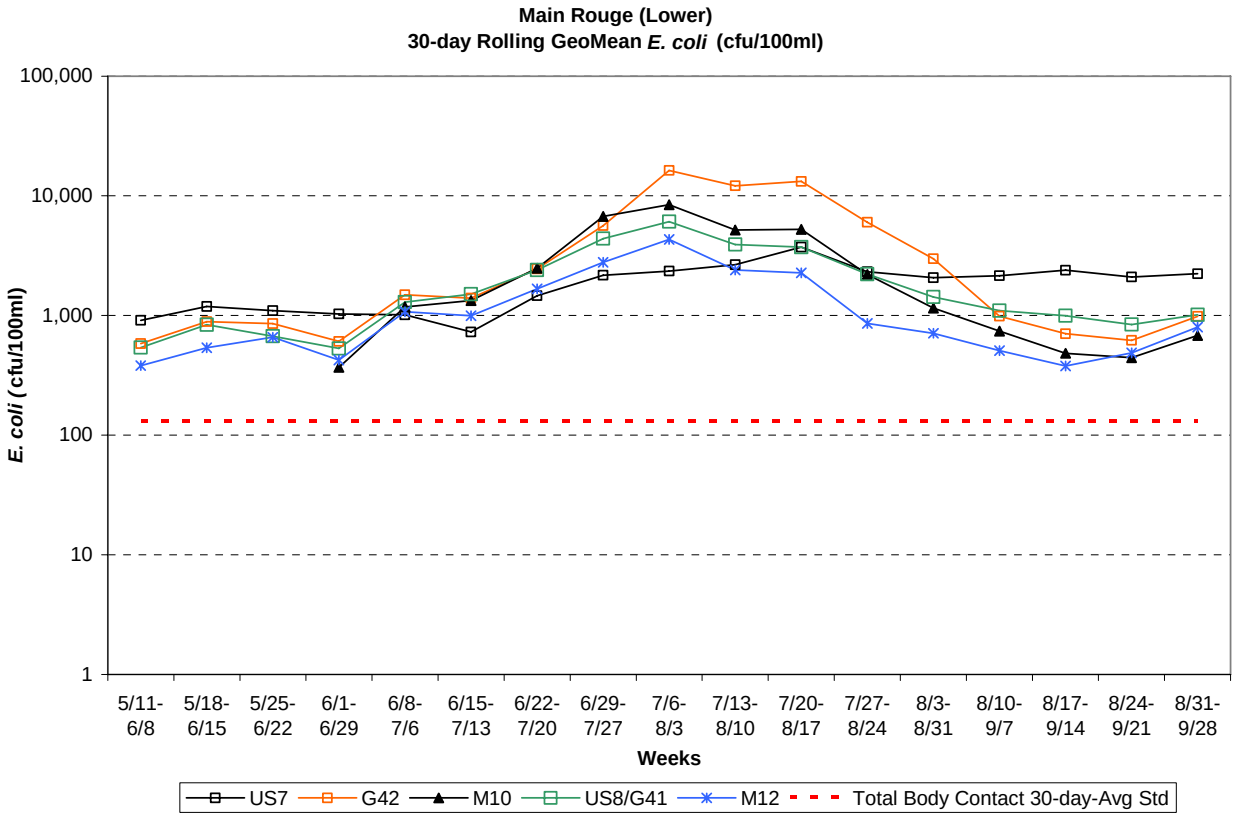


Figure B-4

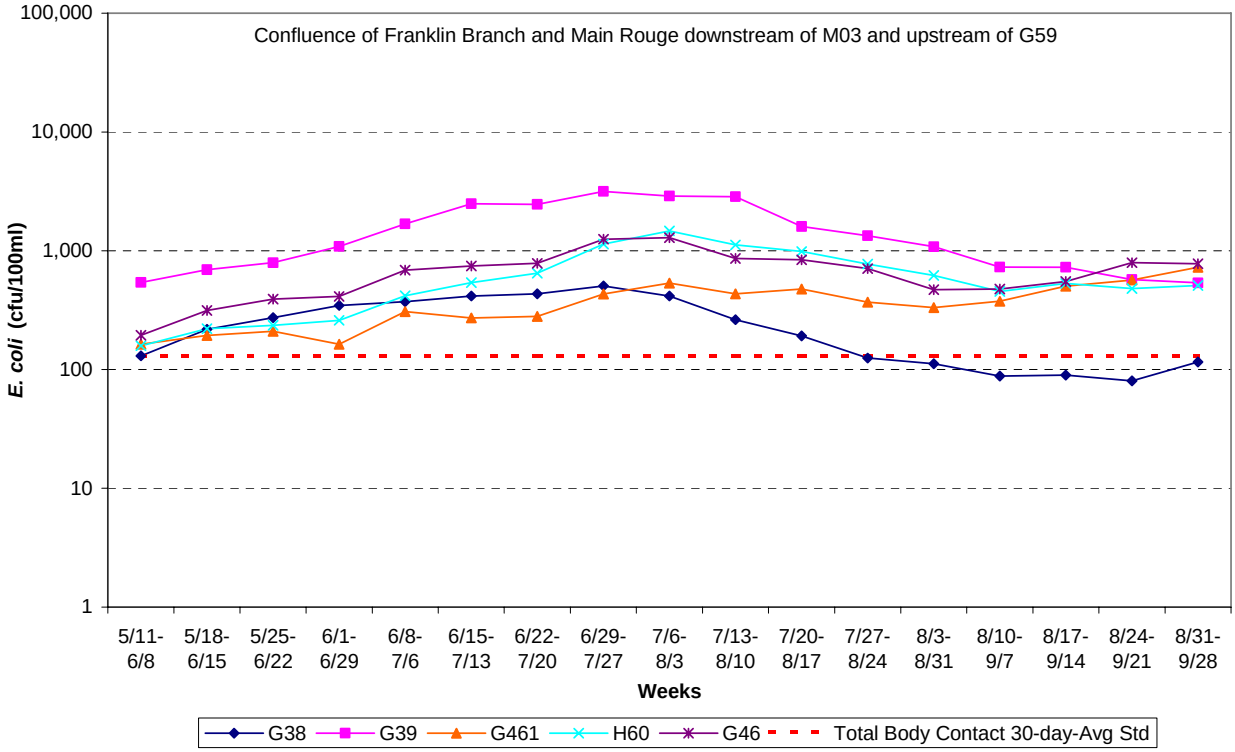


Figure B-5

Main Rouge- Pebble Creek
30-day Rolling GeoMean *E. coli* (cfu/100ml)

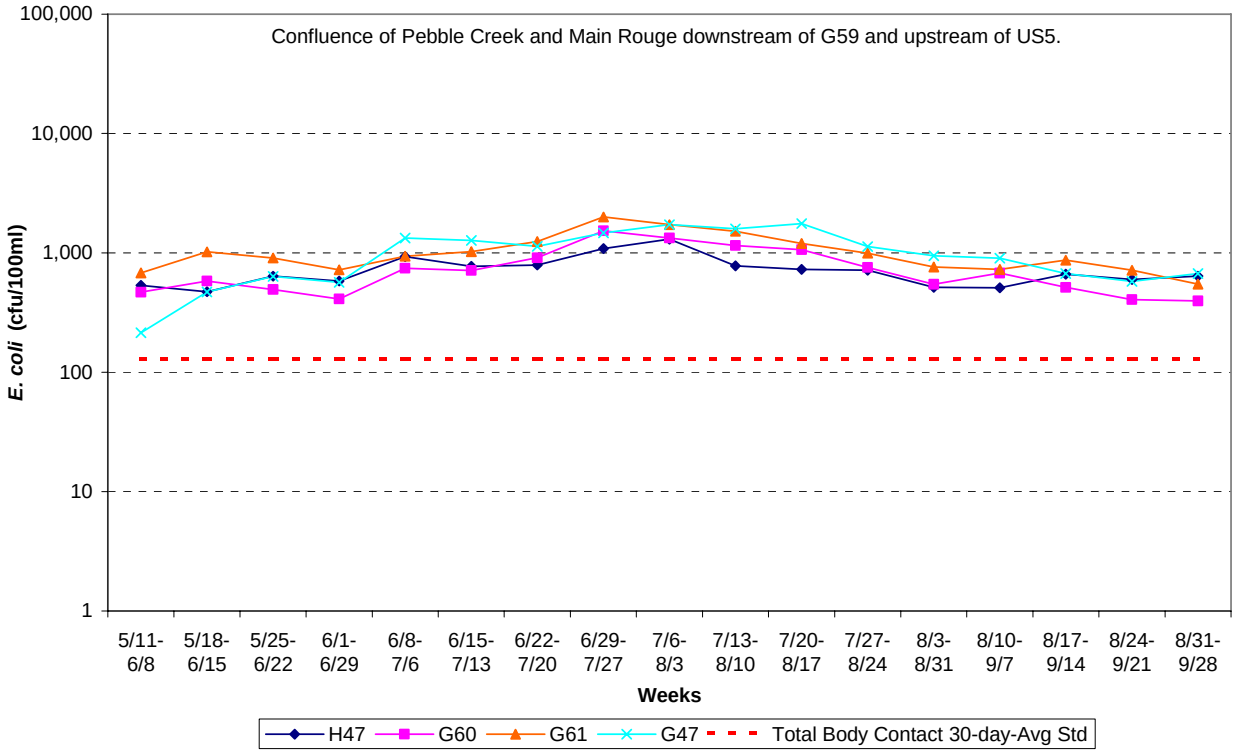


Figure B-6

Main Rouge- Evans Ditch
30-day Rolling GeoMean *E. coli* (cfu/100ml)

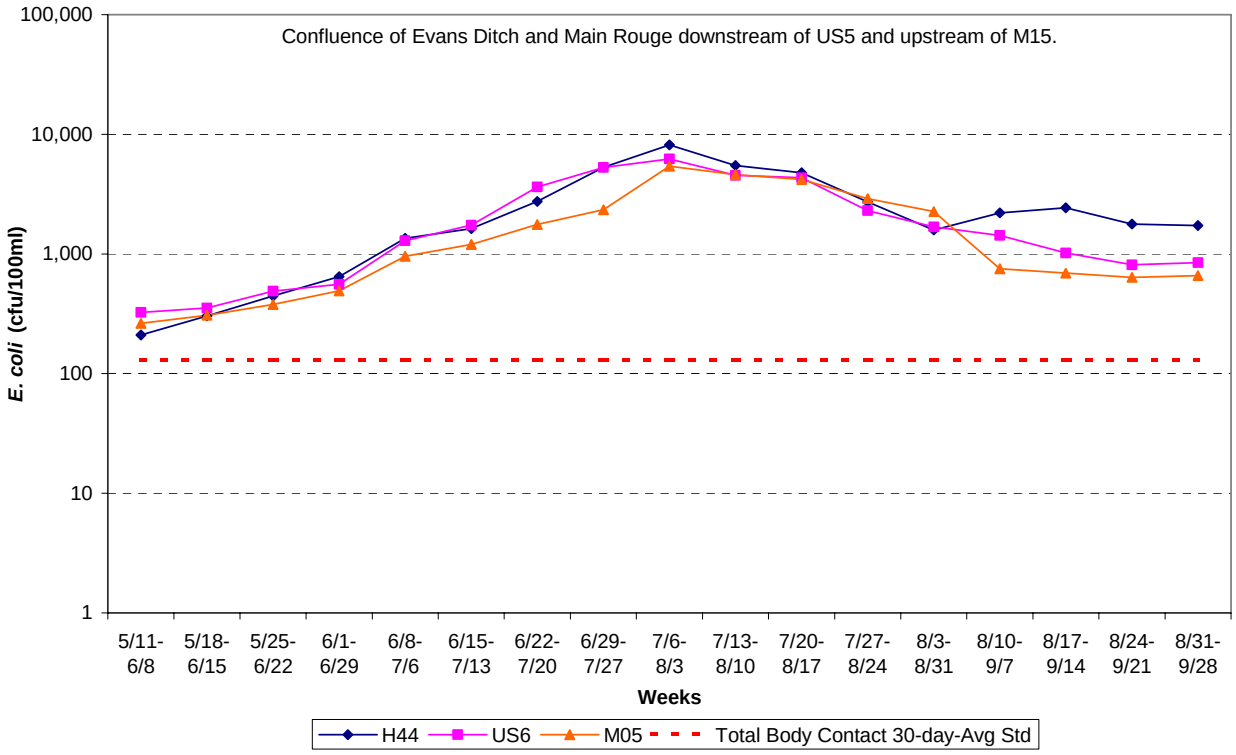


Figure B-7

Upper Rouge
30-day Rolling GeoMean *E. coli* (cfu/100ml)

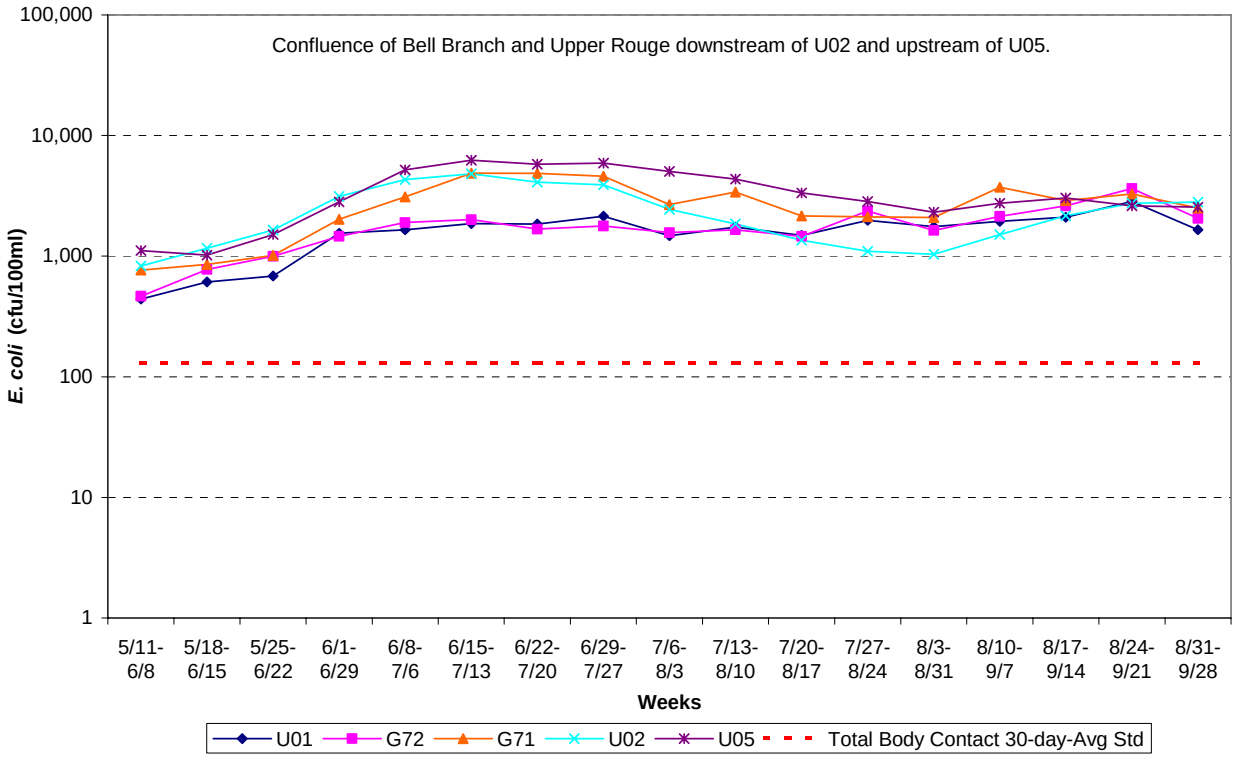


Figure B-8

Upper Rouge- Tarabusi Creek
30-day Rolling GeoMean *E. coli* (cfu/100ml)

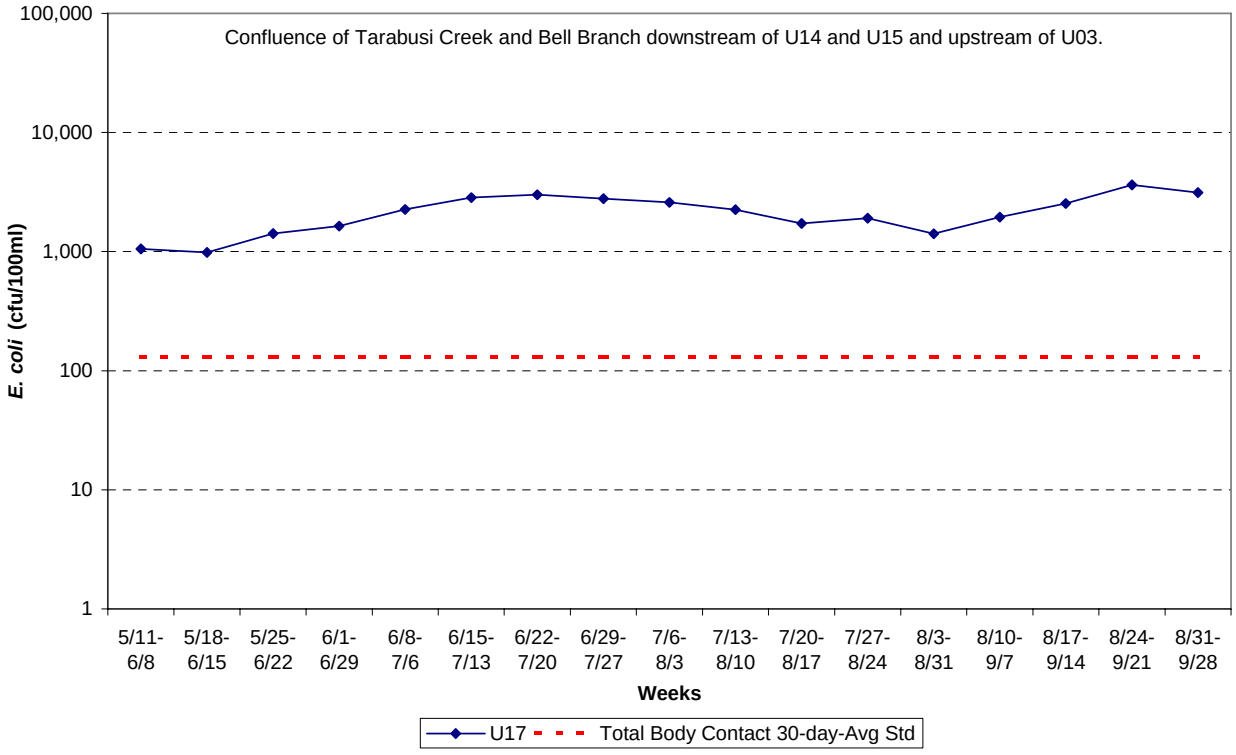


Figure B-9

Upper Rouge- Tarabusi Tributary
30-day Rolling GeoMean *E. coli* (cfu/100ml)

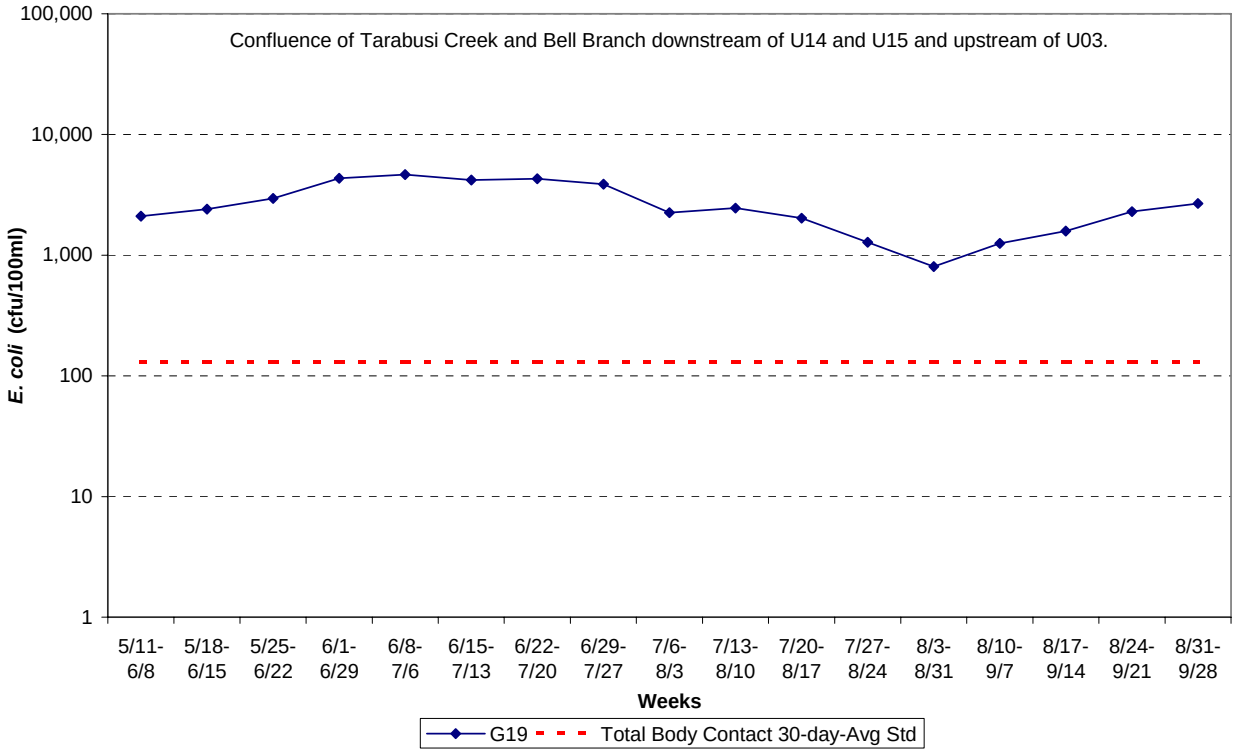


Figure B-10

Upper Rouge- Bell Branch
30-day Rolling GeoMean *E. coli* (cfu/100ml)

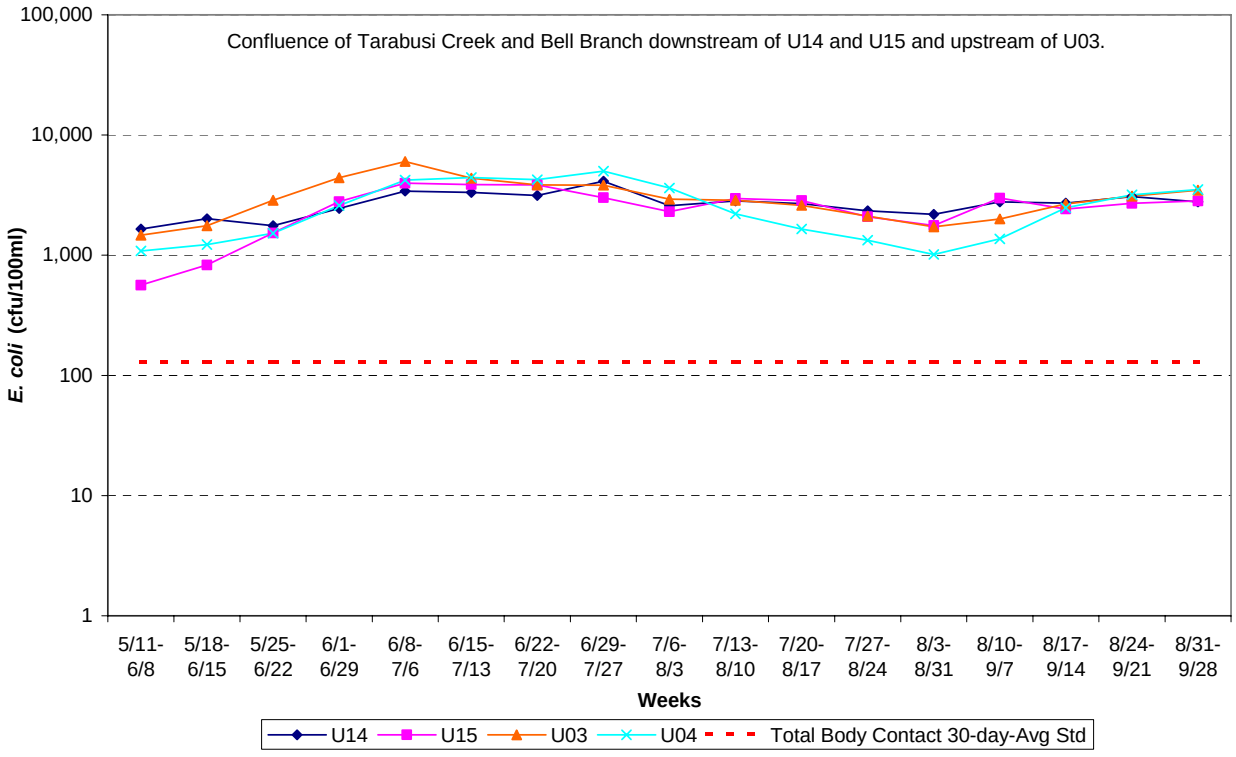


Figure B-11

Middle Rouge (Upper)
30-day Rolling GeoMean *E. coli* (cfu/100ml)

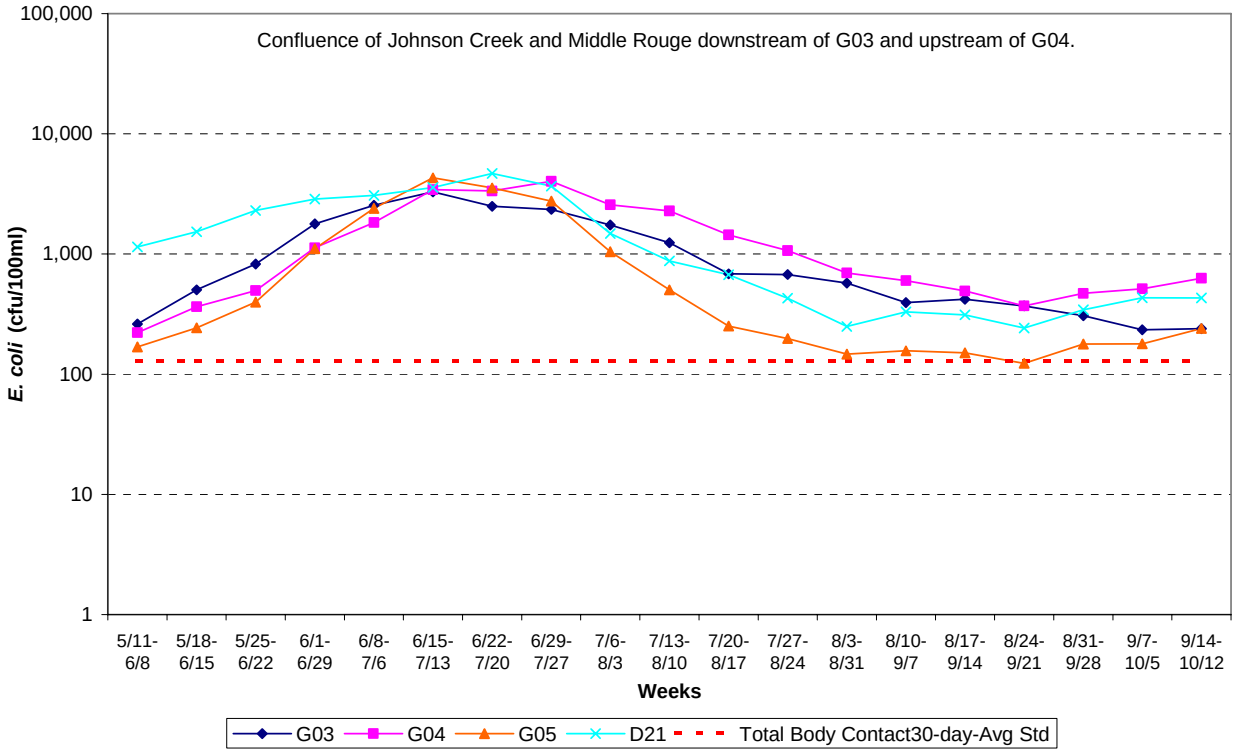


Figure B-12

Middle Rouge (Lower)
30-day Rolling GeoMean *E. coli* (cfu/100ml)

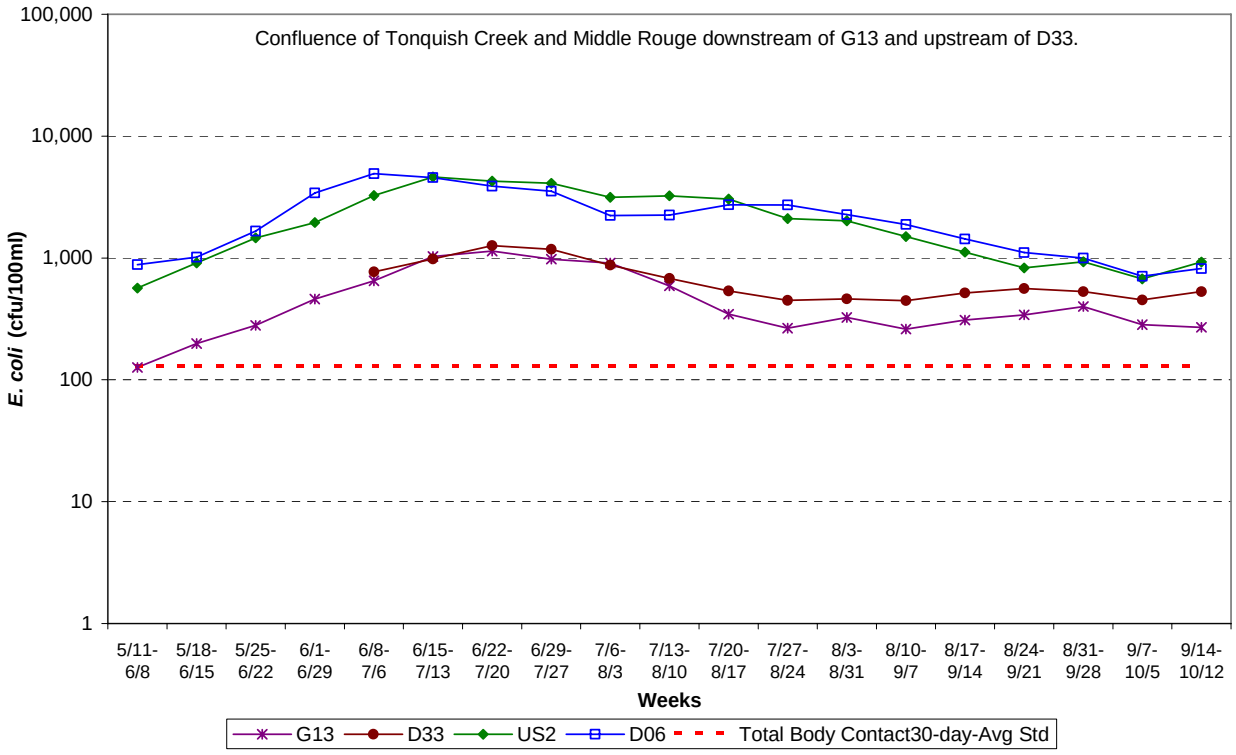


Figure B-13

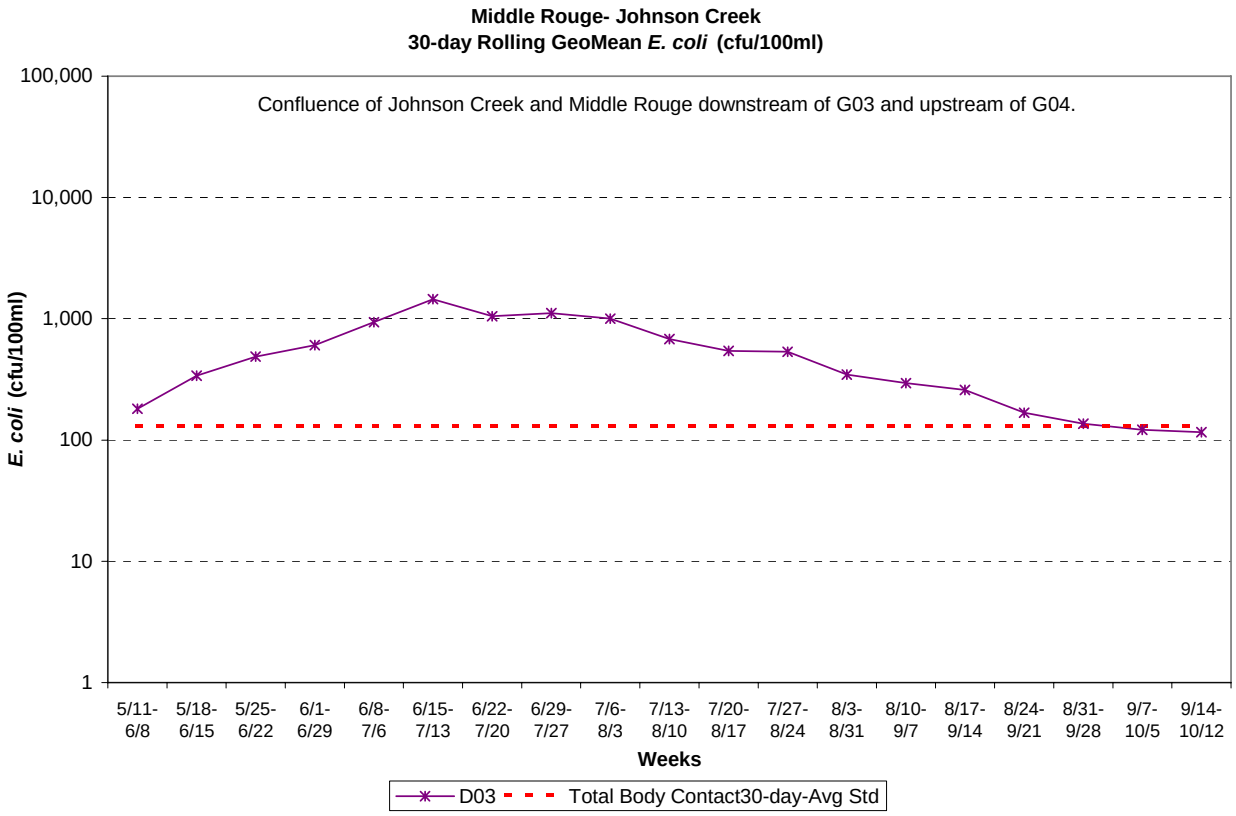


Figure B-14

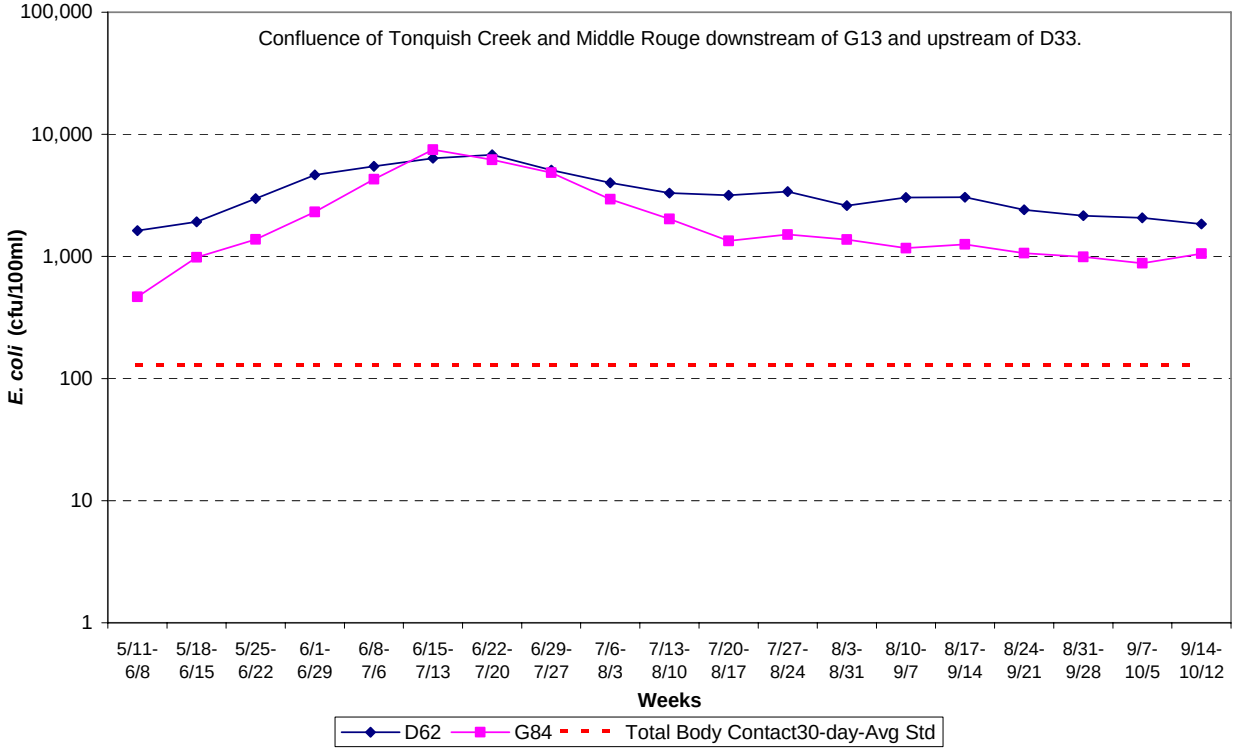


Figure B-15

Lower Rouge (Upper)
30-day Rolling GeoMean *E. coli* (cfu/100ml)

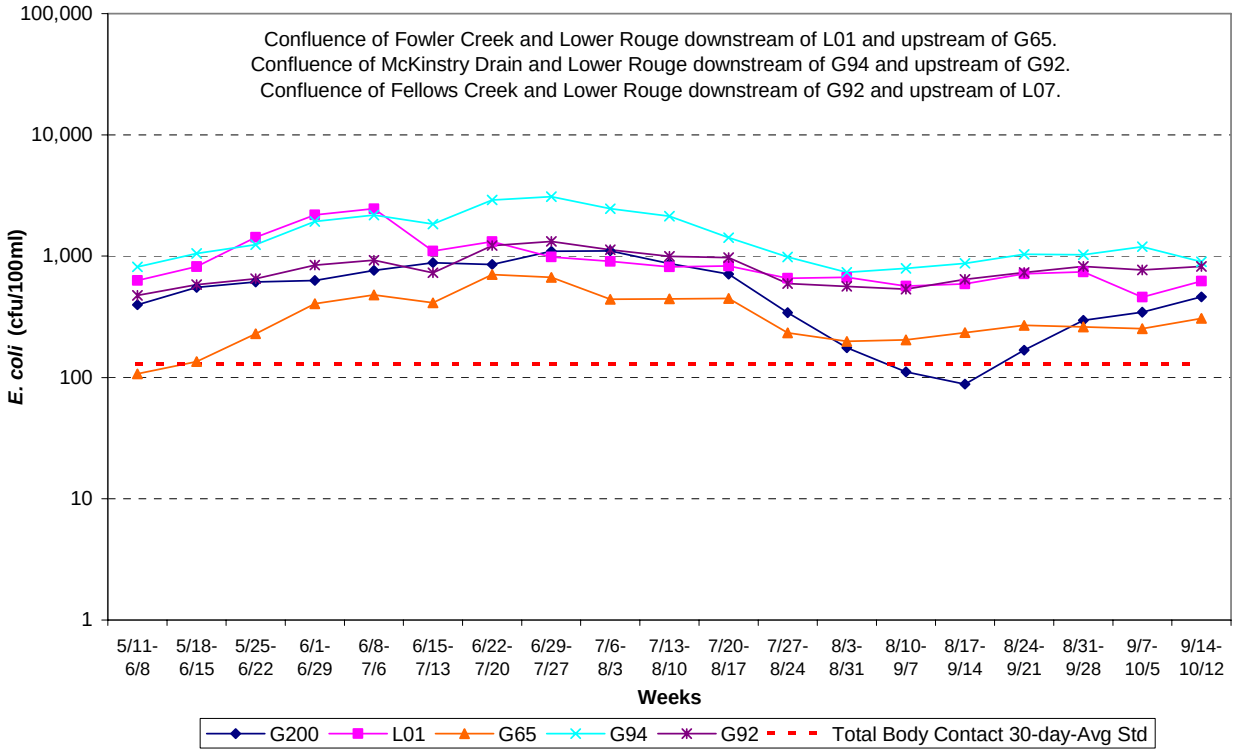


Figure B-16

Lower Rouge (Lower)
30-day Rolling GeoMean *E. coli* (cfu/100ml)

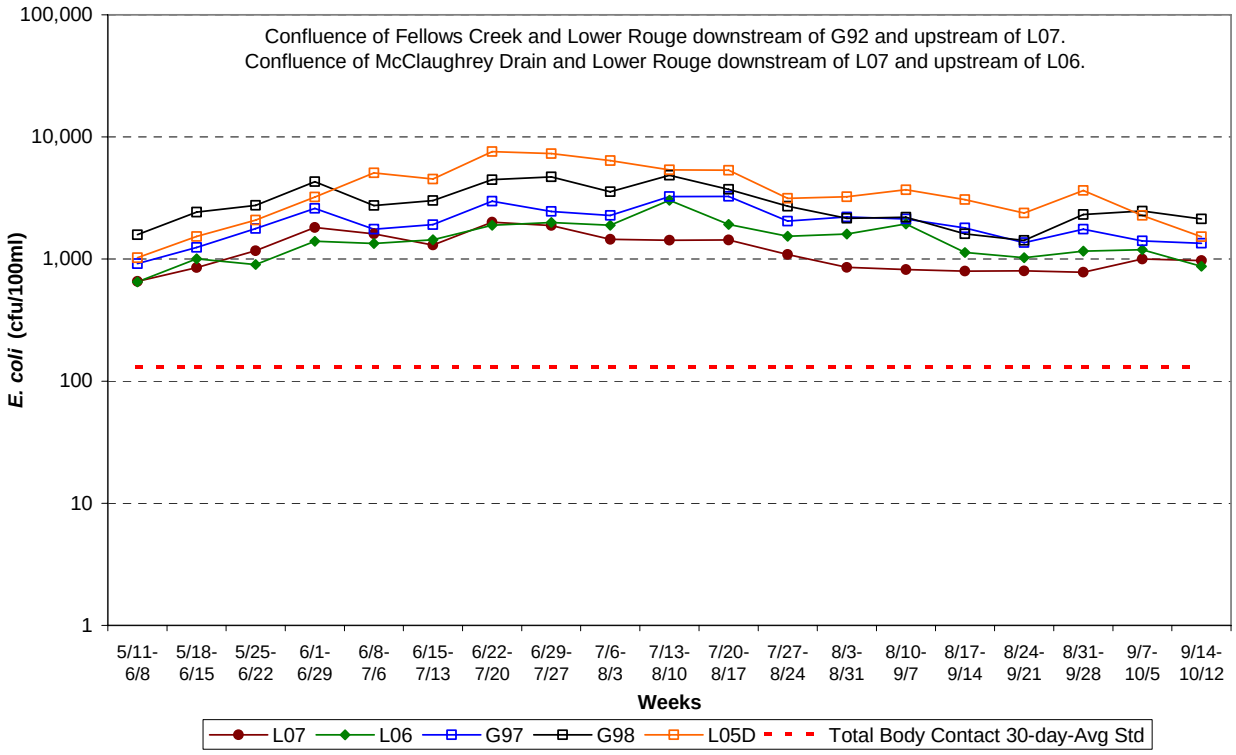


Figure B-17

Lower Rouge- Fowler Creek
30-day Rolling GeoMean *E. coli* (cfu/100ml)

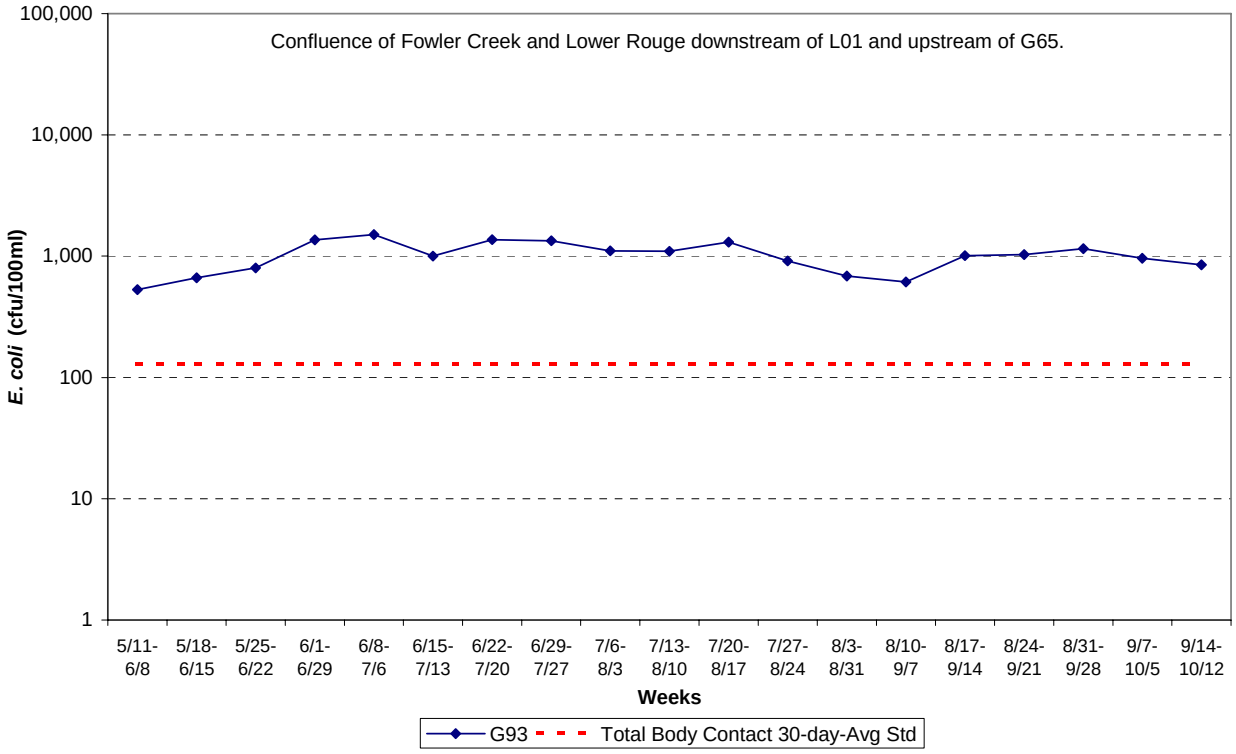


Figure B-18

Lower Rouge- Fellows Creek
30-day Rolling GeoMean *E. coli* (cfu/100ml)

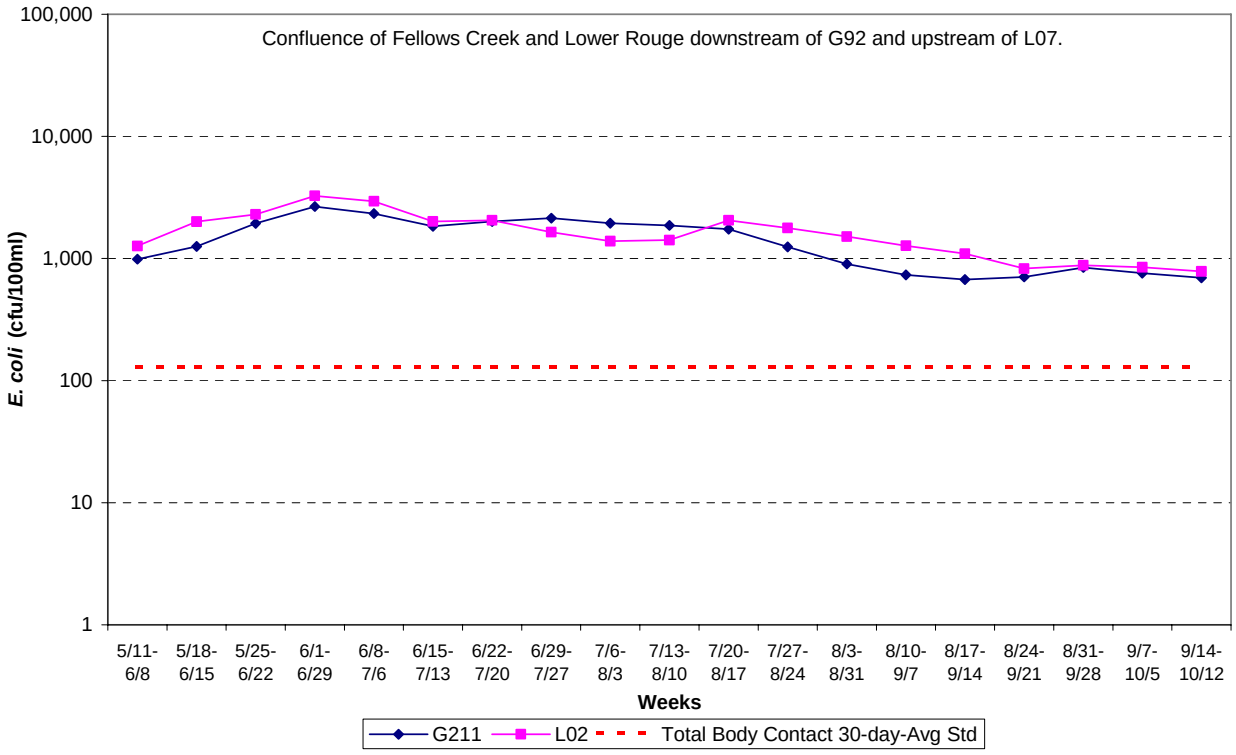


Figure B-19

Lower Rouge- McKinstry Drain
30-day Rolling GeoMean *E. coli* (cfu/100ml)

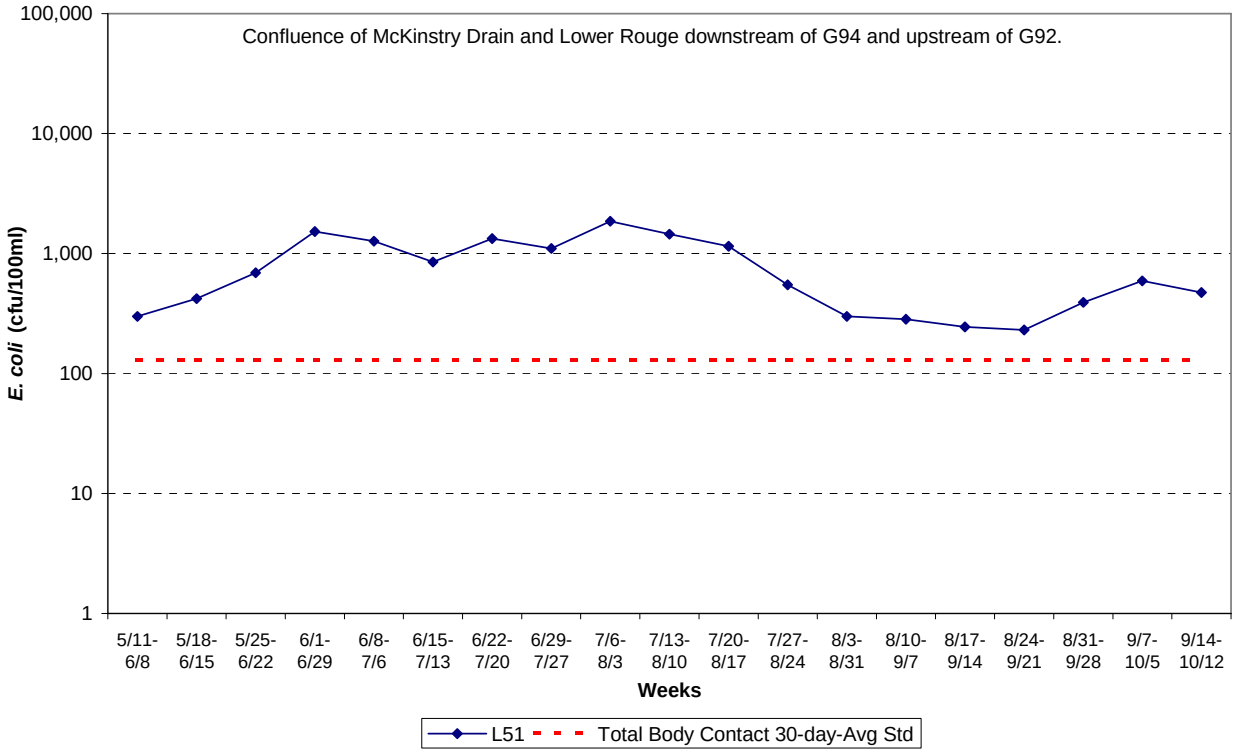
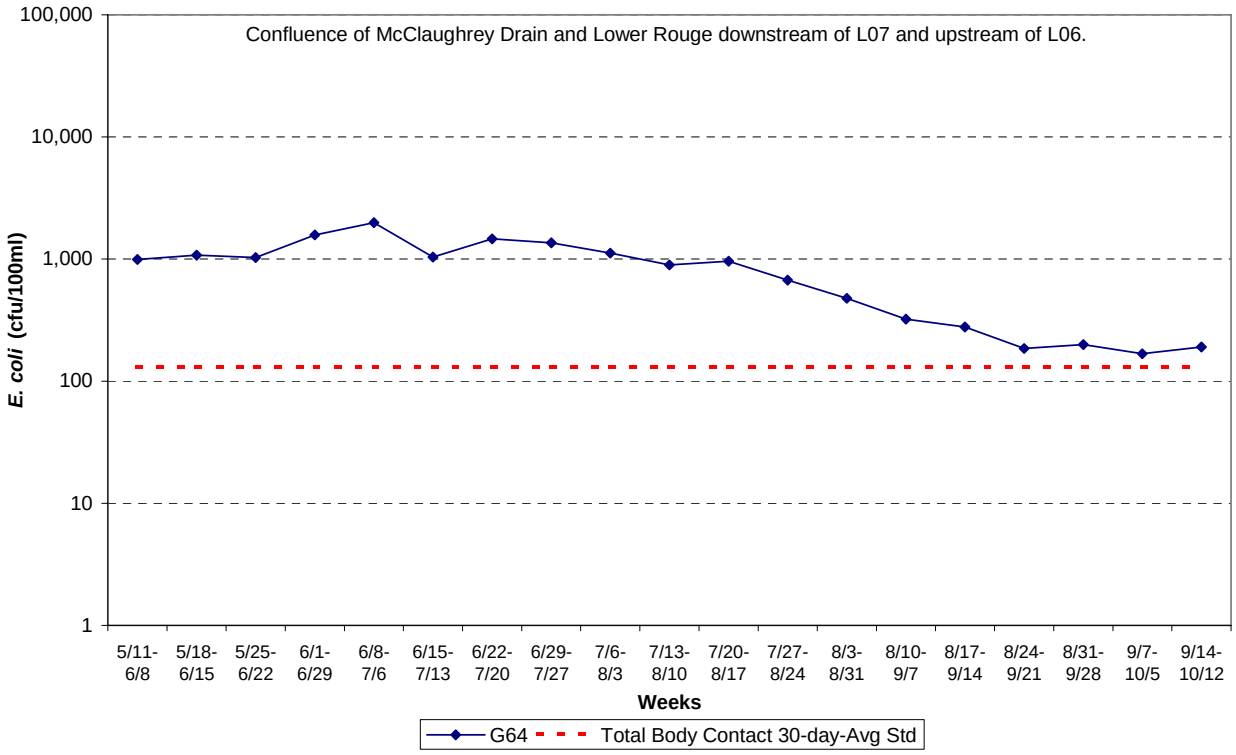


Figure B-20

Lower Rouge- McClaughrey Drain
30-day Rolling GeoMean *E. coli* (cfu/100ml)



APPENDIX C

MAIN ROUGE RIVER
MDEQ 2005 *E. coli* MONITORING DATA

SAMPLING LOCATIONS,
SAMPLING DATES,
E. COLI RESULTS,
DAILY MAXIMUMS, AND
30-DAY ROLLING GEOMETRIC MEANS

Table C-1. Main Rouge at Adams Road *(M01)* MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Adams Road (M01)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	40	63	---	7/26/2005	2,000	1,776	1,166
5/10/2005	80			7/26/2005	2,800		
5/10/2005	80			7/26/2005	1,000		
5/17/2005	60	94	---	8/2/2005	600	524	1,092
5/17/2005	140			8/2/2005	400		
5/17/2005	100			8/2/2005	600		
5/24/2005	400	124	---	8/9/2005	620	489	914
5/24/2005	40			8/9/2005	420		
5/24/2005	120			8/9/2005	450		
5/31/2005	2,400	1,878	---	8/16/2005	1,800	1,310	950
5/31/2005	1,380			8/16/2005	2,400		
5/31/2005	2,000			8/16/2005	520		
6/7/2005	180	508	235	8/23/2005	80	332	723
6/7/2005	1,300			8/23/2005	1,140		
6/7/2005	560			8/23/2005	400		
6/16/2005	500	782	388	8/30/2005	560	864	626
6/16/2005	760			8/30/2005	640		
6/16/2005	1,260			8/30/2005	1,800		
6/21/2005	520	538	549	9/6/2005	460	368	583
6/21/2005	1,000			9/6/2005	180		
6/21/2005	300			9/6/2005	600		
6/28/2005	600	728	782	9/13/2005	340	468	578
6/28/2005	460			9/13/2005	520		
6/28/2005	1,400			9/13/2005	580		
7/5/2005	1,400	1,189	714	9/20/2005	600	749	517
7/5/2005	600			9/20/2005	700		
7/5/2005	2,000			9/20/2005	1,000		
7/12/2005	560	1,078	830	9/27/2005	420	254	490
7/12/2005	1,400			9/27/2005	280		
7/12/2005	1,600			9/27/2005	140		
7/19/2005	760	1,298	918				
7/19/2005	2,400						
7/19/2005	1,200						

Table C-2. Main Rouge at Maple Road (G45) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Maple Road (G45)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	260	252	---	7/26/2005	3,800	3,449	1,184
5/10/2005	340			7/26/2005	3,600		
5/10/2005	180			7/26/2005	3,000		
5/17/2005	1,220	1,049	---	8/2/2005	320	645	1,068
5/17/2005	860			8/2/2005	600		
5/17/2005	1,100			8/2/2005	1,400		
5/24/2005	320	326	---	8/9/2005	800	850	1,014
5/24/2005	360			8/9/2005	640		
5/24/2005	300			8/9/2005	1,200		
5/31/2005	1,200	727	---	8/16/2005	800	1,048	1,131
5/31/2005	800			8/16/2005	1,200		
5/31/2005	400			8/16/2005	1,200		
6/7/2005	1,520	1,670	636	8/23/2005	1,220	599	1,035
6/7/2005	1,780			8/23/2005	420		
6/7/2005	1,720			8/23/2005	420		
6/16/2005	540	1,820	945	8/30/2005	600	509	706
6/16/2005	6,200			8/30/2005	220		
6/16/2005	1,800			8/30/2005	1,000		
6/21/2005	2,800	2,310	1,107	9/6/2005	480	521	676
6/21/2005	2,200			9/6/2005	460		
6/21/2005	2,000			9/6/2005	640		
6/28/2005	440	1,082	1,407	9/13/2005	1,600	1,887	793
6/28/2005	2,400			9/13/2005	3,000		
6/28/2005	1,200			9/13/2005	1,400		
7/5/2005	600	1,104	1,530	9/20/2005	480	456	672
7/5/2005	1,600			9/20/2005	300		
7/5/2005	1,400			9/20/2005	660		
7/12/2005	600	606	1,249	9/27/2005	1,000	153	511
7/12/2005	800			9/27/2005	60		
7/12/2005	464			9/27/2005	60		
7/19/2005	1,000	933	1,093				
7/19/2005	580						
7/19/2005	1,400						

Table C-3. Main Rouge at Riverside Drive (G58) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Riverside Drive (G58)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	20	49	---	7/26/2005	2,400	2,678	1,782
5/10/2005	20			7/26/2005	4,000		
5/10/2005	300			7/26/2005	2,000		
5/17/2005	800	395	---	8/2/2005	1,400	732	1,621
5/17/2005	240			8/2/2005	1,400		
5/17/2005	320			8/2/2005	200		
5/24/2005	280	300	---	8/9/2005	400	635	1,303
5/24/2005	600			8/9/2005	400		
5/24/2005	160			8/9/2005	1,600		
5/31/2005	220	128	---	8/16/2005	200	577	1,203
5/31/2005	80			8/16/2005	800		
5/31/2005	120			8/16/2005	1,200		
6/7/2005	660	945	234	8/23/2005	540	547	829
6/7/2005	780			8/23/2005	420		
6/7/2005	1,640			8/23/2005	720		
6/16/2005	600	363	349	8/30/2005	700	838	657
6/16/2005	400			8/30/2005	840		
6/16/2005	200			8/30/2005	1,000		
6/21/2005	620	645	385	9/6/2005	200	238	525
6/21/2005	800			9/6/2005	240		
6/21/2005	540			9/6/2005	280		
6/28/2005	2,800	1,175	507	9/13/2005	1,400	765	545
6/28/2005	1,000			9/13/2005	400		
6/28/2005	580			9/13/2005	800		
7/5/2005	3,000	1,887	867	9/20/2005	340	408	509
7/5/2005	1,600			9/20/2005	1,000		
7/5/2005	1,400			9/20/2005	200		
7/12/2005	800	862	852	9/27/2005	600	458	491
7/12/2005	1,000			9/27/2005	400		
7/12/2005	800			9/27/2005	400		
7/19/2005	1,800	3,509	1,340				
7/19/2005	4,000						
7/19/2005	6,000						

Table C-4. Main Rouge at Lahser Road (M03) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Lahser Road (M03)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	100	49	---	7/26/2005	1,200	1,154	986
5/10/2005	60			7/26/2005	1,600		
5/10/2005	<20			7/26/2005	800		
5/17/2005	100	166	---	8/2/2005	320	278	820
5/17/2005	380			8/2/2005	240		
5/17/2005	120			8/2/2005	280		
5/24/2005	340	299	---	8/9/2005	280	256	456
5/24/2005	280			8/9/2005	120		
5/24/2005	280			8/9/2005	500		
5/31/2005	100	199	---	8/16/2005	800	1,154	564
5/31/2005	280			8/16/2005	1,600		
5/31/2005	280			8/16/2005	1,200		
6/7/2005	340	485	221	8/23/2005	660	690	580
6/7/2005	600			8/23/2005	920		
6/7/2005	560			8/23/2005	540		
6/16/2005	240	276	266	8/30/2005	600	565	502
6/16/2005	220			8/30/2005	500		
6/16/2005	400			8/30/2005	600		
6/21/2005	360	301	299	9/6/2005	160	249	491
6/21/2005	380			9/6/2005	240		
6/21/2005	200			9/6/2005	400		
6/28/2005	560	698	355	9/13/2005	800	1,129	661
6/28/2005	380			9/13/2005	1,000		
6/28/2005	1,600			9/13/2005	1,800		
7/5/2005	6,800	4,837	671	9/20/2005	1,000	268	493
7/5/2005	3,200			9/20/2005	40		
7/5/2005	5,200			9/20/2005	480		
7/12/2005	480	395	645	9/27/2005	520	596	479
7/12/2005	460			9/27/2005	600		
7/12/2005	280			9/27/2005	680		
7/19/2005	220	604	754				
7/19/2005	1,000						
7/19/2005	1,000						

Table C-5. Franklin Branch at Middlebelt between Walnut Lake and 15 Mile Road (G38) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Franklin Branch at Middlebelt between Walnut Lake and 15 Mile Road (G38)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	20	36	---	7/26/2005	380	426	506
5/10/2005	60			7/26/2005	600		
5/10/2005	40			7/26/2005	340		
5/17/2005	20	29	---	8/2/2005	120	163	417
5/17/2005	60			8/2/2005	180		
5/17/2005	<20			8/2/2005	200		
5/24/2005	120	132	---	8/9/2005	120	76	263
5/24/2005	160			8/9/2005	60		
5/24/2005	120			8/9/2005	60		
5/31/2005	240	531	---	8/16/2005	60	100	192
5/31/2005	1,200			8/16/2005	140		
5/31/2005	520			8/16/2005	120		
6/7/2005	360	274	130	8/23/2005	80	58	125
6/7/2005	220			8/23/2005	60		
6/7/2005	260			8/23/2005	40		
6/16/2005	440	399	218	8/30/2005	160	244	112
6/16/2005	800			8/30/2005	240		
6/16/2005	180			8/30/2005	380		
6/21/2005	200	200	274	9/6/2005	40	50	88
6/21/2005	400			9/6/2005	40		
6/21/2005	100			9/6/2005	80		
6/28/2005	120	429	346	9/13/2005	20	81	90
6/28/2005	1,000			9/13/2005	220		
6/28/2005	660			9/13/2005	120		
7/5/2005	600	756	372	9/20/2005	60	58	80
7/5/2005	1,200			9/20/2005	80		
7/5/2005	600			9/20/2005	40		
7/12/2005	340	485	417	9/27/2005	600	363	116
7/12/2005	800			9/27/2005	400		
7/12/2005	420			9/27/2005	200		
7/19/2005	460	493	435				
7/19/2005	520						
7/19/2005	500						

Table C-6. Franklin Branch at Middlebelt between 14 Mile Road and 15 Mile Road (G39) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Franklin Branch at Middlebelt between 14 Mile Road and 15 Mile Road (G39)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	700	482	---	7/26/2005	2,200	2,194	3,162
5/10/2005	500			7/26/2005	4,000		
5/10/2005	320			7/26/2005	1,200		
5/17/2005	420	312	---	8/2/2005	1,200	2,621	2,882
5/17/2005	400			8/2/2005	5,000		
5/17/2005	180			8/2/2005	3,000		
5/24/2005	1,400	876	---	8/9/2005	2,500	1,890	2,849
5/24/2005	600			8/9/2005	600		
5/24/2005	800			8/9/2005	4,500		
5/31/2005	280	224	---	8/16/2005	400	635	1,603
5/31/2005	40			8/16/2005	800		
5/31/2005	1,000			8/16/2005	800		
6/7/2005	2,600	1,596	542	8/23/2005	1,000	628	1,341
6/7/2005	460			8/23/2005	620		
6/7/2005	3,400			8/23/2005	400		
6/16/2005	1,600	1,636	693	8/30/2005	1,400	759	1,084
6/16/2005	1,800			8/30/2005	400		
6/16/2005	1,520			8/30/2005	780		
6/21/2005	200	619	795	9/6/2005	600	363	730
6/21/2005	1,600			9/6/2005	400		
6/21/2005	740			9/6/2005	200		
6/28/2005	9,400	4,164	1,085	9/13/2005	1,400	1,844	727
6/28/2005	2,400			9/13/2005	1,600		
6/28/2005	3,200			9/13/2005	2,800		
7/5/2005	2,800	2,005	1,683	9/20/2005	220	192	572
7/5/2005	1,600			9/20/2005	160		
7/5/2005	1,800			9/20/2005	200		
7/12/2005	14,000	11,261	2,487	9/27/2005	400	458	537
7/12/2005	17,000			9/27/2005	600		
7/12/2005	6,000			9/27/2005	400		
7/19/2005	3,000	1,533	2,455				
7/19/2005	500						
7/19/2005	2,400						

Table C-7. Franklin Branch at Franklin Road (G461) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Franklin Branch at Franklin Road (G461)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	380	227	---	7/26/2005	1,200	1,293	433
5/10/2005	140			7/26/2005	1,000		
5/10/2005	220			7/26/2005	1,800		
5/17/2005	80	99	---	8/2/2005	200	317	535
5/17/2005	120			8/2/2005	400		
5/17/2005	100			8/2/2005	400		
5/24/2005	620	384	---	8/9/2005	240	304	435
5/24/2005	240			8/9/2005	420		
5/24/2005	380			8/9/2005	280		
5/31/2005	60	36	---	8/16/2005	400	315	476
5/31/2005	40			8/16/2005	300		
5/31/2005	20			8/16/2005	260		
6/7/2005	280	372	163	8/23/2005	300	175	370
6/7/2005	400			8/23/2005	100		
6/7/2005	460			8/23/2005	180		
6/16/2005	320	536	194	8/30/2005	740	758	332
6/16/2005	400			8/30/2005	1,400		
6/16/2005	1,200			8/30/2005	420		
6/21/2005	120	147	210	9/6/2005	740	587	376
6/21/2005	120			9/6/2005	720		
6/21/2005	220			9/6/2005	380		
6/28/2005	300	110	163	9/13/2005	640	1,308	503
6/28/2005	20			9/13/2005	3,500		
6/28/2005	220			9/13/2005	1,000		
7/5/2005	1,000	862	308	9/20/2005	600	577	568
7/5/2005	800			9/20/2005	400		
7/5/2005	800			9/20/2005	800		
7/12/2005	200	200	272	9/27/2005	520	602	726
7/12/2005	200			9/27/2005	1,000		
7/12/2005	200			9/27/2005	420		
7/19/2005	1,000	621	280				
7/19/2005	400						
7/19/2005	600						

Table C-8. Franklin Branch at 13 Mile Road (H60) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Franklin Branch at 13 Mile Road (H60)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	80	50	---	7/26/2005	2,600	1,841	---
5/10/2005	40			7/26/2005	3,000		
5/10/2005	40			7/26/2005	800		
5/17/2005	240	137	---	8/2/2005	600	1,887	---
5/17/2005	60			8/2/2005	800		
5/17/2005	180			8/2/2005	14,000		
5/24/2005	400	425	---	8/9/2005	400	468	---
5/24/2005	400			8/9/2005	320		
5/24/2005	480			8/9/2005	800		
5/31/2005	80	127	---	8/16/2005	1,000	577	984
5/31/2005	320			8/16/2005	320		
5/31/2005	80			8/16/2005	600		
6/7/2005	180	271	159	8/23/2005	340	294	773
6/7/2005	220			8/23/2005	340		
6/7/2005	500			8/23/2005	220		
6/16/2005	400	262	221	8/30/2005	600	607	619
6/16/2005	280			8/30/2005	620		
6/16/2005	160			8/30/2005	600		
6/21/2005	220	189	235	9/6/2005	200	407	455
6/21/2005	220			9/6/2005	800		
6/21/2005	140			9/6/2005	420		
6/28/2005	600	687	259	9/13/2005	1,600	990	529
6/28/2005	540			9/13/2005	740		
6/28/2005	1,000			9/13/2005	820		
7/5/2005	600	1,390	418	9/20/2005	360	357	480
7/5/2005	3,200			9/20/2005	300		
7/5/2005	1,400			9/20/2005	420		
7/12/2005	1,600	964	539	9/27/2005	400	397	510
7/12/2005	1,400			9/27/2005	600		
7/12/2005	400			9/27/2005	260		
7/19/2005	NC		---				
7/19/2005	NC						
7/19/2005	NC						

Table C-9. Franklin Branch at 12 Mile Road (G46) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Franklin Branch at 12 Mile Road (G46)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	80	68	---	7/26/2005	2,000	3,326	1,252
5/10/2005	100			7/26/2005	4,600		
5/10/2005	40			7/26/2005	4,000		
5/17/2005	100	106	---	8/2/2005	600	577	1,286
5/17/2005	100			8/2/2005	800		
5/17/2005	120			8/2/2005	400		
5/24/2005	380	391	---	8/9/2005	280	364	861
5/24/2005	560			8/9/2005	540		
5/24/2005	280			8/9/2005	320		
5/31/2005	800	213	---	8/16/2005	800	601	839
5/31/2005	120			8/16/2005	800		
5/31/2005	100			8/16/2005	340		
6/7/2005	500	458	194	8/23/2005	380	422	708
6/7/2005	320			8/23/2005	340		
6/7/2005	600			8/23/2005	580		
6/16/2005	160	765	315	8/30/2005	400	431	470
6/16/2005	2,800			8/30/2005	200		
6/16/2005	1,000			8/30/2005	1,000		
6/21/2005	140	318	392	9/6/2005	400	621	477
6/21/2005	500			9/6/2005	1,000		
6/21/2005	460			9/6/2005	600		
6/28/2005	600	506	413	9/13/2005	640	743	550
6/28/2005	600			9/13/2005	640		
6/28/2005	360			9/13/2005	1,000		
7/5/2005	3,200	2,713	687	9/20/2005	3,800	3,768	794
7/5/2005	2,400			9/20/2005	3,200		
7/5/2005	2,600			9/20/2005	4,400		
7/12/2005	1,000	684	744	9/27/2005	300	381	778
7/12/2005	800			9/27/2005	400		
7/12/2005	400			9/27/2005	460		
7/19/2005	1,000	986	783				
7/19/2005	800						
7/19/2005	1,200						

Table C-10. Main Rouge at 10 Mile Road west of Telegraph Road (G59) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at 10 Mile Road west of Telegraph Road (G59)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	460	461	---	7/26/2005	5,200	5,025	2,105
5/10/2005	820			7/26/2005	12,200		
5/10/2005	260			7/26/2005	2,000		
5/17/2005	140	77	---	8/2/2005	36,000	13,949	3,729
5/17/2005	80			8/2/2005	13,000		
5/17/2005	40			8/2/2005	5,800		
5/24/2005	160	772	---	8/9/2005	2,000	585	2,579
5/24/2005	800			8/9/2005	200		
5/24/2005	3,600			8/9/2005	500		
5/31/2005	120	136	---	8/16/2005	200	400	2,047
5/31/2005	80			8/16/2005	400		
5/31/2005	260			8/16/2005	800		
6/7/2005	2,200	1,493	353	8/23/2005	260	297	1,373
6/7/2005	1,800			8/23/2005	240		
6/7/2005	840			8/23/2005	420		
6/16/2005	3,200	2,907	511	8/30/2005	1,000	946	983
6/16/2005	3,200			8/30/2005	920		
6/16/2005	2,400			8/30/2005	920		
6/21/2005	120	362	697	9/6/2005	420	600	524
6/21/2005	660			9/6/2005	920		
6/21/2005	600			9/6/2005	560		
6/28/2005	800	800	702	9/13/2005	500	328	467
6/28/2005	800			9/13/2005	220		
6/28/2005	800			9/13/2005	320		
7/5/2005	6,200	3,699	1,360	9/20/2005	600	1,026	563
7/5/2005	2,400			9/20/2005	1,200		
7/5/2005	3,400			9/20/2005	1,500		
7/12/2005	3,400	1,268	1,316	9/27/2005	2,200	2,230	843
7/12/2005	600			9/27/2005	8,400		
7/12/2005	1,000			9/27/2005	600		
7/19/2005	2,000	2,194	1,244				
7/19/2005	2,400						
7/19/2005	2,200						

Table C-11. Pebble Creek, west of Middlebelt and south of 13 Mile Road (H47) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Pebble Creek, west of Middlebelt and south of 13 Mile Road (H47)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	<20	216	---	7/26/2005	5,800	3,175	1,090
5/10/2005	660			7/26/2005	4,600		
5/10/2005	760			7/26/2005	1,200		
5/17/2005	80	50	---	8/2/2005	800	1,498	1,302
5/17/2005	<20			8/2/2005	4,200		
5/17/2005	80			8/2/2005	1,000		
5/24/2005	1,320	983	---	8/9/2005	200	252	778
5/24/2005	900			8/9/2005	400		
5/24/2005	800			8/9/2005	200		
5/31/2005	300	313	---	8/16/2005	600	416	728
5/31/2005	340			8/16/2005	600		
5/31/2005	300			8/16/2005	200		
6/7/2005	700	1,455	534	8/23/2005	280	372	714
6/7/2005	2,000			8/23/2005	460		
6/7/2005	2,200			8/23/2005	400		
6/16/2005	300	363	472	8/30/2005	1,400	617	515
6/16/2005	100			8/30/2005	420		
6/16/2005	1,600			8/30/2005	400		
6/21/2005	800	648	638	9/6/2005	1,500	1,442	511
6/21/2005	1,000			9/6/2005	1,000		
6/21/2005	340			9/6/2005	2,000		
6/28/2005	220	615	580	9/13/2005	600	928	663
6/28/2005	480			9/13/2005	740		
6/28/2005	2,200			9/13/2005	1,800		
7/5/2005	4,600	3,315	931	9/20/2005	400	252	600
7/5/2005	2,200			9/20/2005	200		
7/5/2005	3,600			9/20/2005	200		
7/12/2005	320	577	773	9/27/2005	400	504	637
7/12/2005	1,000			9/27/2005	400		
7/12/2005	600			9/27/2005	800		
7/19/2005	400	411	793				
7/19/2005	580						
7/19/2005	300						

Table C-12. Pebble Creek at 11 Mile Road (G60) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Pebble Creek at 11 Mile Road (G60)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	120	133	---	7/26/2005	4,000	3,227	1,531
5/10/2005	140			7/26/2005	2,800		
5/10/2005	140			7/26/2005	3,000		
5/17/2005	820	550	---	8/2/2005	400	363	1,333
5/17/2005	260			8/2/2005	200		
5/17/2005	780			8/2/2005	600		
5/24/2005	2,600	1,808	---	8/9/2005	1,800	1,731	1,155
5/24/2005	1,420			8/9/2005	2,400		
5/24/2005	1,600			8/9/2005	1,200		
5/31/2005	220	183	---	8/16/2005	260	500	1,063
5/31/2005	200			8/16/2005	800		
5/31/2005	140			8/16/2005	600		
6/7/2005	800	928	468	8/23/2005	200	243	756
6/7/2005	1,000			8/23/2005	180		
6/7/2005	1,000			8/23/2005	400		
6/16/2005	340	397	583	8/30/2005	400	639	547
6/16/2005	400			8/30/2005	740		
6/16/2005	460			8/30/2005	880		
6/21/2005	260	238	493	9/6/2005	1,200	1,048	676
6/21/2005	260			9/6/2005	1,600		
6/21/2005	200			9/6/2005	600		
6/28/2005	660	726	411	9/13/2005	480	439	514
6/28/2005	1,000			9/13/2005	440		
6/28/2005	580			9/13/2005	400		
7/5/2005	6,400	3,545	743	9/20/2005	220	155	406
7/5/2005	1,200			9/20/2005	140		
7/5/2005	5,800			9/20/2005	120		
7/12/2005	600	756	713	9/27/2005	220	214	396
7/12/2005	1,800			9/27/2005	140		
7/12/2005	400			9/27/2005	320		
7/19/2005	2,000	1,339	909				
7/19/2005	1,200						
7/19/2005	1,000						

Table C-13. Pebble Creek at Franklin Road (G61) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Pebble Creek at Franklin Road (G61)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	120	106	---	7/26/2005	2,000	2,759	1,996
5/10/2005	100			7/26/2005	3,500		
5/10/2005	100			7/26/2005	3,000		
5/17/2005	500	480	---	8/2/2005	600	577	1,724
5/17/2005	460			8/2/2005	400		
5/17/2005	480			8/2/2005	800		
5/24/2005	4,600	3,760	---	8/9/2005	1,400	1,715	1,516
5/24/2005	3,400			8/9/2005	2,000		
5/24/2005	3,400			8/9/2005	1,800		
5/31/2005	1,400	876	---	8/16/2005	620	414	1,199
5/31/2005	600			8/16/2005	220		
5/31/2005	800			8/16/2005	520		
6/7/2005	800	862	679	8/23/2005	840	870	997
6/7/2005	800			8/23/2005	560		
6/7/2005	1,000			8/23/2005	1,400		
6/16/2005	340	820	1,022	8/30/2005	1,200	727	763
6/16/2005	3,000			8/30/2005	400		
6/16/2005	540			8/30/2005	800		
6/21/2005	240	263	907	9/6/2005	380	455	728
6/21/2005	380			9/6/2005	620		
6/21/2005	200			9/6/2005	400		
6/28/2005	1,200	1,200	721	9/13/2005	4,200	4,149	869
6/28/2005	1,200			9/13/2005	3,400		
6/28/2005	1,200			9/13/2005	5,000		
7/5/2005	3,000	3,257	938	9/20/2005	240	157	715
7/5/2005	2,400			9/20/2005	100		
7/5/2005	4,800			9/20/2005	160		
7/12/2005	1,600	1,339	1,025	9/27/2005	400	232	549
7/12/2005	1,000			9/27/2005	260		
7/12/2005	1,500			9/27/2005	120		
7/19/2005	1,600	2,194	1,248				
7/19/2005	2,200						
7/19/2005	3,000						

Table C-14. Pebble Creek at 10 Mile Road (G47) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Pebble Creek at 10 Mile Road (G47)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	40	78	---	7/26/2005	3,000	2,289	1,471
5/10/2005	100			7/26/2005	2,000		
5/10/2005	120			7/26/2005	2,000		
5/17/2005	100	137	---	8/2/2005	6,600	1,018	1,722
5/17/2005	160			8/2/2005	400		
5/17/2005	160			8/2/2005	400		
5/24/2005	200	830	---	8/9/2005	4,200	2,932	1,593
5/24/2005	2,200			8/9/2005	2,000		
5/24/2005	1,300			8/9/2005	3,000		
5/31/2005	40	61	---	8/16/2005	1,200	1,090	1,761
5/31/2005	140			8/16/2005	600		
5/31/2005	40			8/16/2005	1,800		
6/7/2005	820	831	214	8/23/2005	280	248	1,131
6/7/2005	1,060			8/23/2005	160		
6/7/2005	660			8/23/2005	340		
6/16/2005	3,200	4,026	471	8/30/2005	800	928	944
6/16/2005	6,000			8/30/2005	1,000		
6/16/2005	3,400			8/30/2005	1,000		
6/21/2005	2,200	619	636	9/6/2005	2,200	808	901
6/21/2005	180			9/6/2005	300		
6/21/2005	600			9/6/2005	800		
6/28/2005	800	464	567	9/13/2005	420	679	673
6/28/2005	260			9/13/2005	1,200		
6/28/2005	480			9/13/2005	620		
7/5/2005	4,000	4,320	1,329	9/20/2005	200	504	576
7/5/2005	4,800			9/20/2005	1,600		
7/5/2005	4,200			9/20/2005	400		
7/12/2005	400	660	1,270	9/27/2005	380	526	670
7/12/2005	1,200			9/27/2005	480		
7/12/2005	600			9/27/2005	800		
7/19/2005	4,000	2,275	1,133				
7/19/2005	4,600						
7/19/2005	640						

Table C-15. Main Rouge at Beech Road (US5) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Beech Road (US5)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	820	262	---	7/26/2005	5,400	4,800	2,302
5/10/2005	220			7/26/2005	6,400		
5/10/2005	100			7/26/2005	3,200		
5/17/2005	180	137	---	8/2/2005	33,500	3,892	2,983
5/17/2005	120			8/2/2005	4,400		
5/17/2005	120			8/2/2005	400		
5/24/2005	1,400	1,822	---	8/9/2005	2,500	2,359	2,605
5/24/2005	1,800			8/9/2005	3,500		
5/24/2005	2,400			8/9/2005	1,500		
5/31/2005	140	183	---	8/16/2005	600	524	2,530
5/31/2005	220			8/16/2005	1,200		
5/31/2005	200			8/16/2005	200		
6/7/2005	600	832	398	8/23/2005	200	357	1,525
6/7/2005	800			8/23/2005	300		
6/7/2005	1,200			8/23/2005	760		
6/16/2005	1,120	1,078	528	8/30/2005	740	939	1,101
6/16/2005	1,600			8/30/2005	1,400		
6/16/2005	700			8/30/2005	800		
6/21/2005	600	552	698	9/6/2005	1,000	1,538	914
6/21/2005	700			9/6/2005	2,600		
6/21/2005	400			9/6/2005	1,400		
6/28/2005	800	1,064	627	9/13/2005	600	524	677
6/28/2005	940			9/13/2005	480		
6/28/2005	1,600			9/13/2005	500		
7/5/2005	4,600	4,649	1,196	9/20/2005	1,200	584	692
7/5/2005	5,200			9/20/2005	520		
7/5/2005	4,200			9/20/2005	320		
7/12/2005	600	607	1,123	9/27/2005	540	730	798
7/12/2005	600			9/27/2005	600		
7/12/2005	620			9/27/2005	1,200		
7/19/2005	5,200	4,486	1,493				
7/19/2005	2,800						
7/19/2005	6,200						

Table C-16. Evans Ditch at Tamarack off 10 Mile Road (H44) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Evans Ditch at Tamarack off 10 Mile Road (H44)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	400	157	---	7/26/2005	13,000	15,832	5,304
5/10/2005	80			7/26/2005	18,500		
5/10/2005	120			7/26/2005	16,500		
5/17/2005	40	86	---	8/2/2005	7,500	7,211	8,170
5/17/2005	160			8/2/2005	1,000		
5/17/2005	100			8/2/2005	50,000		
5/24/2005	340	130	---	8/9/2005	1,000	794	5,491
5/24/2005	80			8/9/2005	500		
5/24/2005	80			8/9/2005	1,000		
5/31/2005	160	146	---	8/16/2005	3,000	2,080	4,782
5/31/2005	140			8/16/2005	2,000		
5/31/2005	140			8/16/2005	1,500		
6/7/2005	1,400	1,621	211	8/23/2005	1,600	800	2,727
6/7/2005	800			8/23/2005	400		
6/7/2005	3,800			8/23/2005	800		
6/16/2005	2,800	980	304	8/30/2005	400	1,063	1,589
6/16/2005	1,200			8/30/2005	3,000		
6/16/2005	280			8/30/2005	1,000		
6/21/2005	400	586	446	9/6/2005	34,000	37,084	2,204
6/21/2005	1,400			9/6/2005	40,000		
6/21/2005	360			9/6/2005	37,500		
6/28/2005	400	832	647	9/13/2005	5,500	1,301	2,433
6/28/2005	800			9/13/2005	1,000		
6/28/2005	1,800			9/13/2005	400		
7/5/2005	5,600	5,784	1,350	9/20/2005	200	431	1,776
7/5/2005	5,400			9/20/2005	1,000		
7/5/2005	6,400			9/20/2005	400		
7/12/2005	2,600	4,156	1,630	9/27/2005	600	695	1,727
7/12/2005	4,600			9/27/2005	400		
7/12/2005	6,000			9/27/2005	1,400		
7/19/2005	6,500	13,261	2,744				
7/19/2005	20,500						
7/19/2005	17,500						

Table C-17. Evans Ditch at 9 Mile Road (US6) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Evans Ditch at 9 Mile Road (US6)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	380	299	---	7/26/2005	7,000	8,819	5,295
5/10/2005	220			7/26/2005	7,000		
5/10/2005	320			7/26/2005	14,000		
5/17/2005	140	266	---	8/2/2005	1,500	3,455	6,230
5/17/2005	480			8/2/2005	5,500		
5/17/2005	280			8/2/2005	5,000		
5/24/2005	800	790	---	8/9/2005	500	1,931	4,531
5/24/2005	440			8/9/2005	2,400		
5/24/2005	1,400			8/9/2005	6,000		
5/31/2005	120	145	---	8/16/2005	1,000	1,442	4,338
5/31/2005	140			8/16/2005	3,000		
5/31/2005	180			8/16/2005	1,000		
6/7/2005	240	397	325	8/23/2005	400	765	2,304
6/7/2005	1,000			8/23/2005	1,400		
6/7/2005	260			8/23/2005	800		
6/16/2005	100	458	353	8/30/2005	4,000	1,857	1,687
6/16/2005	800			8/30/2005	2,000		
6/16/2005	1,200			8/30/2005	800		
6/21/2005	3,000	1,348	489	9/6/2005	200	1,521	1,432
6/21/2005	340			9/6/2005	11,000		
6/21/2005	2,400			9/6/2005	1,600		
6/28/2005	1,000	1,533	558	9/13/2005	360	355	1,021
6/28/2005	3,000			9/13/2005	520		
6/28/2005	1,200			9/13/2005	240		
7/5/2005	17,600	9,493	1,289	9/20/2005	800	458	811
7/5/2005	9,000			9/20/2005	1,200		
7/5/2005	5,400			9/20/2005	100		
7/12/2005	1,800	1,793	1,743	9/27/2005	600	952	848
7/12/2005	2,000			9/27/2005	1,200		
7/12/2005	1,600			9/27/2005	1,200		
7/19/2005	17,000	18,099	3,637				
7/19/2005	15,500						
7/19/2005	22,500						

Table C-18. Evans Ditch at Berg Road (M05) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Evans Ditch at Berg Road (M05)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	340	332	---	7/26/2005	2,000	1,260	2,344
5/10/2005	360			7/26/2005	1,000		
5/10/2005	300			7/26/2005	1,000		
5/17/2005	80	109	---	8/2/2005	97,000	89,193	5,414
5/17/2005	160			8/2/2005	95,000		
5/17/2005	100			8/2/2005	77,000		
5/24/2005	420	369	---	8/9/2005	1,000	3,148	4,606
5/24/2005	120			8/9/2005	1,200		
5/24/2005	1,000			8/9/2005	26,000		
5/31/2005	160	252	---	8/16/2005	500	737	4,186
5/31/2005	500			8/16/2005	1,000		
5/31/2005	200			8/16/2005	800		
6/7/2005	740	376	263	8/23/2005	2,500	794	2,905
6/7/2005	400			8/23/2005	200		
6/7/2005	180			8/23/2005	1,000		
6/16/2005	2,200	726	308	8/30/2005	200	363	2,265
6/16/2005	280			8/30/2005	600		
6/16/2005	620			8/30/2005	400		
6/21/2005	240	306	379	9/6/2005	200	363	754
6/21/2005	460			9/6/2005	200		
6/21/2005	260			9/6/2005	1,200		
6/28/2005	1,160	1,358	491	9/13/2005	7,200	2,052	692
6/28/2005	1,800			9/13/2005	1,000		
6/28/2005	1,200			9/13/2005	1,200		
7/5/2005	15,400	7,063	957	9/20/2005	600	493	638
7/5/2005	10,400			9/20/2005	1,000		
7/5/2005	2,200			9/20/2005	200		
7/12/2005	1,000	1,189	1,204	9/27/2005	600	944	661
7/12/2005	600			9/27/2005	1,400		
7/12/2005	2,800			9/27/2005	1,000		
7/19/2005	1,800	4,928	1,767				
7/19/2005	9,500						
7/19/2005	7,000						

Table C-19. Main Rouge north of 7 Mile Road at Bonnie Brook Golf Course (M15) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge, north of 7 Mile Road at Bonnie Brook Golf Course (M15)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	240	287	---	7/26/2005	9,000	4,160	3,250
5/10/2005	260			7/26/2005	2,000		
5/10/2005	380			7/26/2005	4,000		
5/17/2005	220	102	---	8/2/2005	1,000	3,158	4,269
5/17/2005	80			8/2/2005	7,000		
5/17/2005	60			8/2/2005	4,500		
5/24/2005	2,400	2,292	---	8/9/2005	500	292	2,051
5/24/2005	760			8/9/2005	100		
5/24/2005	6,600			8/9/2005	500		
5/31/2005	160	179	---	8/16/2005	500	855	1,978
5/31/2005	180			8/16/2005	2,500		
5/31/2005	200			8/16/2005	500		
6/7/2005	420	764	391	8/23/2005	400	577	1,136
6/7/2005	1,000			8/23/2005	400		
6/7/2005	1,060			8/23/2005	1,200		
6/16/2005	800	1,454	541	8/30/2005	760	1,316	903
6/16/2005	3,200			8/30/2005	2,500		
6/16/2005	1,200			8/30/2005	1,200		
6/21/2005	1,800	1,864	968	9/6/2005	1,000	1,339	760
6/21/2005	1,800			9/6/2005	2,000		
6/21/2005	2,000			9/6/2005	1,200		
6/28/2005	400	807	786	9/13/2005	3,800	5,259	1,355
6/28/2005	940			9/13/2005	5,800		
6/28/2005	1,400			9/13/2005	6,600		
7/5/2005	11,400	11,418	1,803	9/20/2005	600	363	1,142
7/5/2005	12,800			9/20/2005	400		
7/5/2005	10,200			9/20/2005	200		
7/12/2005	500	1,026	1,913	9/27/2005	800	529	1,122
7/12/2005	1,800			9/27/2005	420		
7/12/2005	1,200			9/27/2005	440		
7/19/2005	18,000	9,217	2,768				
7/19/2005	3,000						
7/19/2005	14,500						

Table C-20. Main Rouge at Fenkell Road (G43) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Fenkell Road (G43)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	160	198	---	7/26/2005	2,500	1,554	2,912
5/10/2005	220			7/26/2005	1,500		
5/10/2005	220			7/26/2005	1,000		
5/17/2005	160	157	---	8/2/2005	10,500	4,034	3,617
5/17/2005	240			8/2/2005	500		
5/17/2005	100			8/2/2005	12,500		
5/24/2005	1,820	835	---	8/9/2005	800	783	2,265
5/24/2005	800			8/9/2005	1,500		
5/24/2005	400			8/9/2005	400		
5/31/2005	420	343	---	8/16/2005	600	925	2,073
5/31/2005	480			8/16/2005	2,200		
5/31/2005	200			8/16/2005	600		
6/7/2005	1,600	955	385	8/23/2005	1,000	843	1,308
6/7/2005	680			8/23/2005	1,000		
6/7/2005	800			8/23/2005	600		
6/16/2005	3,000	2,080	617	8/30/2005	800	1,308	1,264
6/16/2005	3,000			8/30/2005	1,400		
6/16/2005	1,000			8/30/2005	2,000		
6/21/2005	800	884	872	9/6/2005	600	458	818
6/21/2005	1,800			9/6/2005	400		
6/21/2005	480			9/6/2005	400		
6/28/2005	1,240	1,365	962	9/13/2005	2,600	2,655	1,044
6/28/2005	1,800			9/13/2005	3,000		
6/28/2005	1,140			9/13/2005	2,400		
7/5/2005	6,800	8,128	1,811	9/20/2005	600	711	991
7/5/2005	9,400			9/20/2005	1,000		
7/5/2005	8,400			9/20/2005	600		
7/12/2005	600	1,442	1,967	9/27/2005	3,000	2,896	1,268
7/12/2005	2,500			9/27/2005	4,500		
7/12/2005	2,000			9/27/2005	1,800		
7/19/2005	3,000	8,427	2,602				
7/19/2005	28,500						
7/19/2005	7,000						

Table C-21. Main Rouge at Plymouth Road (US7) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Plymouth Road (US7)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	140	125	---	7/26/2005	8,000	3,420	2,170
5/10/2005	100			7/26/2005	2,500		
5/10/2005	140			7/26/2005	2,000		
5/17/2005	1,000	711	---	8/2/2005	2,500	1,357	2,349
5/17/2005	600			8/2/2005	500		
5/17/2005	600			8/2/2005	2,000		
5/24/2005	260	1,259	---	8/9/2005	2,800	2,077	2,654
5/24/2005	4,800			8/9/2005	3,200		
5/24/2005	1,600			8/9/2005	1,000		
5/31/2005	1,600	1,226	---	8/16/2005	1,400	4,718	3,716
5/31/2005	4,800			8/16/2005	15,000		
5/31/2005	240			8/16/2005	5,000		
6/7/2005	4,600	4,562	911	8/23/2005	1,500	1,480	2,321
6/7/2005	8,600			8/23/2005	1,800		
6/7/2005	2,400			8/23/2005	1,200		
6/16/2005	200	473	1,188	8/30/2005	2,500	1,913	2,066
6/16/2005	240			8/30/2005	2,000		
6/16/2005	2,200			8/30/2005	1,400		
6/21/2005	100	476	1,097	9/6/2005	2,200	1,639	2,145
6/21/2005	1,800			9/6/2005	2,000		
6/21/2005	600			9/6/2005	1,000		
6/28/2005	720	913	1,028	9/13/2005	3,000	3,533	2,386
6/28/2005	660			9/13/2005	4,200		
6/28/2005	1,600			9/13/2005	3,500		
7/5/2005	1,000	1,129	1,011	9/20/2005	3,200	2,486	2,099
7/5/2005	800			9/20/2005	6,000		
7/5/2005	1,800			9/20/2005	800		
7/12/2005	1,400	876	727	9/27/2005	4,500	2,008	2,231
7/12/2005	600			9/27/2005	1,800		
7/12/2005	800			9/27/2005	1,000		
7/19/2005	19,500	15,590	1,463				
7/19/2005	33,500						
7/19/2005	5,800						

Table C-22. Main Rouge at Ann Arbor Trail (G42) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Ann Arbor Trail (G42)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	80	137	---	7/26/2005	48,000	49,612	5,633
5/10/2005	100			7/26/2005	53,000		
5/10/2005	320			7/26/2005	48,000		
5/17/2005	1,340	916	---	8/2/2005	67,000	67,782	16,268
5/17/2005	820			8/2/2005	56,000		
5/17/2005	700			8/2/2005	83,000		
5/24/2005	1,800	1,864	---	8/9/2005	6,000	4,932	12,108
5/24/2005	1,000			8/9/2005	4,000		
5/24/2005	3,600			8/9/2005	5,000		
5/31/2005	240	249	---	8/16/2005	2,200	1,283	13,203
5/31/2005	200			8/16/2005	1,200		
5/31/2005	320			8/16/2005	800		
6/7/2005	1,060	1,140	581	8/23/2005	500	368	6,010
6/7/2005	1,320			8/23/2005	200		
6/7/2005	1,060			8/23/2005	500		
6/16/2005	1,160	1,135	887	8/30/2005	1,500	1,480	2,977
6/16/2005	1,260			8/30/2005	1,800		
6/16/2005	1,000			8/30/2005	1,200		
6/21/2005	400	764	856	9/6/2005	260	269	985
6/21/2005	620			9/6/2005	340		
6/21/2005	1,800			9/6/2005	220		
6/28/2005	400	337	608	9/13/2005	1,900	913	703
6/28/2005	400			9/13/2005	400		
6/28/2005	240			9/13/2005	1,000		
7/5/2005	24,600	21,595	1,484	9/20/2005	800	684	620
7/5/2005	17,200			9/20/2005	400		
7/5/2005	23,800			9/20/2005	1,000		
7/12/2005	1,800	832	1,394	9/27/2005	2,400	3,663	981
7/12/2005	400			9/27/2005	3,200		
7/12/2005	800			9/27/2005	6,400		
7/19/2005	16,500	18,855	2,445				
7/19/2005	12,500						
7/19/2005	32,500						

Table C-23. Main Rouge at Ford Mansion (M10) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Ford Mansion (M10)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	NC		---	7/26/2005	10,000	32,992	6,738
5/10/2005	NC			7/26/2005	66,500		
5/10/2005	NC			7/26/2005	54,000		
5/17/2005	NC		---	8/2/2005	6,000	4,481	8,407
5/17/2005	NC			8/2/2005	2,500		
5/17/2005	NC			8/2/2005	6,000		
5/24/2005	NC		---	8/9/2005	2,400	1,687	5,172
5/24/2005	NC			8/9/2005	1,000		
5/24/2005	NC			8/9/2005	2,000		
5/31/2005	80	83	---	8/16/2005	400	824	5,250
5/31/2005	60			8/16/2005	1,400		
5/31/2005	120			8/16/2005	1,000		
6/7/2005	400	436	---	8/23/2005	400	252	2,202
6/7/2005	280			8/23/2005	200		
6/7/2005	740			8/23/2005	200		
6/16/2005	NC	693	---	8/30/2005	2,000	1,293	1,152
6/16/2005	600			8/30/2005	1,080		
6/16/2005	800			8/30/2005	1,000		
6/21/2005	220	223	---	9/6/2005	600	487	739
6/21/2005	180			9/6/2005	320		
6/21/2005	280			9/6/2005	600		
6/28/2005	1,520	1,482	368	9/13/2005	200	200	482
6/28/2005	1,700			9/13/2005	200		
6/28/2005	1,260			9/13/2005	200		
7/5/2005	19,200	19,137	1,179	9/20/2005	200	543	444
7/5/2005	23,400			9/20/2005	1,000		
7/5/2005	15,600			9/20/2005	800		
7/12/2005	1,400	765	1,330	9/27/2005	2,000	2,125	680
7/12/2005	400			9/27/2005	600		
7/12/2005	800			9/27/2005	8,000		
7/19/2005	29,000	19,399	2,480				
7/19/2005	9,500						
7/19/2005	26,500						

Table C-24. Main Rouge at Rotunda Drive (US8) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Rotunda Drive (US8)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	120	151	---	7/26/2005	6,800	5,641	4,382
5/10/2005	120			7/26/2005	4,000		
5/10/2005	240			7/26/2005	6,600		
5/17/2005	780	831	---	8/2/2005	3,800	3,100	6,092
5/17/2005	920			8/2/2005	2,800		
5/17/2005	800			8/2/2005	2,800		
5/24/2005	1,600	1,964	---	8/9/2005	1,000	1,587	3,925
5/24/2005	1,820			8/9/2005	1,600		
5/24/2005	2,600			8/9/2005	2,500		
5/31/2005	200	164	---	8/16/2005	2,000	1,864	3,728
5/31/2005	100			8/16/2005	1,800		
5/31/2005	220			8/16/2005	1,800		
6/7/2005	520	1,130	539	8/23/2005	1,060	1,019	2,210
6/7/2005	1,540			8/23/2005	980		
6/7/2005	1,800			8/23/2005	1,020		
6/16/2005	2,000	1,356	837	8/30/2005	200	635	1,428
6/16/2005	1,560			8/30/2005	3,200		
6/16/2005	800			8/30/2005	400		
6/21/2005	160	276	671	9/6/2005	1,200	832	1,098
6/21/2005	220			9/6/2005	800		
6/21/2005	600			9/6/2005	600		
6/28/2005	740	597	529	9/13/2005	1,800	968	994
6/28/2005	600			9/13/2005	1,200		
6/28/2005	480			9/13/2005	420		
7/5/2005	9,400	14,300	1,293	9/20/2005	800	800	840
7/5/2005	15,400			9/20/2005	800		
7/5/2005	20,200			9/20/2005	800		
7/12/2005	1,000	2,410	1,505	9/27/2005	4,800	2,566	1,010
7/12/2005	2,000			9/27/2005	2,200		
7/12/2005	7,000			9/27/2005	1,600		
7/19/2005	14,500	13,920	2,397				
7/19/2005	12,000						
7/19/2005	15,500						

Table C-25. Main Rouge at Greenfield Road (M12) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Main Rouge at Greenfield Road (M12)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/10/2005	300	272	---	7/26/2005	2,600	3,465	2,784
5/10/2005	240			7/26/2005	3,200		
5/10/2005	280			7/26/2005	5,000		
5/17/2005	40	98	---	8/2/2005	2,400	2,265	4,309
5/17/2005	580			8/2/2005	2,200		
5/17/2005	40			8/2/2005	2,200		
5/24/2005	1,740	2,291	---	8/9/2005	600	952	2,400
5/24/2005	1,920			8/9/2005	1,800		
5/24/2005	3,600			8/9/2005	800		
5/31/2005	100	167	---	8/16/2005	400	400	2,267
5/31/2005	180			8/16/2005	400		
5/31/2005	260			8/16/2005	400		
6/7/2005	800	784	380	8/23/2005	120	154	856
6/7/2005	700			8/23/2005	380		
6/7/2005	860			8/23/2005	80		
6/16/2005	1,600	1,512	536	8/30/2005	520	1,356	710
6/16/2005	600			8/30/2005	3,000		
6/16/2005	3,600			8/30/2005	1,600		
6/21/2005	320	268	656	9/6/2005	400	425	508
6/21/2005	300			9/6/2005	320		
6/21/2005	200			9/6/2005	600		
6/28/2005	400	255	423	9/13/2005	160	217	378
6/28/2005	160			9/13/2005	400		
6/28/2005	260			9/13/2005	160		
7/5/2005	18,400	17,768	1,076	9/20/2005	800	1,423	487
7/5/2005	20,600			9/20/2005	2,000		
7/5/2005	14,800			9/20/2005	1,800		
7/12/2005	100	531	995	9/27/2005	1,600	1,832	799
7/12/2005	1,500			9/27/2005	1,200		
7/12/2005	1,000			9/27/2005	3,200		
7/19/2005	13,500	20,041	1,669				
7/19/2005	22,500						
7/19/2005	26,500						

APPENDIX D

UPPER ROUGE RIVER
MDEQ 2005 *E. coli* MONITORING DATA

SAMPLING LOCATIONS,
SAMPLING DATES,
E. COLI RESULTS,
DAILY MAXIMUMS, AND
30-DAY ROLLING GEOMETRIC MEANS

Table D-1. Upper Rouge at Powers Road (U01) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Upper Rouge at Powers Road (U01)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	40	179	---	7/29/2005	2,500	1,442	2,144
5/12/2005	360			7/29/2005	1,200		
5/12/2005	400			7/29/2005	1,000		
5/19/2005	480	390	---	8/5/2005	2,500	2,321	1,478
5/19/2005	440			8/5/2005	2,500		
5/19/2005	280			8/5/2005	2,000		
5/26/2005	120	250	---	8/12/2005	2,400	3,115	1,737
5/26/2005	540			8/12/2005	4,500		
5/26/2005	240			8/12/2005	2,800		
6/2/2005	1,200	993	---	8/19/2005	400	783	1,482
6/2/2005	1,200			8/19/2005	2,000		
6/2/2005	680			8/19/2005	600		
6/9/2005	1,000	965	441	8/26/2005	4,000	3,774	1,985
6/9/2005	880			8/26/2005	2,800		
6/9/2005	1,020			8/26/2005	4,800		
6/14/2005	800	916	611	9/2/2005	1,000	783	1,757
6/14/2005	600			9/2/2005	800		
6/14/2005	1,600			9/2/2005	600		
6/24/2005	300	682	684	9/9/2005	6,000	3,780	1,937
6/24/2005	880			9/9/2005	4,500		
6/24/2005	1,200			9/9/2005	2,000		
6/30/2005	15,800	14,895	1,549	9/16/2005	2,000	4,672	2,100
6/30/2005	12,600			9/16/2005	6,000		
6/30/2005	16,600			9/16/2005	8,500		
7/8/2005	1,600	1,390	1,656	9/26/2005	4,200	3,540	2,840
7/8/2005	1,400			9/26/2005	2,400		
7/8/2005	1,200			9/26/2005	4,400		
7/15/2005	1,200	1,731	1,862	9/30/2005	200	252	1,653
7/15/2005	2,400			9/30/2005	400		
7/15/2005	1,800			9/30/2005	200		
7/22/2005	1,400	876	1,845				
7/22/2005	1,200						
7/22/2005	400						

Table D-2. Upper Rouge at Tuck Road (G72) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Upper Rouge at Tuck Road (G72)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	120	145	---	7/29/2005	4,400	4,373	1,774
5/12/2005	160			7/29/2005	5,000		
5/12/2005	160			7/29/2005	3,800		
5/19/2005	340	943	---	8/5/2005	600	1,129	1,570
5/19/2005	1,540			8/5/2005	1,200		
5/19/2005	1,600			8/5/2005	2,000		
5/26/2005	300	307	---	8/12/2005	2,000	2,289	1,653
5/26/2005	160			8/12/2005	2,000		
5/26/2005	600			8/12/2005	3,000		
6/2/2005	520	479	---	8/19/2005	1,000	783	1,463
6/2/2005	460			8/19/2005	600		
6/2/2005	460			8/19/2005	800		
6/9/2005	1,000	1,086	465	8/26/2005	13,600	8,452	2,370
6/9/2005	800			8/26/2005	7,400		
6/9/2005	1,600			8/26/2005	6,000		
6/14/2005	1,800	1,864	775	9/2/2005	400	684	1,636
6/14/2005	2,000			9/2/2005	1,000		
6/14/2005	1,800			9/2/2005	800		
6/24/2005	3,600	3,302	996	9/9/2005	6,500	4,302	2,137
6/24/2005	2,000			9/9/2005	3,500		
6/24/2005	5,000			9/9/2005	3,500		
6/30/2005	800	2,082	1,462	9/16/2005	9,500	6,193	2,608
6/30/2005	9,400			9/16/2005	5,000		
6/30/2005	1,200			9/16/2005	5,000		
7/8/2005	600	1,772	1,899	9/26/2005	3,500	4,138	3,638
7/8/2005	1,600			9/26/2005	4,600		
7/8/2005	5,800			9/26/2005	4,400		
7/15/2005	1,500	1,442	2,009	9/30/2005	1,000	493	2,061
7/15/2005	1,000			9/30/2005	200		
7/15/2005	2,000			9/30/2005	600		
7/22/2005	1,200	756	1,678				
7/22/2005	600						
7/22/2005	600						

Table D-3. Upper Rouge at Inkster Road (G71) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Upper Rouge Inkster Road (G71)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	1,060	1,210	---	7/29/2005	1,000	1,301	4,590
5/12/2005	2,200			7/29/2005	1,000		
5/12/2005	760			7/29/2005	2,200		
5/19/2005	1,060	716	---	8/5/2005	200	727	2,682
5/19/2005	540			8/5/2005	800		
5/19/2005	640			8/5/2005	2,400		
5/26/2005	320	342	---	8/12/2005	41,500	18,334	3,393
5/26/2005	260			8/12/2005	13,500		
5/26/2005	480			8/12/2005	11,000		
6/2/2005	200	660	---	8/19/2005	2,500	1,339	2,154
6/2/2005	1,800			8/19/2005	800		
6/2/2005	800			8/19/2005	1,200		
6/9/2005	1,800	1,361	767	8/26/2005	2,000	1,833	2,117
6/9/2005	1,000			8/26/2005	1,400		
6/9/2005	1,400			8/26/2005	2,200		
6/14/2005	2,100	2,066	854	9/2/2005	1,600	1,215	2,088
6/14/2005	3,000			9/2/2005	1,400		
6/14/2005	1,400			9/2/2005	800		
6/24/2005	200	1,702	1,016	9/9/2005	8,500	13,133	3,726
6/24/2005	8,800			9/9/2005	13,000		
6/24/2005	2,800			9/9/2005	20,500		
6/30/2005	17,400	10,659	2,021	9/16/2005	1,500	5,168	2,892
6/30/2005	14,500			9/16/2005	8,000		
6/30/2005	4,800			9/16/2005	11,500		
7/8/2005	2,200	5,662	3,105	9/26/2005	2,000	2,499	3,276
7/8/2005	5,500			9/26/2005	3,000		
7/8/2005	15,000			9/26/2005	2,600		
7/15/2005	26,000	12,974	4,875	9/30/2005	600	476	2,502
7/15/2005	7,000			9/30/2005	180		
7/15/2005	12,000			9/30/2005	1,000		
7/22/2005	2,000	2,000	4,843				
7/22/2005	2,000						
7/22/2005	2,000						

Table D-4. Upper Rouge at Graham Road (U02) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Upper Rouge Graham Road (U02)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	1,120	1,026	---	7/29/2005	2,500	2,726	3,902
5/12/2005	860			7/29/2005	1,800		
5/12/2005	1,120			7/29/2005	4,500		
5/19/2005	920	619	---	8/5/2005	400	577	2,446
5/19/2005	340			8/5/2005	600		
5/19/2005	760			8/5/2005	800		
5/26/2005	340	245	---	8/12/2005	1,600	1,308	1,856
5/26/2005	120			8/12/2005	1,000		
5/26/2005	360			8/12/2005	1,400		
6/2/2005	1,200	1,021	---	8/19/2005	1,200	896	1,356
6/2/2005	1,200			8/19/2005	600		
6/2/2005	740			8/19/2005	1,000		
6/9/2005	3,200	2,493	831	8/26/2005	800	862	1,097
6/9/2005	2,200			8/26/2005	1,000		
6/9/2005	2,200			8/26/2005	800		
6/14/2005	3,400	5,572	1,166	9/2/2005	3,000	2,052	1,037
6/14/2005	10,600			9/2/2005	2,400		
6/14/2005	4,800			9/2/2005	1,200		
6/24/2005	2,400	3,504	1,648	9/9/2005	1,000	3,780	1,510
6/24/2005	3,200			9/9/2005	6,000		
6/24/2005	5,600			9/9/2005	9,000		
6/30/2005	4,800	5,955	3,121	9/16/2005	2,000	7,905	2,163
6/30/2005	4,400			9/16/2005	19,000		
6/30/2005	10,000			9/16/2005	13,000		
7/8/2005	8,000	5,202	4,322	9/26/2005	4,200	2,932	2,742
7/8/2005	4,400			9/26/2005	4,000		
7/8/2005	4,000			9/26/2005	1,500		
7/15/2005	6,000	4,305	4,821	9/30/2005	1,400	964	2,804
7/15/2005	3,500			9/30/2005	800		
7/15/2005	3,800			9/30/2005	800		
7/22/2005	3,500	2,488	4,103				
7/22/2005	2,000						
7/22/2005	2,200						

Table D-5. Bell Branch at Riverside Street (U14) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Bell Branch at Riverside Street (U14)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	NC		---	7/29/2005	4,800	4,654	4,121
5/12/2005	NC			7/29/2005	7,000		
5/12/2005	NC			7/29/2005	3,000		
5/19/2005	NC		---	8/5/2005	2,200	890	2,580
5/19/2005	NC			8/5/2005	800		
5/19/2005	NC			8/5/2005	400		
5/26/2005	NC		---	8/12/2005	7,000	7,151	2,824
5/26/2005	NC			8/12/2005	9,500		
5/26/2005	NC			8/12/2005	5,500		
6/2/2005	400	868	---	8/19/2005	2,600	2,153	2,686
6/2/2005	1,540			8/19/2005	2,400		
6/2/2005	1,060			8/19/2005	1,600		
6/9/2005	12,200	3,133	---	8/26/2005	1,400	1,104	2,341
6/9/2005	1,400			8/26/2005	1,200		
6/9/2005	1,800			8/26/2005	800		
6/14/2005	2,200	2,978	---	9/2/2005	4,000	3,297	2,185
6/14/2005	2,000			9/2/2005	3,200		
6/14/2005	6,000			9/2/2005	2,800		
6/24/2005	800	1,185	---	9/9/2005	2,000	2,943	2,776
6/24/2005	2,600			9/9/2005	1,500		
6/24/2005	800			9/9/2005	8,500		
6/30/2005	11,500	9,247	2,452	9/16/2005	7,000	6,316	2,708
6/30/2005	5,500			9/16/2005	3,000		
6/30/2005	12,500			9/16/2005	12,000		
7/8/2005	1,800	4,555	3,417	9/26/2005	5,500	4,041	3,071
7/8/2005	7,000			9/26/2005	3,000		
7/8/2005	7,500			9/26/2005	4,000		
7/15/2005	2,400	2,764	3,332	9/30/2005	2,500	669	2,779
7/15/2005	1,600			9/30/2005	600		
7/15/2005	5,500			9/30/2005	200		
7/22/2005	1,600	2,194	3,135				
7/22/2005	2,200						
7/22/2005	3,000						

Table D-6. Bell Branch at 6 Mile Road, west of Farmington (U15) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Bell Branch at 6 Mile Road, west of Farmington (U15)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	360	557	---	7/29/2005	4,000	2,125	3,006
5/12/2005	600			7/29/2005	2,000		
5/12/2005	800			7/29/2005	1,200		
5/19/2005	220	338	---	8/5/2005	3,000	1,026	2,300
5/19/2005	380			8/5/2005	600		
5/19/2005	460			8/5/2005	600		
5/26/2005	580	197	---	8/12/2005	22,500	15,654	2,958
5/26/2005	20			8/12/2005	11,000		
5/26/2005	660			8/12/2005	15,500		
6/2/2005	640	755	---	8/19/2005	600	1,480	2,846
6/2/2005	700			8/19/2005	4,500		
6/2/2005	960			8/19/2005	1,200		
6/9/2005	1,400	2,033	564	8/26/2005	800	783	2,087
6/9/2005	2,000			8/26/2005	600		
6/9/2005	3,000			8/26/2005	1,000		
6/14/2005	3,500	3,865	830	9/2/2005	600	916	1,763
6/14/2005	3,000			9/2/2005	1,600		
6/14/2005	5,500			9/2/2005	800		
6/24/2005	6,400	7,230	1,532	9/9/2005	17,000	14,272	2,985
6/24/2005	8,200			9/9/2005	9,000		
6/24/2005	7,200			9/9/2005	19,000		
6/30/2005	5,000	3,915	2,786	9/16/2005	10,500	5,489	2,421
6/30/2005	3,000			9/16/2005	4,500		
6/30/2005	4,000			9/16/2005	3,500		
7/8/2005	5,000	4,448	3,972	9/26/2005	2,800	2,527	2,694
7/8/2005	3,200			9/26/2005	2,400		
7/8/2005	5,500			9/26/2005	2,400		
7/15/2005	1,800	1,793	3,874	9/30/2005	1,000	1,000	2,829
7/15/2005	2,000			9/30/2005	1,000		
7/15/2005	1,600			9/30/2005	1,000		
7/22/2005	2,500	3,699	3,840				
7/22/2005	4,500						
7/22/2005	4,500						

Table D-7. Tarabusi Creek at 7 Mile Road between Farmington Road and Merriman Road (U17) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Tarabusi Creek at 7 Mile Road between Farmington Road and Merriman Road (U17)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	760	2,133	---	7/29/2005	2,500	2,972	2,788
5/12/2005	11,400			7/29/2005	3,000		
5/12/2005	1,120			7/29/2005	3,500		
5/19/2005	600	690	---	8/5/2005	2,400	1,887	2,586
5/19/2005	740			8/5/2005	1,000		
5/19/2005	740			8/5/2005	2,800		
5/26/2005	1,320	1,340	---	8/12/2005	1,000	1,474	2,248
5/26/2005	1,200			8/12/2005	2,000		
5/26/2005	1,520			8/12/2005	1,600		
6/2/2005	120	589	---	8/19/2005	800	928	1,723
6/2/2005	1,420			8/19/2005	1,000		
6/2/2005	1,200			8/19/2005	1,000		
6/9/2005	1,800	1,129	1,056	8/26/2005	2,600	3,298	1,908
6/9/2005	1,000			8/26/2005	4,600		
6/9/2005	800			8/26/2005	3,000		
6/14/2005	1,200	1,512	986	9/2/2005	800	660	1,413
6/14/2005	1,200			9/2/2005	600		
6/14/2005	2,400			9/2/2005	600		
6/24/2005	5,200	4,273	1,419	9/9/2005	12,000	9,524	1,953
6/24/2005	3,000			9/9/2005	9,000		
6/24/2005	5,000			9/9/2005	8,000		
6/30/2005	7,400	2,747	1,638	9/16/2005	1,000	5,446	2,536
6/30/2005	1,000			9/16/2005	17,000		
6/30/2005	2,800			9/16/2005	9,500		
7/8/2005	3,000	2,972	2,264	9/26/2005	8,000	5,646	3,639
7/8/2005	3,500			9/26/2005	4,500		
7/8/2005	2,500			9/26/2005	5,000		
7/15/2005	4,000	3,509	2,841	9/30/2005	2,500	1,554	3,130
7/15/2005	4,500			9/30/2005	1,500		
7/15/2005	2,400			9/30/2005	1,000		
7/22/2005	1,600	1,978	2,998				
7/22/2005	2,200						
7/22/2005	2,200						

Table D-8. Tributary to Tarabusi Creek at 8 Mile Road and Purlingbrook, east of Orchard Lake Road (G19) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Tributary to Tarabusi Creek at 8 Mile Road and Purlingbrook, east of Orchard Lake Road (G19)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	1,540	1,762	---	7/29/2005	2,000	2,000	3,879
5/12/2005	2,140			7/29/2005	2,500		
5/12/2005	1,660			7/29/2005	1,600		
5/19/2005	1,400	1,192	---	8/5/2005	1,500	1,026	2,248
5/19/2005	1,140			8/5/2005	600		
5/19/2005	1,060			8/5/2005	1,200		
5/26/2005	1,600	2,314	---	8/12/2005	22,000	3,208	2,452
5/26/2005	4,400			8/12/2005	500		
5/26/2005	1,760			8/12/2005	3,000		
6/2/2005	1,000	1,461	---	8/19/2005	1,600	1,308	2,022
6/2/2005	2,600			8/19/2005	1,400		
6/2/2005	1,200			8/19/2005	1,000		
6/9/2005	4,600	5,748	2,100	8/26/2005	1,600	400	1,281
6/9/2005	4,800			8/26/2005	200		
6/9/2005	8,600			8/26/2005	200		
6/14/2005	4,800	3,483	2,406	9/2/2005	200	193	802
6/14/2005	4,000			9/2/2005	60		
6/14/2005	2,200			9/2/2005	600		
6/24/2005	5,400	3,324	2,954	9/9/2005	9,000	9,475	1,252
6/24/2005	3,400			9/9/2005	10,500		
6/24/2005	2,000			9/9/2005	9,000		
6/30/2005	19,000	15,714	4,333	9/16/2005	3,000	10,284	1,580
6/30/2005	9,200			9/16/2005	14,500		
6/30/2005	22,200			9/16/2005	25,000		
7/8/2005	1,600	2,077	4,649	9/26/2005	9,500	8,472	2,296
7/8/2005	3,500			9/26/2005	8,000		
7/8/2005	1,600			9/26/2005	8,000		
7/15/2005	2,800	3,429	4,193	9/30/2005	800	862	2,677
7/15/2005	3,200			9/30/2005	800		
7/15/2005	4,500			9/30/2005	1,000		
7/22/2005	4,000	3,925	4,294				
7/22/2005	4,200						
7/22/2005	3,600						

Table D-9. Bell Branch at Inkster Road between 5 Mile Road and 6 Mile Road (U03) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Bell Branch at Inkster Road between 5 Mile Road and 6 Mile Road (U03)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	740	2,391	---	7/29/2005	4,000	4,129	3,831
5/12/2005	4,400			7/29/2005	4,400		
5/12/2005	4,200			7/29/2005	4,000		
5/19/2005	1,000	367	---	8/5/2005	1,800	1,793	2,925
5/19/2005	80			8/5/2005	2,000		
5/19/2005	620			8/5/2005	1,600		
5/26/2005	940	794	---	8/12/2005	7,000	3,037	2,868
5/26/2005	620			8/12/2005	1,000		
5/26/2005	860			8/12/2005	4,000		
6/2/2005	1,000	711	---	8/19/2005	1,600	1,724	2,595
6/2/2005	600			8/19/2005	2,000		
6/2/2005	600			8/19/2005	1,600		
6/9/2005	4,600	13,836	1,470	8/26/2005	1,600	1,086	2,112
6/9/2005	24,400			8/26/2005	1,000		
6/9/2005	23,600			8/26/2005	800		
6/14/2005	3,400	5,870	1,760	9/2/2005	1,800	1,480	1,720
6/14/2005	8,500			9/2/2005	1,200		
6/14/2005	7,000			9/2/2005	1,500		
6/24/2005	5,800	4,168	2,860	9/9/2005	1,500	3,832	2,003
6/24/2005	4,800			9/9/2005	2,500		
6/24/2005	2,600			9/9/2005	15,000		
6/30/2005	3,500	6,916	4,409	9/16/2005	15,000	12,698	2,666
6/30/2005	9,000			9/16/2005	10,500		
6/30/2005	10,500			9/16/2005	13,000		
7/8/2005	3,000	3,345	6,009	9/26/2005	5,600	3,694	3,105
7/8/2005	4,800			9/26/2005	6,000		
7/8/2005	2,600			9/26/2005	1,500		
7/15/2005	3,200	2,846	4,379	9/30/2005	1,800	1,890	3,469
7/15/2005	4,500			9/30/2005	2,500		
7/15/2005	1,600			9/30/2005	1,500		
7/22/2005	4,000	3,037	3,838				
7/22/2005	3,500						
7/22/2005	2,000						

Table D-10. Bell Branch at Beech Daly Road south of 5 Mile Road (U04) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Bell Branch at Beech Daly Road south of 5 Mile Road (U04)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	3,400	1,951	---	7/29/2005	2,500	3,240	5,011
5/12/2005	520			7/29/2005	1,600		
5/12/2005	4,200			7/29/2005	8,500		
5/19/2005	160	472	---	8/5/2005	2,000	1,687	3,622
5/19/2005	820			8/5/2005	1,600		
5/19/2005	800			8/5/2005	1,500		
5/26/2005	120	600	---	8/12/2005	500	630	2,202
5/26/2005	2,000			8/12/2005	1,000		
5/26/2005	900			8/12/2005	500		
6/2/2005	1,000	660	---	8/19/2005	1,500	1,243	1,652
6/2/2005	600			8/19/2005	1,600		
6/2/2005	480			8/19/2005	800		
6/9/2005	1,800	4,081	1,083	8/26/2005	1,000	986	1,334
6/9/2005	3,200			8/26/2005	800		
6/9/2005	11,800			8/26/2005	1,200		
6/14/2005	6,600	3,588	1,223	9/2/2005	1,200	832	1,016
6/14/2005	2,500			9/2/2005	600		
6/14/2005	2,800			9/2/2005	800		
6/24/2005	3,500	1,409	1,522	9/9/2005	7,000	7,383	1,365
6/24/2005	800			9/9/2005	11,500		
6/24/2005	1,000			9/9/2005	5,000		
6/30/2005	12,400	8,545	2,590	9/16/2005	14,000	12,440	2,479
6/30/2005	3,400			9/16/2005	11,000		
6/30/2005	14,800			9/16/2005	12,500		
7/8/2005	5,500	7,580	4,219	9/26/2005	4,500	4,327	3,182
7/8/2005	4,800			9/26/2005	6,000		
7/8/2005	16,500			9/26/2005	3,000		
7/15/2005	2,600	5,232	4,434	9/30/2005	1,000	1,613	3,511
7/15/2005	9,500			9/30/2005	2,800		
7/15/2005	5,800			9/30/2005	1,500		
7/22/2005	2,500	2,876	4,242				
7/22/2005	3,400						
7/22/2005	2,800						

Table D-11. Upper Rouge at Telegraph Road (U05) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Upper Rouge at Telegraph Road (U05)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/12/2005	10,600	7,119	---	7/29/2005	3,800	3,476	5,917
5/12/2005	4,600			7/29/2005	6,500		
5/12/2005	7,400			7/29/2005	1,700		
5/19/2005	700	440	---	8/5/2005	4,400	2,635	5,043
5/19/2005	320			8/5/2005	1,600		
5/19/2005	380			8/5/2005	2,600		
5/26/2005	160	259	---	8/12/2005	5,000	5,593	4,352
5/26/2005	180			8/12/2005	5,000		
5/26/2005	600			8/12/2005	7,000		
6/2/2005	580	551	---	8/19/2005	3,400	2,592	3,349
6/2/2005	600			8/19/2005	1,600		
6/2/2005	480			8/19/2005	3,200		
6/9/2005	5,800	3,845	1,114	8/26/2005	400	1,382	2,836
6/9/2005	1,400			8/26/2005	6,600		
6/9/2005	7,000			8/26/2005	1,000		
6/14/2005	3,800	4,599	1,021	9/2/2005	400	1,243	2,309
6/14/2005	4,000			9/2/2005	1,600		
6/14/2005	6,400			9/2/2005	3,000		
6/24/2005	4,200	3,127	1,511	9/9/2005	14,500	6,270	2,746
6/24/2005	2,800			9/9/2005	8,500		
6/24/2005	2,600			9/9/2005	2,000		
6/30/2005	4,600	5,858	2,820	9/16/2005	13,000	9,306	3,040
6/30/2005	4,600			9/16/2005	15,500		
6/30/2005	9,500			9/16/2005	4,000		
7/8/2005	10,000	11,686	5,195	9/26/2005	2,000	1,207	2,610
7/8/2005	8,400			9/26/2005	400		
7/8/2005	19,000			9/26/2005	2,200		
7/15/2005	6,500	9,597	6,238	9/30/2005	1,000	1,216	2,544
7/15/2005	8,500			9/30/2005	1,800		
7/15/2005	16,000			9/30/2005	1,000		
7/22/2005	3,200	3,175	5,793				
7/22/2005	4,000						
7/22/2005	2,500						

APPENDIX E

MIDDLE ROUGE RIVER
MDEQ 2005 *E. coli* MONITORING DATA

SAMPLING LOCATIONS,
SAMPLING DATES,
E. COLI RESULTS,
DAILY MAXIMUMS, AND
30-DAY ROLLING GEOMETRIC MEANS

Table E-1. Middle Rouge at Old Novi Road/Baseline Road (G03) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Middle Rouge at Old Novi Road/Baseline Road (G03)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	120	73	---	8/3/2005	2,000	1,732	1,742
5/11/2005	80			8/3/2005	500		
5/11/2005	40			8/3/2005	5,200		
5/18/2005	160	172	---	8/10/2005	200	363	1,240
5/18/2005	160			8/10/2005	400		
5/18/2005	200			8/10/2005	600		
5/25/2005	200	169	---	8/17/2005	400	317	682
5/25/2005	40			8/17/2005	400		
5/25/2005	600			8/17/2005	200		
6/1/2005	300	330	---	8/24/2005	400	458	674
6/1/2005	600			8/24/2005	400		
6/1/2005	200			8/24/2005	600		
6/8/2005	3,000	1,754	262	8/31/2005	500	669	572
6/8/2005	1,000			8/31/2005	1,000		
6/8/2005	1,800			8/31/2005	600		
6/15/2005	2,600	1,929	504	9/7/2005	500	271	395
6/15/2005	600			9/7/2005	200		
6/15/2005	4,600			9/7/2005	200		
6/22/2005	1,800	2,052	827	9/14/2005	600	493	420
6/22/2005	2,400			9/14/2005	200		
6/22/2005	2,000			9/14/2005	1,000		
6/29/2005	7,800	7,733	1,777	9/21/2005	40	169	370
6/29/2005	7,800			9/21/2005	600		
6/29/2005	7,600			9/21/2005	200		
7/6/2005	1,400	1,987	2,545	9/28/2005	180	179	307
7/6/2005	2,800			9/28/2005	400		
7/6/2005	2,000			9/28/2005	80		
7/13/2005	6,600	6,311	3,287	10/5/2005	200	173	234
7/13/2005	6,800			10/5/2005	260		
7/13/2005	5,600			10/5/2005	100		
7/20/2005	500	485	2,494	10/12/2005	200	301	239
7/20/2005	440			10/12/2005	340		
7/20/2005	520			10/12/2005	400		
7/27/2005	800	1,521	2,349				
7/27/2005	2,200						
7/27/2005	2,000						

Table E-2. Johnson Creek at Sheldon Road (D03) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Johnson Creek at Sheldon Road (D03)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	100	62	---	8/3/2005		349	1,003
5/11/2005	120			8/3/2005	380		
5/11/2005	20			8/3/2005	320		
5/18/2005	140	183	---	8/10/2005	300	221	679
5/18/2005	220			8/10/2005	180		
5/18/2005	200			8/10/2005	200		
5/25/2005	180	280	---	8/17/2005	1,600	1,235	544
5/25/2005	340			8/17/2005	4,200		
5/25/2005	360			8/17/2005	280		
6/1/2005	60	153	---	8/24/2005	140	262	534
6/1/2005	300			8/24/2005	400		
6/1/2005	200			8/24/2005	320		
6/8/2005	340	396	181	8/31/2005	240	201	346
6/8/2005	480			8/31/2005	120		
6/8/2005	380			8/31/2005	280		
6/15/2005	1,000	1,442	339	9/7/2005	260	155	295
6/15/2005	3,000			9/7/2005	60		
6/15/2005	1,000			9/7/2005	240		
6/22/2005	860	1,119	487	9/14/2005	20	115	259
6/22/2005	2,200			9/14/2005	350		
6/22/2005	740			9/14/2005	220		
6/29/2005	400	832	606	9/21/2005	80	141	168
6/29/2005	1,200			9/21/2005	160		
6/29/2005	1,200			9/21/2005	220		
7/6/2005	1,800	1,361	937	9/28/2005	20	93	136
7/6/2005	1,000			9/28/2005	200		
7/6/2005	1,400			9/28/2005	200		
7/13/2005	5,600	3,491	1,449	10/5/2005	100	113	122
7/13/2005	7,600			10/5/2005	120		
7/13/2005	1,000			10/5/2005	120		
7/20/2005	200	285	1,047	10/12/2005	80	121	116
7/20/2005	320			10/12/2005	140		
7/20/2005	360			10/12/2005	160		
7/27/2005	1,600	1,512	1,112				
7/27/2005	1,800						
7/27/2005	1,200						

Table E-3. Middle Rouge at King's Mill Farm, Park Bridge – Northville Area Drive (G04) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Middle Rouge at King's Mill Farm, Park Bridge - Northville Area Drive (G04)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	80	131	---	8/3/2005	400	952	2,566
5/11/2005	100			8/3/2005	1,200		
5/11/2005	280			8/3/2005	1,800		
5/18/2005	800	477	---	8/10/2005	1,200	1,154	2,279
5/18/2005	400			8/10/2005	800		
5/18/2005	340			8/10/2005	1,600		
5/25/2005	200	150	---	8/17/2005	1,000	737	1,446
5/25/2005	140			8/17/2005	500		
5/25/2005	120			8/17/2005	800		
6/1/2005	200	189	---	8/24/2005	180	301	1,066
6/1/2005	280			8/24/2005	380		
6/1/2005	120			8/24/2005	400		
6/8/2005	280	303	222	8/31/2005	200	660	694
6/8/2005	160			8/31/2005	1,200		
6/8/2005	620			8/31/2005	1,200		
6/15/2005	1,800	1,572	364	9/7/2005	400	458	600
6/15/2005	1,200			9/7/2005	400		
6/15/2005	1,800			9/7/2005	600		
6/22/2005	1,200	2,252	497	9/14/2005	1,000	431	492
6/22/2005	2,800			9/14/2005	400		
6/22/2005	3,400			9/14/2005	200		
6/29/2005	8,000	9,001	1,127	9/21/2005	200	178	370
6/29/2005	8,600			9/21/2005	200		
6/29/2005	10,600			9/21/2005	140		
7/6/2005	1,800	2,086	1,823	9/28/2005	2,000	986	470
7/6/2005	1,800			9/28/2005	400		
7/6/2005	2,800			9/28/2005	1,200		
7/13/2005	6,600	7,176	3,433	10/5/2005	400	1,038	514
7/13/2005	8,000			10/5/2005	3,500		
7/13/2005	7,000			10/5/2005	800		
7/20/2005	1,200	1,382	3,346	10/12/2005	1,200	1,243	628
7/20/2005	1,000			10/12/2005	800		
7/20/2005	2,200			10/12/2005	2,000		
7/27/2005	6,000	5,646	4,021				
7/27/2005	5,000						
7/27/2005	6,000						

Table E-4. Middle Rouge at Gunsolly Drive northeast of Edward Hines and Plymouth Road (G05) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Middle Rouge at Gunsolly Drive northeast of Edward Hines and Plymouth Road (G05)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	20	28	---	8/3/2005	40	77	1,045
5/11/2005				8/3/2005	20		
5/11/2005	40			8/3/2005	560		
5/18/2005	300	416	---	8/10/2005	600	142	504
5/18/2005	400			8/10/2005	60		
5/18/2005	600			8/10/2005	80		
5/25/2005	80	58	---	8/17/2005	2,800	272	251
5/25/2005	40			8/17/2005	120		
5/25/2005	60			8/17/2005	60		
6/1/2005	160	115	---	8/24/2005	120	76	198
6/1/2005	240			8/24/2005	180		
6/1/2005	40			8/24/2005	20		
6/8/2005	1,200	473	145	8/31/2005	480	307	147
6/8/2005	260			8/31/2005	300		
6/8/2005	340			8/31/2005	200		
6/15/2005	720	651	243	9/7/2005	80	104	156
6/15/2005	320			9/7/2005	100		
6/15/2005	1,200			9/7/2005	140		
6/22/2005	7,000	4,832	397	9/14/2005	140	119	151
6/22/2005	6,200			9/14/2005	100		
6/22/2005	2,600			9/14/2005	120		
6/29/2005	9,800	9,712	1,108	9/21/2005	120	99	123
6/29/2005	8,200			9/21/2005	40		
6/29/2005	11,400			9/21/2005	200		
7/6/2005	4,200	5,447	2,395	9/28/2005	340	477	178
7/6/2005	7,400			9/28/2005	1,000		
7/6/2005	5,200			9/28/2005	320		
7/13/2005	9,400	8,868	4,304	10/5/2005	380	317	179
7/13/2005	7,000			10/5/2005	420		
7/13/2005	10,600			10/5/2005	200		
7/20/2005	260	246	3,542	10/12/2005	320	447	240
7/20/2005	220			10/12/2005	1,000		
7/20/2005	260			10/12/2005	280		
7/27/2005	1,600	1,368	2,752				
7/27/2005	1,000						
7/27/2005	1,600						

Table E-5. Middle Rouge at Newburgh Lake inlet (in river near mouth) (D21) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Middle Rouge at Newburgh Lake Inlet (in river near mouth) (D21)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	120	115	---	8/3/2005	160	105	1,480
5/11/2005	80			8/3/2005	120		
5/11/2005	160			8/3/2005	60		
5/18/2005	1,400	1,003	---	8/10/2005	600	337	877
5/18/2005	1,200			8/10/2005	400		
5/18/2005	600			8/10/2005	160		
5/25/2005	4,200	3,280	---	8/17/2005	380	913	671
5/25/2005	2,800			8/17/2005	500		
5/25/2005	3,000			8/17/2005	4,000		
6/1/2005	5,000	3,227	---	8/24/2005	120	201	429
6/1/2005	1,600			8/24/2005	340		
6/1/2005	4,200			8/24/2005	200		
6/8/2005	2,200	1,616	1,146	8/31/2005	60	148	249
6/8/2005	1,600			8/31/2005	340		
6/8/2005	1,200			8/31/2005	160		
6/15/2005	220	495	1,534	9/7/2005	240	425	330
6/15/2005	460			9/7/2005	800		
6/15/2005	1,200			9/7/2005	400		
6/22/2005	11,400	7,567	2,298	9/14/2005	100	253	311
6/22/2005	5,000			9/14/2005	620		
6/22/2005	7,600			9/14/2005	260		
6/29/2005	9,600	9,772	2,859	9/21/2005	180	259	242
6/29/2005	10,800			9/21/2005	240		
6/29/2005	9,000			9/21/2005	400		
7/6/2005	5,400	4,618	3,071	9/28/2005	1,000	1,160	343
7/6/2005	4,800			9/28/2005	2,600		
7/6/2005	3,800			9/28/2005	600		
7/13/2005	7,000	3,462	3,577	10/5/2005	600	465	432
7/13/2005	780			10/5/2005	280		
7/13/2005	7,600			10/5/2005	600		
7/20/2005	2,000	1,887	4,674	10/12/2005	380	421	431
7/20/2005	1,400			10/12/2005	140		
7/20/2005	2,400			10/12/2005	1,400		
7/27/2005	2,200	2,242	3,665				
7/27/2005	3,200						
7/27/2005	1,600						

Table E-6. Middle Rouge at Hines east of Wayne Road (upstream of Nankin Lake) (G13) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Middle Rouge at Hines east of Wayne Road (upstream of Nankin Lake) (G13)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	20	40	---	8/3/2005	260	654	909
5/11/2005	40			8/3/2005	1,580		
5/11/2005	80			8/3/2005	680		
5/18/2005	40	117	---	8/10/2005	80	128	589
5/18/2005	200			8/10/2005	120		
5/18/2005	200			8/10/2005	220		
5/25/2005	100	78	---	8/17/2005	140	300	346
5/25/2005	80			8/17/2005	1,600		
5/25/2005	60			8/17/2005	120		
6/1/2005	300	203	---	8/24/2005	180	173	266
6/1/2005	200			8/24/2005	160		
6/1/2005	140			8/24/2005	180		
6/8/2005	360	429	126	8/31/2005	800	832	325
6/8/2005	220			8/31/2005	400		
6/8/2005	1,000			8/31/2005	1,800		
6/15/2005	600	386	199	9/7/2005	200	216	260
6/15/2005	400			9/7/2005	120		
6/15/2005	240			9/7/2005	420		
6/22/2005	1,200	645	279	9/14/2005	340	306	310
6/22/2005	800			9/14/2005	280		
6/22/2005	280			9/14/2005	300		
6/29/2005	1,800	952	461	9/21/2005	380	483	341
6/29/2005	800			9/21/2005	380		
6/29/2005	600			9/21/2005	780		
7/6/2005	2,200	1,121	648	9/28/2005	140	383	399
7/6/2005	800			9/28/2005	1,000		
7/6/2005	800			9/28/2005	400		
7/13/2005	9,400	4,310	1,028	10/5/2005	180	151	284
7/13/2005	14,200			10/5/2005	160		
7/13/2005	600			10/5/2005	120		
7/20/2005	1,600	645	1,139	10/12/2005	240	166	269
7/20/2005	600			10/12/2005	320		
7/20/2005	280			10/12/2005	60		
7/27/2005	400	304	980				
7/27/2005	320						
7/27/2005	220						

Table E-7. Middle Rouge at Hines/Nankin Lake (opposite canoe livery) (D33) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Middle Rouge at Hines/Nankin Lake (opposite canoe livery) (D33)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
6/8/2005	320	271	---	8/17/2005	200	284	537
6/8/2005	240			8/17/2005	140		
6/8/2005	260			8/17/2005	820		
6/15/2005	360	264	---	8/24/2005	440	381	449
6/15/2005	160			8/24/2005	700		
6/15/2005	320			8/24/2005	180		
6/22/2005	1,000	711	---	8/31/2005	200	577	461
6/22/2005	1,800			8/31/2005	600		
6/22/2005	200			8/31/2005	1,600		
6/29/2005	3,800	2,610	---	9/7/2005	780	500	447
6/29/2005	1,800			9/7/2005	400		
6/29/2005	2,600			9/7/2005	400		
7/6/2005	800	2,024	769	9/14/2005	1,000	1,189	518
7/6/2005	1,400			9/14/2005	1,400		
7/6/2005	7,400			9/14/2005	1,200		
7/13/2005	1,000	928	984	9/21/2005	380	426	561
7/13/2005	800			9/21/2005	600		
7/13/2005	1,000			9/21/2005	340		
7/20/2005	800	928	1,265	9/28/2005	280	285	530
7/20/2005	1,000			9/28/2005	180		
7/20/2005	1,000			9/28/2005	460		
7/27/2005	800	504	1,181	10/5/2005	160	264	453
7/27/2005	400			10/5/2005	360		
7/27/2005	400			10/5/2005	320		
8/3/2005	2,140	585	875	10/12/2005	600	1,081	529
8/3/2005	360			10/12/2005	620		
8/3/2005	260			10/12/2005	3,400		
8/10/2005	520	572	680				
8/10/2005	600						
8/10/2005	600						

Table E-8. Tonquish Creek at Joy Road, west of Lilley Road (D62) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Tonquish Creek at Joy Road, west of Lilley Road (D62)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	20	193	---	8/3/2005	1,400	3,540	4,010
5/11/2005	1,000			8/3/2005	6,600		
5/11/2005	360			8/3/2005	4,800		
5/18/2005	2,600	2,060	---	8/10/2005	2,000	2,154	3,305
5/18/2005	1,400			8/10/2005	2,000		
5/18/2005	2,400			8/10/2005	2,500		
5/25/2005	1,000	1,243	---	8/17/2005	1,700	3,624	3,166
5/25/2005	800			8/17/2005	2,500		
5/25/2005	2,400			8/17/2005	11,200		
6/1/2005	3,400	2,529	---	8/24/2005	8,000	3,826	3,398
6/1/2005	3,400			8/24/2005	3,500		
6/1/2005	1,400			8/24/2005	2,000		
6/8/2005	2,000	2,125	1,216	8/31/2005	500	1,145	2,610
6/8/2005	3,000			8/31/2005	1,000		
6/8/2005	1,600			8/31/2005	3,000		
6/15/2005	2,200	1,917	1,924	9/7/2005	15,000	7,677	3,047
6/15/2005	800			9/7/2005	5,200		
6/15/2005	4,000			9/7/2005	5,800		
6/22/2005	21,200	18,259	2,977	9/14/2005	1,800	2,160	3,048
6/22/2005	19,400			9/14/2005	2,800		
6/22/2005	14,800			9/14/2005	2,000		
6/29/2005	9,500	11,686	4,660	9/21/2005	2,000	1,129	2,414
6/29/2005	10,500			9/21/2005	1,200		
6/29/2005	16,000			9/21/2005	600		
7/6/2005	4,600	5,661	5,475	9/28/2005	2,000	2,194	2,160
7/6/2005	6,800			9/28/2005	2,200		
7/6/2005	5,800			9/28/2005	2,400		
7/13/2005	5,500	4,494	6,360	10/5/2005	200	916	2,066
7/13/2005	5,500			10/5/2005	1,600		
7/13/2005	3,000			10/5/2005	2,400		
7/20/2005	3,600	2,689	6,805	10/12/2005	3,800	4,313	1,841
7/20/2005	1,800			10/12/2005	4,800		
7/20/2005	3,000			10/12/2005	4,400		
7/27/2005	3,400	4,282	5,092				
7/27/2005	4,200						
7/27/2005	5,500						

Table E-9. Tonquish Creek at Wayne Road (G84) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Tonquish Creek at Wayne Road (G84)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	60	58	---	8/3/2005	600	934	2,945
5/11/2005	40			8/3/2005	400		
5/11/2005	80			8/3/2005	3,400		
5/18/2005	2,000	1,639	---	8/10/2005	1,000	843	2,029
5/18/2005	1,000			8/10/2005	1,000		
5/18/2005	2,200			8/10/2005	600		
5/25/2005	1,120	846	---	8/17/2005	2,000	2,289	1,339
5/25/2005	540			8/17/2005	3,000		
5/25/2005	1,000			8/17/2005	2,000		
6/1/2005	320	249	---	8/24/2005	2,000	1,687	1,515
6/1/2005	120			8/24/2005	800		
6/1/2005	400			8/24/2005	3,000		
6/8/2005	1,000	1,129	468	8/31/2005	1,200	1,616	1,375
6/8/2005	1,200			8/31/2005	2,200		
6/8/2005	1,200			8/31/2005	1,600		
6/15/2005	2,000	2,363	983	9/7/2005	600	416	1,170
6/15/2005	3,000			9/7/2005	200		
6/15/2005	2,200			9/7/2005	600		
6/22/2005	18,400	8,916	1,380	9/14/2005	1,200	1,200	1,255
6/22/2005	1,800			9/14/2005	1,200		
6/22/2005	21,400			9/14/2005	1,200		
6/29/2005	4,500	11,233	2,315	9/21/2005	1,600	1,008	1,065
6/29/2005	35,000			9/21/2005	800		
6/29/2005	9,000			9/21/2005	800		
7/6/2005	8,000	5,429	4,289	9/28/2005	1,500	1,174	991
7/6/2005	5,000			9/28/2005	1,800		
7/6/2005	4,000			9/28/2005	600		
7/13/2005	4,000	18,327	7,489	10/5/2005	600	896	881
7/13/2005	57,000			10/5/2005	1,000		
7/13/2005	27,000			10/5/2005	1,200		
7/20/2005	500	909	6,185	10/12/2005	400	1,018	1,053
7/20/2005	1,000			10/12/2005	1,200		
7/20/2005	1,500			10/12/2005	2,200		
7/27/2005	2,000	2,621	4,842				
7/27/2005	2,000						
7/27/2005	4,500						

Table E-10. Middle Rouge at Inkster Road (US2) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Middle Rouge at Inkster Road (US2)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	100	219	---	8/3/2005	400	1,610	3,142
5/11/2005				8/3/2005	600		
5/11/2005	480			8/3/2005	17,400		
5/18/2005	800	560	---	8/10/2005	3,800	4,623	3,236
5/18/2005	1,100			8/10/2005	5,000		
5/18/2005	200			8/10/2005	5,200		
5/25/2005	600	1,293	---	8/17/2005	1,800	3,742	3,047
5/25/2005	3,000			8/17/2005	5,200		
5/25/2005	1,200			8/17/2005	5,600		
6/1/2005	1,000	317	---	8/24/2005	280	304	2,104
6/1/2005	400			8/24/2005	360		
6/1/2005	80			8/24/2005	280		
6/8/2005	1,060	840	566	8/31/2005	4,000	3,915	2,015
6/8/2005	1,000			8/31/2005	5,000		
6/8/2005	560			8/31/2005	3,000		
6/15/2005	4,400	3,255	912	9/7/2005	400	363	1,496
6/15/2005	2,800			9/7/2005	600		
6/15/2005	2,800			9/7/2005	200		
6/22/2005	12,600	5,922	1,461	9/14/2005	2,500	1,063	1,115
6/22/2005	20,600			9/14/2005	600		
6/22/2005	800			9/14/2005	800		
6/29/2005	6,600	5,540	1,954	9/21/2005	2,500	843	828
6/29/2005	18,400			9/21/2005	400		
6/29/2005	1,400			9/21/2005	600		
7/6/2005	3,000	4,026	3,248	9/28/2005	1,000	543	929
7/6/2005	6,400			9/28/2005	200		
7/6/2005	3,400			9/28/2005	800		
7/13/2005	4,500	4,953	4,631	10/5/2005	2,000	783	673
7/13/2005	3,000			10/5/2005	400		
7/13/2005	9,000			10/5/2005	600		
7/20/2005		1,549	4,271	10/12/2005	800	1,793	927
7/20/2005	800			10/12/2005	6,000		
7/20/2005	3,000			10/12/2005	1,200		
7/27/2005	1,500	4,859	4,094				
7/27/2005	8,500						
7/27/2005	9,000						

Table E-11. Middle Rouge at Hines/Ford Road (D06) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Middle Rouge at Hines/Ford Road (D06)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/11/2005	1,720	1,125	---	8/3/2005	1,000	2,095	2,290
5/11/2005	440			8/3/2005	1,000		
5/11/2005	1,880			8/3/2005	9,200		
5/18/2005	1,200	952	---	8/10/2005	7,000	3,552	2,323
5/18/2005	600			8/10/2005	1,600		
5/18/2005	1,200			8/10/2005	4,000		
5/25/2005	680	573	---	8/17/2005	6,500	2,962	2,737
5/25/2005	600			8/17/2005	2,000		
5/25/2005	460			8/17/2005	2,000		
6/1/2005	600	546	---	8/24/2005	600	965	2,718
6/1/2005	340			8/24/2005	1,500		
6/1/2005	800			8/24/2005	1,000		
6/8/2005	1,200	1,598	883	8/31/2005	3,000	2,795	2,264
6/8/2005	1,000			8/31/2005	2,800		
6/8/2005	3,400			8/31/2005	2,600		
6/15/2005	2,200	2,265	1,015	9/7/2005	400	832	1,882
6/15/2005	2,400			9/7/2005	1,800		
6/15/2005	2,200			9/7/2005	800		
6/22/2005	11,800	11,108	1,659	9/14/2005	1,800	896	1,429
6/22/2005	8,800			9/14/2005	400		
6/22/2005	13,200			9/14/2005	1,000		
6/29/2005	23,000	21,059	3,412	9/21/2005	1,600	832	1,109
6/29/2005	18,800			9/21/2005	600		
6/29/2005	21,600			9/21/2005	600		
7/6/2005		3,420	5,169	9/28/2005	600	577	1,000
7/6/2005	5,000			9/28/2005	400		
7/6/2005	3,200			9/28/2005	800		
7/13/2005		1,104	5,247	10/5/2005	500	493	707
7/13/2005	1,600			10/5/2005	200		
7/13/2005	600			10/5/2005	1,200		
7/20/2005	1,000	1,000	4,345	10/12/2005	2,200	1,741	819
7/20/2005	1,000			10/12/2005	2,000		
7/20/2005	1,000			10/12/2005	1,200		
7/27/2005	12,500	6,962	3,901				
7/27/2005	3,000						
7/27/2005	9,000						

APPENDIX F

LOWER ROUGE RIVER
MDEQ 2005 *E. COLI* MONITORING DATA

SAMPLING LOCATIONS,
SAMPLING DATES,
E. COLI RESULTS,
DAILY MAXIMUMS, AND
30-DAY ROLLING GEOMETRIC MEANS

Table F-1. Lower Rouge at Denton Road (G200) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at Denton Road (G200)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	120	219	---	8/4/2005	3,400	2,287	1,105
5/13/2005	200			8/4/2005	4,400		
5/13/2005	440			8/4/2005	800		
5/20/2005	40	140	---	8/11/2005	800	504	870
5/20/2005	340			8/11/2005	400		
5/20/2005	200			8/11/2005	400		
5/27/2005	1,200	1,918	---	8/18/2005	200	200	711
5/27/2005	4,200			8/18/2005	200		
5/27/2005	1,400			8/18/2005	200		
6/3/2005	520	641	---	8/25/2005	40	25	343
6/3/2005	940			8/25/2005	20		
6/3/2005	540			8/25/2005	20		
6/10/2005	60	263	397	9/1/2005	60	29	176
6/10/2005	3,800			9/1/2005	20		
6/10/2005	80			9/1/2005	20		
6/17/2005	1,800	1,135	552	9/8/2005	220	231	111
6/17/2005	1,400			9/8/2005	140		
6/17/2005	580			9/8/2005	400		
6/23/2005	80	234	612	9/15/2005	200	157	88
6/23/2005	1,000			9/15/2005	160		
6/23/2005	160			9/15/2005	120		
6/30/2005	11,400	2,220	630	9/22/2005	3,500	5,082	168
6/30/2005	600			9/22/2005	2,500		
6/30/2005	1,600			9/22/2005	15,000		
7/7/2005	1,600	1,664	763	9/29/2005	400	431	296
7/7/2005	3,600			9/29/2005	1,000		
7/7/2005	800			9/29/2005	200		
7/14/2005	400	550	884	10/6/2005	600	62	345
7/14/2005	800			10/6/2005	20		
7/14/2005	520			10/6/2005	20		
7/21/2005	1,400	968	856	10/13/2005	2,000	986	462
7/21/2005	1,200			10/13/2005	1,200		
7/21/2005	540			10/13/2005	400		
7/28/2005	680	814	1,099				
7/28/2005	880						
7/28/2005	900						

Table F-2. Lower Rouge at Beck Road (L01) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at Beck Road (L01)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	240	211	---	8/4/2005	1,000	1,382	907
5/13/2005	280			8/4/2005	600		
5/13/2005	140			8/4/2005	4,400		
5/20/2005	260	252	---	8/11/2005	400	635	818
5/20/2005	180			8/11/2005	800		
5/20/2005	340			8/11/2005	800		
5/27/2005	240	249	---	8/18/2005	200	252	832
5/27/2005	400			8/18/2005	200		
5/27/2005	160			8/18/2005	400		
6/3/2005	420	594	---	8/25/2005	460	604	659
6/3/2005	500			8/25/2005	600		
6/3/2005	1,000			8/25/2005	800		
6/10/2005	12,800	12,789	631	9/1/2005	1,400	1,003	669
6/10/2005	19,000			9/1/2005	600		
6/10/2005	8,600			9/1/2005	1,200		
6/17/2005	600	783	821	9/8/2005	780	595	565
6/17/2005	800			9/8/2005	500		
6/17/2005	1,000			9/8/2005	540		
6/23/2005	11,600	4,058	1,431	9/15/2005	800	783	589
6/23/2005	1,800			9/15/2005	1,000		
6/23/2005	3,200			9/15/2005	600		
6/30/2005	2,800	2,077	2,188	9/22/2005	400	660	715
6/30/2005	1,600			9/22/2005	600		
6/30/2005	2,000			9/22/2005	1,200		
7/7/2005	1,000	1,063	2,458	9/29/2005	800	727	742
7/7/2005	1,200			9/29/2005	800		
7/7/2005	1,000			9/29/2005	600		
7/14/2005	400	231	1,101	10/6/2005	20	93	461
7/14/2005	220			10/6/2005	200		
7/14/2005	140			10/6/2005	200		
7/21/2005	1,800	1,939	1,320	10/13/2005	2,400	2,713	624
7/21/2005	3,000			10/13/2005	2,600		
7/21/2005	1,350			10/13/2005	3,200		
7/28/2005	480	931	983				
7/28/2005	1,200						
7/28/2005	1,400						

Table F-3. Fowler Creek at Beck Road (G93) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Fowler Creek at Beck Road (G93)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	120	190	---	8/4/2005	2,000	1,170	1,105
5/13/2005	240			8/4/2005	1,000		
5/13/2005	240			8/4/2005	800		
5/20/2005	1,320	1,280	---	8/11/2005	800	727	1,097
5/20/2005	1,020			8/11/2005	1,200		
5/20/2005	1,556			8/11/2005	400		
5/27/2005	200	211	---	8/18/2005	400	621	1,305
5/27/2005	260			8/18/2005	600		
5/27/2005	180			8/18/2005	1,000		
6/3/2005	480	461	---	8/25/2005	400	458	913
6/3/2005	600			8/25/2005	400		
6/3/2005	340			8/25/2005	600		
6/10/2005	3,200	1,973	542	9/1/2005	1,000	621	685
6/10/2005	1,200			9/1/2005	200		
6/10/2005	2,000			9/1/2005	1,200		
6/17/2005	520	584	678	9/8/2005	400	679	614
6/17/2005	480			9/8/2005	1,400		
6/17/2005	800			9/8/2005	560		
6/23/2005	1,800	2,904	799	9/15/2005	7,000	8,759	1,010
6/23/2005	4,000			9/15/2005	8,000		
6/23/2005	3,400			9/15/2005	12,000		
6/30/2005	3,400	3,047	1,363	9/22/2005	1,200	695	1,033
6/30/2005	3,200			9/22/2005	1,400		
6/30/2005	2,600			9/22/2005	200		
7/7/2005	540	756	1,505	9/29/2005	1,000	794	1,153
7/7/2005	800			9/29/2005	1,000		
7/7/2005	1,000			9/29/2005	500		
7/14/2005	200	260	1,003	10/6/2005	400	252	963
7/14/2005	220			10/6/2005	200		
7/14/2005	400			10/6/2005	200		
7/21/2005	3,800	2,738	1,366	10/13/2005	800	363	850
7/21/2005	3,000			10/13/2005	200		
7/21/2005	1,800			10/13/2005	300		
7/28/2005	1,000	2,621	1,339				
7/28/2005	4,500						
7/28/2005	4,000						

Table F-4. Lower Rouge at Canton Center Road (G65) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at Canton Center Road (G65)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	140	88	---	8/4/2005	100	112	441
5/13/2005	80			8/4/2005	100		
5/13/2005	60			8/4/2005	140		
5/20/2005	40	73	---	8/11/2005	400	252	445
5/20/2005	120			8/11/2005	200		
5/20/2005	80			8/11/2005	200		
5/27/2005	60	52	---	8/18/2005	200	200	449
5/27/2005	60			8/18/2005	200		
5/27/2005	40			8/18/2005	200		
6/3/2005	120	105	---	8/25/2005	100	158	234
6/3/2005	120			8/25/2005	180		
6/3/2005	80			8/25/2005	220		
6/10/2005	380	400	107	9/1/2005	200	342	198
6/10/2005	400			9/1/2005	1,000		
6/10/2005	420			9/1/2005	200		
6/17/2005	180	282	135	9/8/2005	200	129	204
6/17/2005	520			9/8/2005	180		
6/17/2005	240			9/8/2005	60		
6/23/2005	380	1,031	230	9/15/2005	800	504	234
6/23/2005	1,600			9/15/2005	400		
6/23/2005	1,800			9/15/2005	400		
6/30/2005	660	903	406	9/22/2005	860	396	268
6/30/2005	620			9/22/2005	300		
6/30/2005	1,800			9/22/2005	240		
7/7/2005	240	240	479	9/29/2005	100	138	261
7/7/2005	160			9/29/2005	120		
7/7/2005	360			9/29/2005	220		
7/14/2005	180	192	413	10/6/2005	240	290	253
7/14/2005	280			10/6/2005	300		
7/14/2005	140			10/6/2005	340		
7/21/2005	2,800	4,132	707	10/13/2005	240	343	307
7/21/2005	6,000			10/13/2005	600		
7/21/2005	4,200			10/13/2005	280		
7/28/2005	400	783	669				
7/28/2005	1,200						
7/28/2005	1,000						

Table F-5. Sines Drain at Sheldon Road (G94) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Sines Drain at Sheldon Road (G94)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	500	288	---	8/4/2005	1,200	1,687	2,464
5/13/2005	400			8/4/2005	1,600		
5/13/2005	120			8/4/2005	2,500		
5/20/2005	940	628	---	8/11/2005	400	543	2,132
5/20/2005	1,200			8/11/2005	400		
5/20/2005	220			8/11/2005	1,000		
5/27/2005	2,400	584	---	8/18/2005	400	317	1,424
5/27/2005	180			8/18/2005	200		
5/27/2005	460			8/18/2005	400		
6/3/2005	600	611	---	8/25/2005	1,200	1,613	987
6/3/2005	380			8/25/2005	3,500		
6/3/2005	1,000			8/25/2005	1,000		
6/10/2005	4,600	5,615	816	9/1/2005	200	458	735
6/10/2005	5,200			9/1/2005	400		
6/10/2005	7,400			9/1/2005	1,200		
6/17/2005	800	1,038	1,055	9/8/2005	2,500	2,488	795
6/17/2005	1,000			9/8/2005	2,800		
6/17/2005	1,400			9/8/2005	2,200		
6/23/2005	1,800	1,446	1,246	9/15/2005	2,000	862	872
6/23/2005	1,400			9/15/2005	400		
6/23/2005	1,200			9/15/2005	800		
6/30/2005	5,400	5,263	1,935	9/22/2005	600	756	1,037
6/30/2005	5,000			9/22/2005	600		
6/30/2005	5,400			9/22/2005	1,200		
7/7/2005	1,000	1,119	2,184	9/29/2005	3,000	1,533	1,026
7/7/2005	1,000			9/29/2005	1,200		
7/7/2005	1,400			9/29/2005	1,000		
7/14/2005	2,200	2,394	1,841	10/6/2005	800	986	1,196
7/14/2005	2,400			10/6/2005	1,200		
7/14/2005	2,600			10/6/2005	1,000		
7/21/2005	9,000	10,086	2,901	10/13/2005	260	592	898
7/21/2005	9,500			10/13/2005	800		
7/21/2005	12,000			10/13/2005	1,000		
7/28/2005	2,200	1,993	3,094				
7/28/2005	2,000						
7/28/2005	1,800						

Table F-6. McKinstry Drain at Michigan Avenue, east of Morton Taylor Road (L51) MDEQ 2005 *E. coli* Monitoring Data (cfu/100ml).

McKinstry Drain at Michigan Avenue, east of Morton Taylor Road (L51)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	100	78	---	8/4/2005	1,600	3,443	1,017
5/13/2005	60			8/4/2005	8,500		
5/13/2005	80			8/4/2005	3,000		
5/20/2005	220	284	---	8/11/2005	400	342	1,448
5/20/2005	260			8/11/2005	200		
5/20/2005	400			8/11/2005	500		
5/27/2005	160	99	---	8/18/2005	400	317	1,151
5/27/2005	60			8/18/2005	400		
5/27/2005	100			8/18/2005	200		
6/3/2005	180	148	---	8/25/2005	20	101	548
6/3/2005	100			8/25/2005	200		
6/3/2005	180			8/25/2005	260		
6/10/2005	8,800	7,356	299	9/1/2005	40	63	299
6/10/2005	7,800			9/1/2005	80		
6/10/2005	5,800			9/1/2005	80		
6/17/2005	400	431	420	9/8/2005	4,200	2,603	283
6/17/2005	1,000			9/8/2005	2,800		
6/17/2005	200			9/8/2005	1,500		
6/23/2005	3,400	3,394	691	9/15/2005	200	165	245
6/23/2005	11,500			9/15/2005	140		
6/23/2005	1,000			9/15/2005	160		
6/30/2005	5,000	5,161	1,524	9/22/2005	260	238	231
6/30/2005	5,000			9/22/2005	200		
6/30/2005	5,500			9/22/2005	260		
7/7/2005	20	58	1,266	9/29/2005	2,600	1,428	392
7/7/2005	20			9/29/2005	1,400		
7/7/2005	500			9/29/2005	800		
7/14/2005	2,000	1,000	849	10/6/2005	1,000	493	591
7/14/2005	500			10/6/2005	600		
7/14/2005	1,000			10/6/2005	200		
7/21/2005	5,000	4,121	1,334	10/13/2005	800	862	474
7/21/2005	3,500			10/13/2005	400		
7/21/2005	4,000			10/13/2005	2,000		
7/28/2005	600	1,310	1,103				
7/28/2005	1,500						
7/28/2005	2,500						

Table F-7. Lower Rouge at Haggerty Road (G92) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at Haggerty Road (G92)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	120	185	---	8/4/2005	820	839	1,132
5/13/2005	240			8/4/2005	1,000		
5/13/2005	220			8/4/2005	720		
5/20/2005	460	398	---	8/11/2005	340	325	996
5/20/2005	360			8/11/2005	280		
5/20/2005	380			8/11/2005	360		
5/27/2005	400	504	---	8/18/2005	800	458	972
5/27/2005	320			8/18/2005	400		
5/27/2005	1,000			8/18/2005	300		
6/3/2005	340	387	---	8/25/2005	600	577	595
6/3/2005	340			8/25/2005	1,000		
6/3/2005	500			8/25/2005	320		
6/10/2005	2,200	1,692	475	9/1/2005	800	800	565
6/10/2005	1,000			9/1/2005	1,600		
6/10/2005	2,200			9/1/2005	400		
6/17/2005	260	511	582	9/8/2005	260	630	534
6/17/2005	640			9/8/2005	800		
6/17/2005	800			9/8/2005	1,200		
6/23/2005	1,200	702	652	9/15/2005	1,200	832	644
6/23/2005	600			9/15/2005	600		
6/23/2005	480			9/15/2005	800		
6/30/2005	3,000	1,829	844	9/22/2005	800	884	734
6/30/2005	3,400			9/22/2005	480		
6/30/2005	600			9/22/2005	1,800		
7/7/2005	540	616	926	9/29/2005	1,000	1,026	824
7/7/2005	800			9/29/2005	600		
7/7/2005	540			9/29/2005	1,800		
7/14/2005	580	518	731	10/6/2005	400	577	772
7/14/2005	460			10/6/2005	600		
7/14/2005	520			10/6/2005	800		
7/21/2005	5,800	6,689	1,223	10/13/2005	600	876	825
7/21/2005	8,600			10/13/2005	800		
7/21/2005	6,000			10/13/2005	1,400		
7/28/2005	800	1,038	1,323				
7/28/2005	1,000						
7/28/2005	1,400						

Table F-8. Fellows Creek at Ford Road, between Canton Center and Sheldon Road (G211) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Fellows Creek at Ford Road, between Canton Center and Sheldon Road (G211)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	240	429	---	8/4/2005	2,200	2,363	1,947
5/13/2005	1,100			8/4/2005	3,000		
5/13/2005	300			8/4/2005	2,000		
5/20/2005	400	276	---	8/11/2005	800	986	1,866
5/20/2005	220			8/11/2005	1,000		
5/20/2005	240			8/11/2005	1,200		
5/27/2005	600	762	---	8/18/2005	400	928	1,739
5/27/2005	900			8/18/2005	2,000		
5/27/2005	820			8/18/2005	1,000		
6/3/2005	1,600	2,374	---	8/25/2005	600	416	1,245
6/3/2005	3,800			8/25/2005	600		
6/3/2005	2,200			8/25/2005	200		
6/10/2005	6,200	4,406	989	9/1/2005	800	660	901
6/10/2005	4,600			9/1/2005	600		
6/10/2005	3,000			9/1/2005	600		
6/17/2005	1,540	1,405	1,254	9/8/2005	1,000	843	733
6/17/2005	1,800			9/8/2005	600		
6/17/2005	1,000			9/8/2005	1,000		
6/23/2005	2,400	2,417	1,934	9/15/2005	400	635	672
6/23/2005	4,200			9/15/2005	800		
6/23/2005	1,400			9/15/2005	800		
6/30/2005	4,200	3,813	2,669	9/22/2005	800	1,200	707
6/30/2005	3,000			9/22/2005	1,200		
6/30/2005	4,400			9/22/2005	1,800		
7/7/2005	1,400	1,220	2,336	9/29/2005	800	1,018	846
7/7/2005	720			9/29/2005	2,200		
7/7/2005	1,800			9/29/2005	600		
7/14/2005	2,400	1,320	1,836	10/6/2005	320	382	758
7/14/2005	1,020			10/6/2005	620		
7/14/2005	940			10/6/2005	280		
7/21/2005	1,600	2,207	2,009	10/13/2005	480	546	695
7/21/2005	2,800			10/13/2005	500		
7/21/2005	2,400			10/13/2005	680		
7/28/2005	7,200	3,328	2,142				
7/28/2005	6,400						
7/28/2005	800						

Table F-9. Fellows Creek at Palmer Road (L02) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Fellows Creek at Palmer Road (L02)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	460	268	---	8/4/2005	640	1,587	1,389
5/13/2005	300			8/4/2005	2,400		
5/13/2005	140			8/4/2005	2,600		
5/20/2005	2,600	2,521	---	8/11/2005	1,400	964	1,415
5/20/2005	2,200			8/11/2005	1,600		
5/20/2005	2,800			8/11/2005	400		
5/27/2005	380	634	---	8/18/2005	6,800	4,906	2,049
5/27/2005	1,400			8/18/2005	2,800		
5/27/2005	480			8/18/2005	6,200		
6/3/2005	2,400	1,457	---	8/25/2005	1,400	1,455	1,774
6/3/2005	920			8/25/2005	2,200		
6/3/2005	1,400			8/25/2005	1,000		
6/10/2005	5,000	5,148	1,263	9/1/2005	800	727	1,513
6/10/2005	4,400			9/1/2005	1,200		
6/10/2005	6,200			9/1/2005	400		
6/17/2005	4,400	2,712	2,006	9/8/2005	600	660	1,270
6/17/2005	2,060			9/8/2005	600		
6/17/2005	2,200			9/8/2005	800		
6/23/2005	5,800	4,963	2,298	9/15/2005	200	458	1,094
6/23/2005	6,200			9/15/2005	600		
6/23/2005	3,400			9/15/2005	800		
6/30/2005	3,200	3,641	3,259	9/22/2005	800	1,200	826
6/30/2005	5,800			9/22/2005	1,200		
6/30/2005	2,600			9/22/2005	1,800		
7/7/2005	800	879	2,945	9/29/2005	4,200	2,005	880
7/7/2005	800			9/29/2005	1,200		
7/7/2005	1,060			9/29/2005	1,600		
7/14/2005	880	770	2,014	10/6/2005	800	596	846
7/14/2005	740			10/6/2005	440		
7/14/2005	700			10/6/2005	600		
7/21/2005	2,800	2,996	2,054	10/13/2005	800	452	784
7/21/2005	2,400			10/13/2005	340		
7/21/2005	4,000			10/13/2005	340		
7/28/2005	1,600	1,608	1,640				
7/28/2005	2,600						
7/28/2005	1,000						

Table F-10. Lower Rouge at Hannan Road (L07) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at Hannan Road (L07)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	240	226	---	8/4/2005	1,400	1,104	1,448
5/13/2005	160			8/4/2005	1,200		
5/13/2005	300			8/4/2005	800		
5/20/2005	240	375	---	8/11/2005	740	702	1,429
5/20/2005	580			8/11/2005	600		
5/20/2005	380			8/11/2005	780		
5/27/2005	800	458	---	8/18/2005	820	809	1,434
5/27/2005	500			8/18/2005	1,040		
5/27/2005	240			8/18/2005	620		
6/3/2005	1,000	1,368	---	8/25/2005	1,600	1,832	1,093
6/3/2005	1,600			8/25/2005	1,600		
6/3/2005	1,600			8/25/2005	2,400		
6/10/2005	2,800	2,274	655	9/1/2005	400	395	853
6/10/2005	3,000			9/1/2005	320		
6/10/2005	1,400			9/1/2005	480		
6/17/2005	800	838	852	9/8/2005	1,200	904	820
6/17/2005	800			9/8/2005	1,400		
6/17/2005	920			9/8/2005	440		
6/23/2005	1,200	1,841	1,171	9/15/2005	800	607	797
6/23/2005	2,600			9/15/2005	400		
6/23/2005	2,000			9/15/2005	700		
6/30/2005	2,600	4,094	1,814	9/22/2005	600	832	801
6/30/2005	6,000			9/22/2005	1,600		
6/30/2005	4,400			9/22/2005	600		
7/7/2005	1,600	750	1,609	9/29/2005	1,200	1,616	781
7/7/2005	220			9/29/2005	2,200		
7/7/2005	1,200			9/29/2005	1,600		
7/14/2005	840	795	1,304	10/6/2005	1,200	1,342	998
7/14/2005	880			10/6/2005	840		
7/14/2005	680			10/6/2005	2,400		
7/21/2005	9,800	7,128	2,001	10/13/2005	800	793	972
7/21/2005	6,600			10/13/2005	1,200		
7/21/2005	5,600			10/13/2005	520		
7/28/2005	1,600	1,356	1,882				
7/28/2005	2,600						
7/28/2005	600						

Table F-11. McClaughrey Drain at Annapolis and Treadwell (G64) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

McClaughrey Drain at Annapolis and Treadwell (G64)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	420	264	---	8/4/2005	2,000	1,082	1,119
5/13/2005	220			8/4/2005	880		
5/13/2005	200			8/4/2005	720		
5/20/2005	1,640	1,795	---	8/11/2005	360	465	895
5/20/2005	2,800			8/11/2005	1,000		
5/20/2005	1,260			8/11/2005	280		
5/27/2005	200	337	---	8/18/2005	540	756	961
5/27/2005	600			8/18/2005	1,000		
5/27/2005	320			8/18/2005	800		
6/3/2005	180	442	---	8/25/2005	360	366	672
6/3/2005	1,200			8/25/2005	400		
6/3/2005	400			8/25/2005	340		
6/10/2005	14,200	13,654	993	9/1/2005	120	179	478
6/10/2005	16,600			9/1/2005	120		
6/10/2005	10,800			9/1/2005	400		
6/17/2005	520	397	1,077	9/8/2005	140	150	322
6/17/2005	600			9/8/2005	60		
6/17/2005	200			9/8/2005	400		
6/23/2005	1,000	1,423	1,028	9/15/2005	320	223	278
6/23/2005	1,800			9/15/2005	60		
6/23/2005	1,600			9/15/2005	580		
6/30/2005	4,800	2,846	1,575	9/22/2005	80	99	185
6/30/2005	1,600			9/22/2005	120		
6/30/2005	3,000			9/22/2005	100		
7/7/2005	1,200	1,423	1,990	9/29/2005	600	536	200
7/7/2005	2,400			9/29/2005	800		
7/7/2005	1,000			9/29/2005	320		
7/14/2005	280	529	1,039	10/6/2005	60	76	168
7/14/2005	220			10/6/2005	120		
7/14/2005	2,400			10/6/2005	60		
7/21/2005	2,400	2,181	1,460	10/13/2005	420	281	190
7/21/2005	2,400			10/13/2005	240		
7/21/2005	1,800			10/13/2005	220		
7/28/2005	800	986	1,357				
7/28/2005	1,200						
7/28/2005	1,000						

Table F-12. Lower Rouge at Wayne Road (L06) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at Wayne Road (L06)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	60	139	---	8/4/2005	1,160	1,722	1,887
5/13/2005	140			8/4/2005	2,000		
5/13/2005	320			8/4/2005	2,200		
5/20/2005	1,400	1,245	---	8/11/2005	6,400	3,935	3,022
5/20/2005	460			8/11/2005	3,400		
5/20/2005	3,000			8/11/2005	2,800		
5/27/2005	400	256	---	8/18/2005	1,160	836	1,919
5/27/2005	60			8/18/2005	840		
5/27/2005	700			8/18/2005	600		
6/3/2005	580	455	---	8/25/2005	800	1,600	1,536
6/3/2005	540			8/25/2005	1,600		
6/3/2005	300			8/25/2005	3,200		
6/10/2005	6,600	5,766	650	9/1/2005	800	1,154	1,599
6/10/2005	4,400			9/1/2005	2,000		
6/10/2005	6,600			9/1/2005	960		
6/17/2005	1,400	1,227	1,005	9/8/2005	2,000	4,469	1,935
6/17/2005	600			9/8/2005	7,200		
6/17/2005	2,200			9/8/2005	6,200		
6/23/2005	400	727	903	9/15/2005	280	267	1,130
6/23/2005	1,200			9/15/2005	340		
6/23/2005	800			9/15/2005	200		
6/30/2005	2,200	2,265	1,396	9/22/2005	600	515	1,026
6/30/2005	2,400			9/22/2005	600		
6/30/2005	2,200			9/22/2005	380		
7/7/2005	360	373	1,341	9/29/2005	2,800	2,996	1,163
7/7/2005	240			9/29/2005	2,400		
7/7/2005	600			9/29/2005	4,000		
7/14/2005	12,600	7,244	1,436	10/6/2005	1,200	1,321	1,195
7/14/2005	4,800			10/6/2005	1,600		
7/14/2005	8,800			10/6/2005	1,200		
7/21/2005	3,800	4,868	1,892	10/13/2005	800	928	872
7/21/2005	4,600			10/13/2005	1,000		
7/21/2005	6,600			10/13/2005	1,000		
7/28/2005	1,000	944	1,993				
7/28/2005	1,400						
7/28/2005	600						

Table F-13. Lower Rouge at Henry Ruff Road (G97) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at Henry Ruff Road (G97)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	140	201	---	8/4/2005	4,000	1,973	2,273
5/13/2005	360			8/4/2005	3,200		
5/13/2005	160			8/4/2005	600		
5/20/2005	540	616	---	8/11/2005	15,400	5,458	3,248
5/20/2005	460			8/11/2005	8,800		
5/20/2005	940			8/11/2005	1,200		
5/27/2005	820	434	---	8/18/2005	2,200	2,882	3,261
5/27/2005	200			8/18/2005	3,200		
5/27/2005	500			8/18/2005	3,400		
6/3/2005	6,600	6,572	---	8/25/2005	800	832	2,044
6/3/2005	8,600			8/25/2005	1,800		
6/3/2005	5,000			8/25/2005	400		
6/10/2005	2,200	1,833	916	9/1/2005	1,400	2,046	2,211
6/10/2005	1,000			9/1/2005	1,800		
6/10/2005	2,800			9/1/2005	3,400		
6/17/2005	1,320	929	1,245	9/8/2005	1,800	1,629	2,128
6/17/2005	800			9/8/2005	1,000		
6/17/2005	760			9/8/2005	2,400		
6/23/2005	2,600	3,664	1,779	9/15/2005	1,500	2,336	1,796
6/23/2005	8,600			9/15/2005	3,400		
6/23/2005	2,200			9/15/2005	2,500		
6/30/2005	2,800	2,892	2,599	9/22/2005	1,200	727	1,363
6/30/2005	2,400			9/22/2005	400		
6/30/2005	3,600			9/22/2005	800		
7/7/2005	1,600	916	1,753	9/29/2005	3,000	2,932	1,754
7/7/2005	2,400			9/29/2005	2,400		
7/7/2005	200			9/29/2005	3,500		
7/14/2005	4,400	2,824	1,911	10/6/2005	400	684	1,409
7/14/2005	3,200			10/6/2005	400		
7/14/2005	1,600			10/6/2005	2,000		
7/21/2005	8,200	8,595	2,981	10/13/2005	1,000	1,308	1,348
7/21/2005	8,800			10/13/2005	1,400		
7/21/2005	8,800			10/13/2005	1,600		
7/28/2005	1,000	1,382	2,453				
7/28/2005	2,200						
7/28/2005	1,200						

Table F-14. Lower Rouge at John Daly Road (G98) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at John Daly Road (G98)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	100	158	---	8/4/2005	1,600	1,793	3,561
5/13/2005	280			8/4/2005	2,000		
5/13/2005	140			8/4/2005	1,800		
5/20/2005	2,400	1,498	---	8/11/2005	10,500	7,407	4,852
5/20/2005	1,400			8/11/2005	8,600		
5/20/2005	1,000			8/11/2005	4,500		
5/27/2005	660	797	---	8/18/2005	2,000	1,533	3,719
5/27/2005	1,200			8/18/2005	600		
5/27/2005	640			8/18/2005	3,000		
6/3/2005	15,400	14,999	---	8/25/2005	1,600	1,887	2,706
6/3/2005	13,200			8/25/2005	1,400		
6/3/2005	16,600			8/25/2005	3,000		
6/10/2005	9,000	3,538	1,585	9/1/2005	1,400	1,215	2,157
6/10/2005	8,200			9/1/2005	1,600		
6/10/2005	600			9/1/2005	800		
6/17/2005	1,600	1,308	2,420	9/8/2005	2,000	2,000	2,204
6/17/2005	1,000			9/8/2005	2,500		
6/17/2005	1,400			9/8/2005	1,600		
6/23/2005	2,000	2,884	2,758	9/15/2005	1,200	1,533	1,609
6/23/2005	4,000			9/15/2005	2,000		
6/23/2005	3,000			9/15/2005	1,500		
6/30/2005	5,000	7,306	4,296	9/22/2005	600	832	1,424
6/30/2005	5,200			9/22/2005	1,200		
6/30/2005	15,000			9/22/2005	800		
7/7/2005	1,400	1,577	2,738	9/29/2005	22,000	21,227	2,310
7/7/2005	2,000			9/29/2005	18,500		
7/7/2005	1,400			9/29/2005	23,500		
7/14/2005	4,500	5,793	3,022	10/6/2005	2,000	1,724	2,477
7/14/2005	5,400			10/6/2005	3,200		
7/14/2005	8,000			10/6/2005	800		
7/21/2005	6,000	9,252	4,468	10/13/2005	1,400	944	2,132
7/21/2005	11,000			10/13/2005	1,000		
7/21/2005	12,000			10/13/2005	600		
7/28/2005	7,000	3,777	4,716				
7/28/2005	3,500						
7/28/2005	2,200						

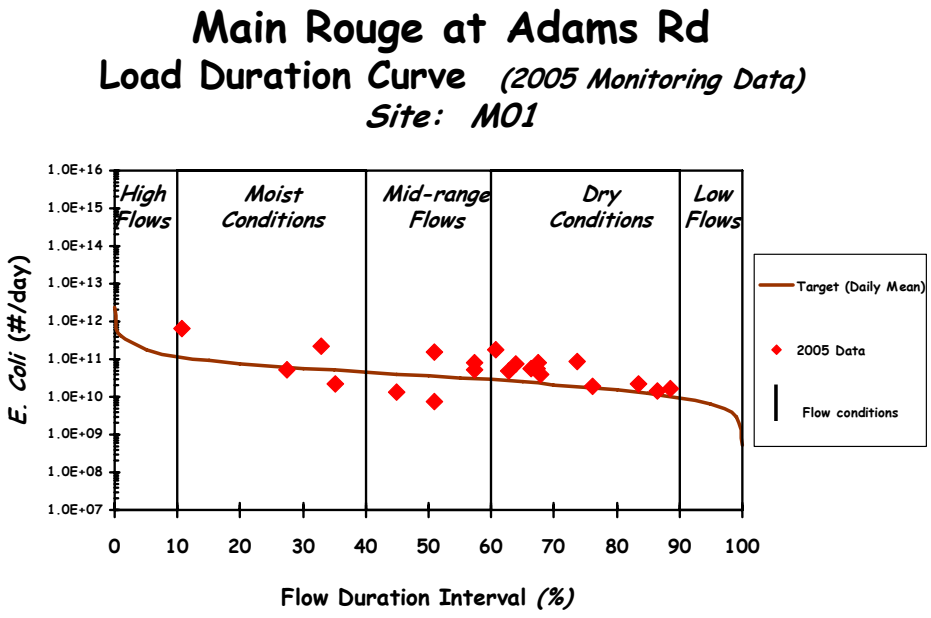
Table F-15. Lower Rouge at Military Road (L05D) MDEQ 2005 *E. coli* Monitoring Data (cfu/100 ml).

Lower Rouge at Military Road (L05D)							
Collection Date	Result	Daily Maximum	30-Day Rolling Geomean	Collection Date	Result	Daily Maximum	30-Day Rolling Geomean
5/13/2005	220	135	---	8/4/2005	3,000	3,211	6,410
5/13/2005	80			8/4/2005	2,400		
5/13/2005	140			8/4/2005	4,600		
5/20/2005	1,600	2,153	---	8/11/2005	2,400	3,248	5,375
5/20/2005	2,600			8/11/2005	3,400		
5/20/2005	2,400			8/11/2005	4,200		
5/27/2005	720	702	---	8/18/2005	4,000	3,761	5,341
5/27/2005	1,600			8/18/2005	3,800		
5/27/2005	300			8/18/2005	3,500		
6/3/2005	600	796	---	8/25/2005	800	928	3,139
6/3/2005	600			8/25/2005	1,000		
6/3/2005	1,400			8/25/2005	1,000		
6/10/2005	60,000	6,952	1,025	9/1/2005	13,000	9,782	3,239
6/10/2005	800			9/1/2005	8,000		
6/10/2005	7,000			9/1/2005	9,000		
6/17/2005	600	1,003	1,530	9/8/2005	1,500	6,240	3,699
6/17/2005	1,200			9/8/2005	12,000		
6/17/2005	1,400			9/8/2005	13,500		
6/23/2005	9,400	10,179	2,087	9/15/2005	1,400	1,263	3,062
6/23/2005	11,000			9/15/2005	800		
6/23/2005	10,200			9/15/2005	1,800		
6/30/2005	6,000	6,113	3,218	9/22/2005	1,000	1,063	2,378
6/30/2005	6,800			9/22/2005	1,200		
6/30/2005	5,600			9/22/2005	1,000		
7/7/2005	12,500	7,837	5,085	9/29/2005	7,000	7,846	3,644
7/7/2005	11,000			9/29/2005	7,500		
7/7/2005	3,500			9/29/2005	9,200		
7/14/2005	3,000	3,882	4,525	10/6/2005	400	922	2,272
7/14/2005	3,000			10/6/2005	1,400		
7/14/2005	6,500			10/6/2005	1,400		
7/21/2005	12,500	13,248	7,583	10/13/2005	1,400	851	1,526
7/21/2005	15,500			10/13/2005	200		
7/21/2005	12,000			10/13/2005	2,200		
7/28/2005	5,000	8,363	7,291				
7/28/2005	13,000						
7/28/2005	9,000						

APPENDIX G

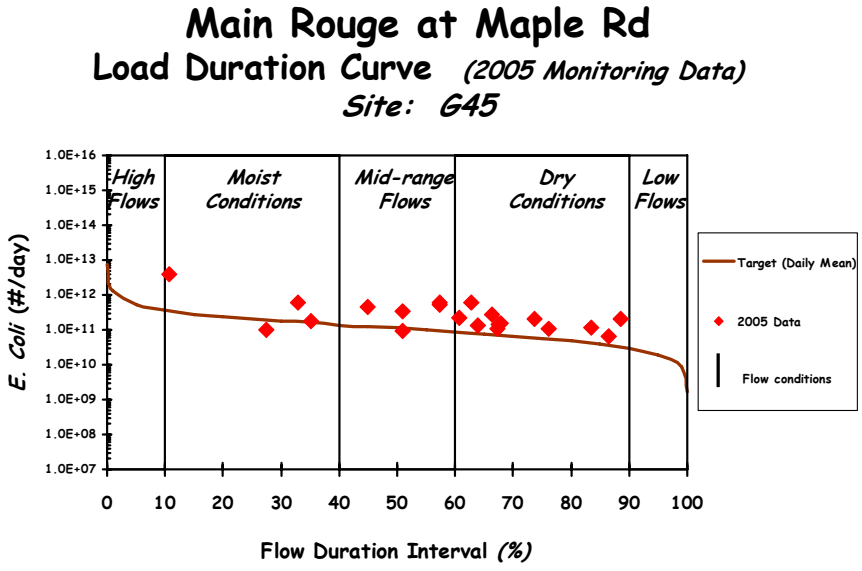
LOAD DURATION CURVES
MAIN ROUGE RIVER
2005 MDEQ DATA

Figure G-1



E. Coli Data & USGS Gage Duration Interval 04166000 *11.89 square miles*

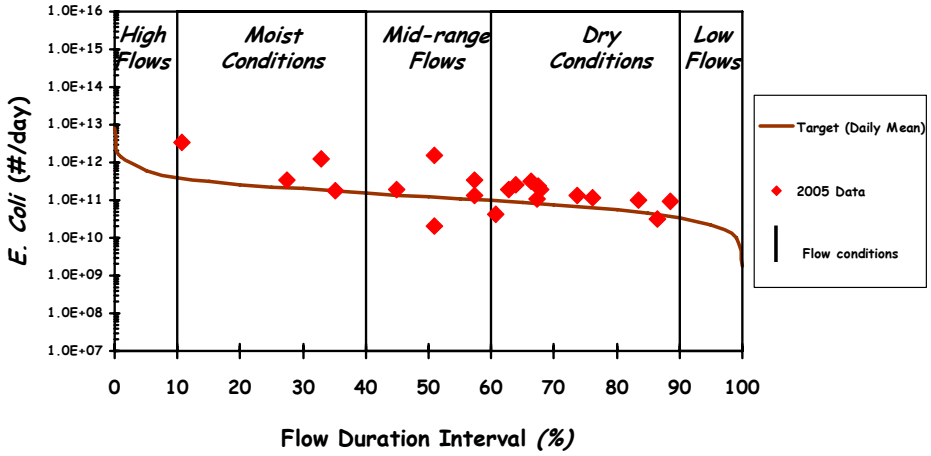
Figure G-2



E. Coli Data & USGS Gage Duration Interval 04166000 *36.71 square miles*

Figure G-3

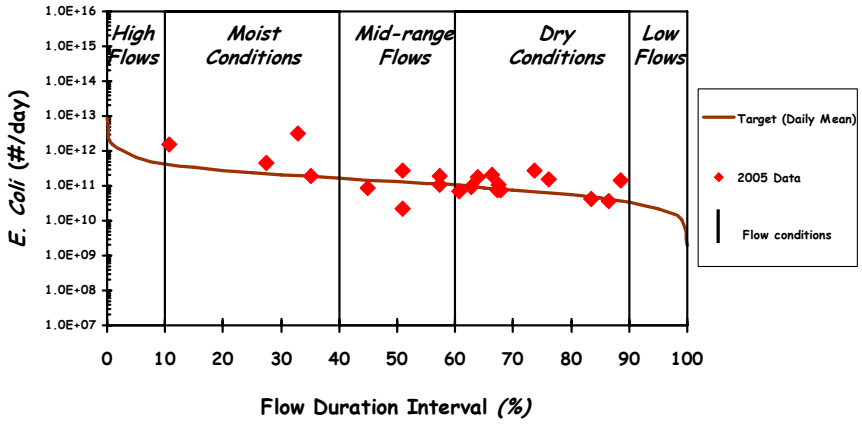
Main Rouge at Riverside Drive
Load Duration Curve *(2005 Monitoring Data)*
Site: G58



E. Coli Data & USGS Gage Duration Interval 04166000 *41.37 square miles*

Figure G-4

Main Rouge at Lahser Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: M03



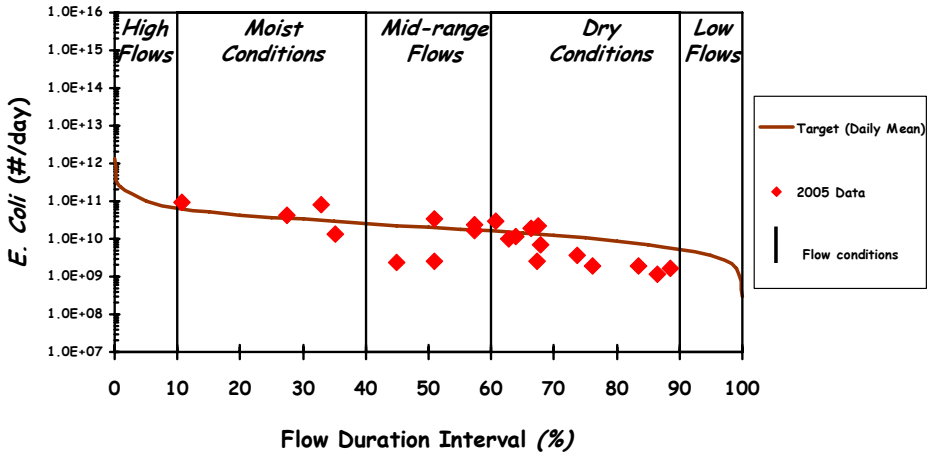
E. Coli Data & USGS Gage Duration Interval 04166000 *43.13 square miles*

Figure G-5

Franklin Branch at Middlebelt between Walnut Lake and 15 Mile Rd

Load Duration Curve *(2005 Monitoring Data)*

Site: G38



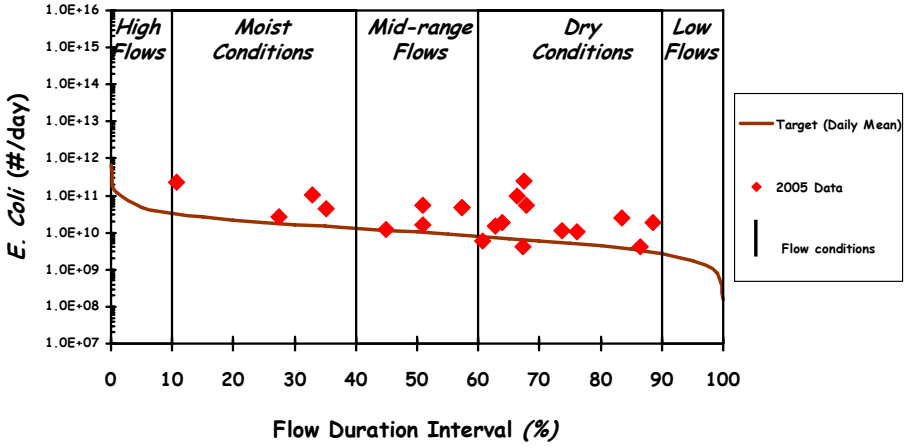
E. Coli Data & USGS Gage Duration Interval 04166000 *6.78 square miles*

Figure G-6

Franklin Branch at Middlebelt between 14 Mile Rd and 15 Mile Rd

Load Duration Curve *(2005 Monitoring Data)*

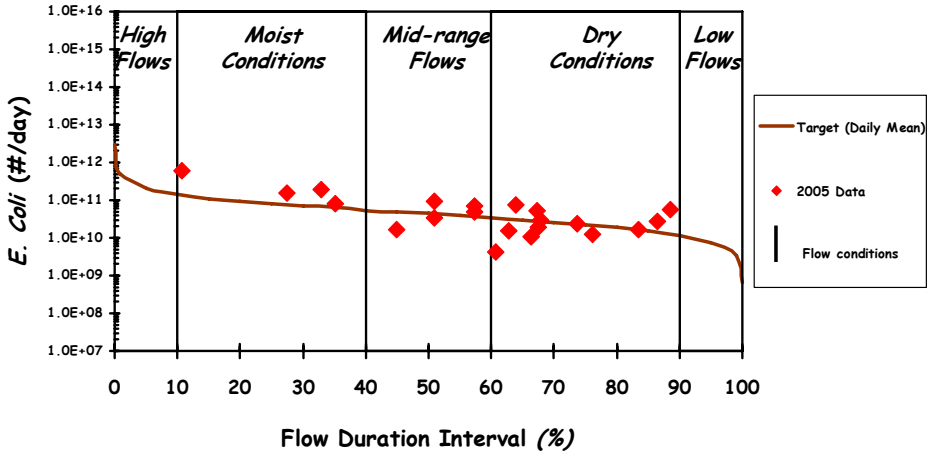
Site: G39



E. Coli Data & USGS Gage Duration Interval 04166000 *3.36 square miles*

Figure G-7

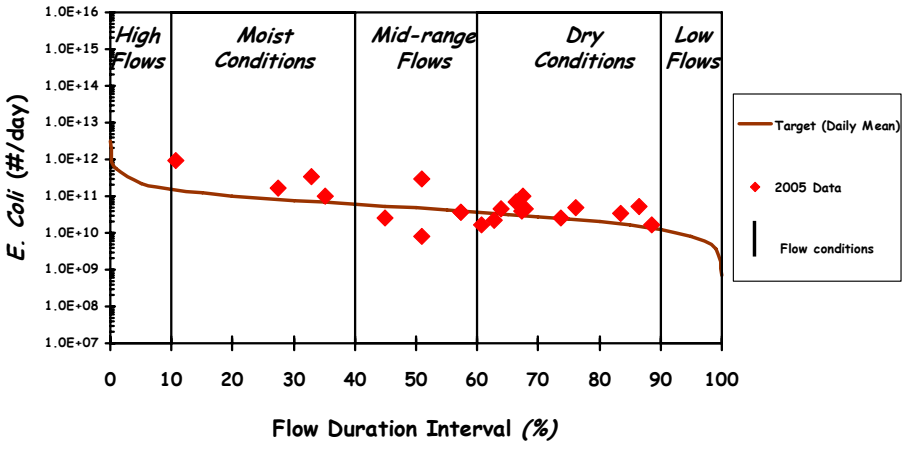
Franklin Branch at Franklin Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G461



E. Coli Data & USGS Gage Duration Interval 04166000 *14.34 square miles*

Figure G-8

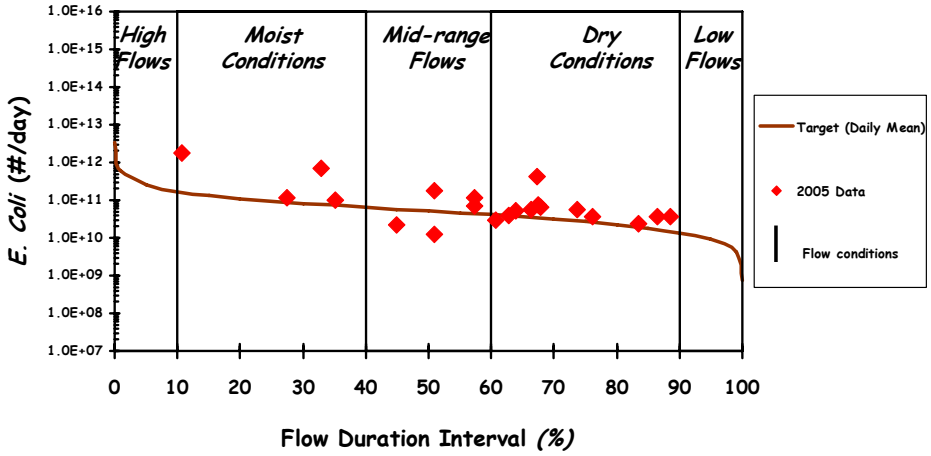
Franklin Branch at 13 Mile Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: H60



E. Coli Data & USGS Gage Duration Interval 04166000 *15.6 square miles*

Figure G-9

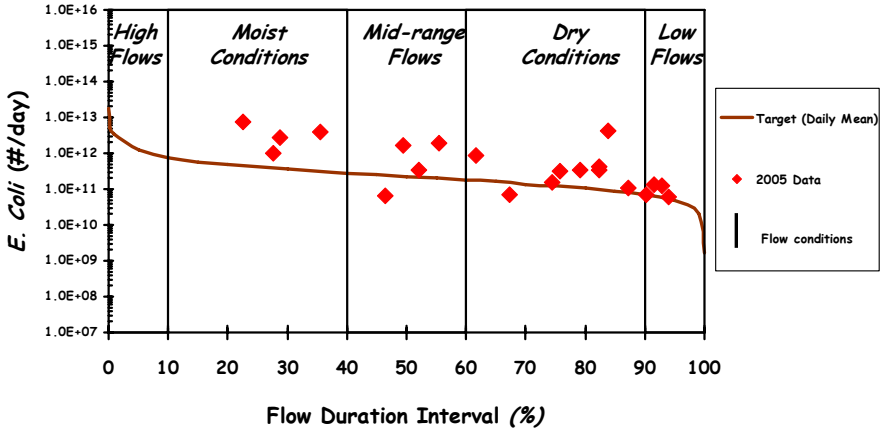
Franklin Branch at 12 Mile Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G46



E. Coli Data & USGS Gage Duration Interval 04166000 *17.20 square miles*

Figure G-10

Main Rouge at 10 mile west of Telegraph
Load Duration Curve *(2005 Monitoring Data)*
Site: G59



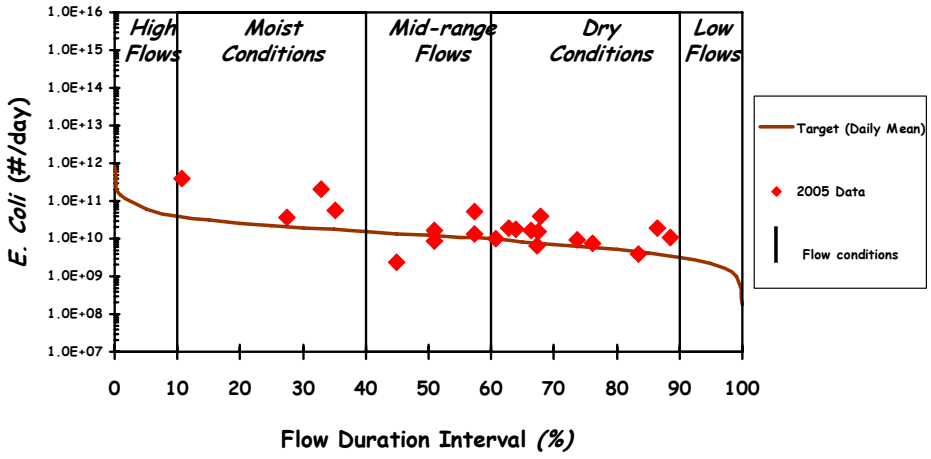
E. Coli Data & USGS Gage Duration Interval 04166100 *66.14 square miles*

Figure G-11

Pebble Creek west of Middlebelt and south of 13 Mile Rd

Load Duration Curve *(2005 Monitoring Data)*

Site: H47



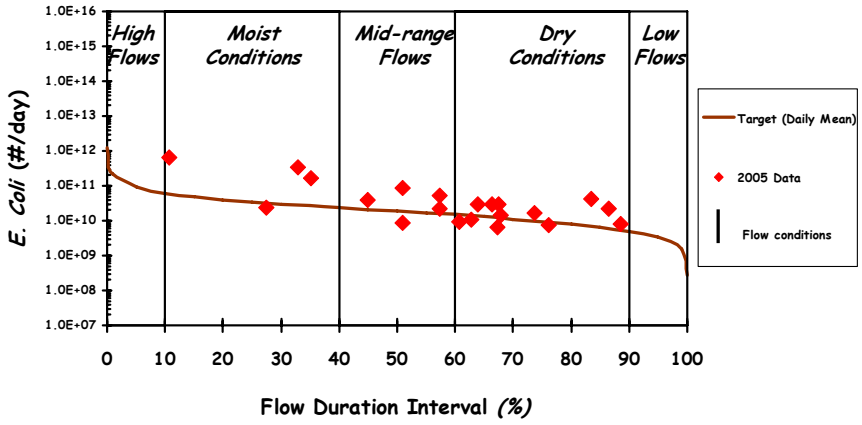
E. Coli Data & USGS Gage Duration Interval 04166000 *4.02 square miles*

Figure G-12

Pebble Creek at 11 Mile Rd

Load Duration Curve *(2005 Monitoring Data)*

Site: G60



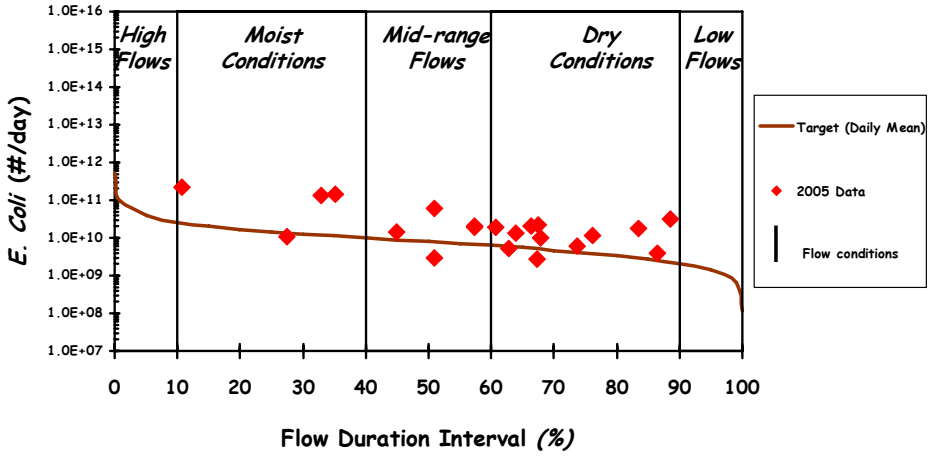
E. Coli Data & USGS Gage Duration Interval 04166000 *6.23 square miles*

Figure G-13

Pebble Creek at Franklin Rd

Load Duration Curve *(2005 Monitoring Data)*

Site: G61



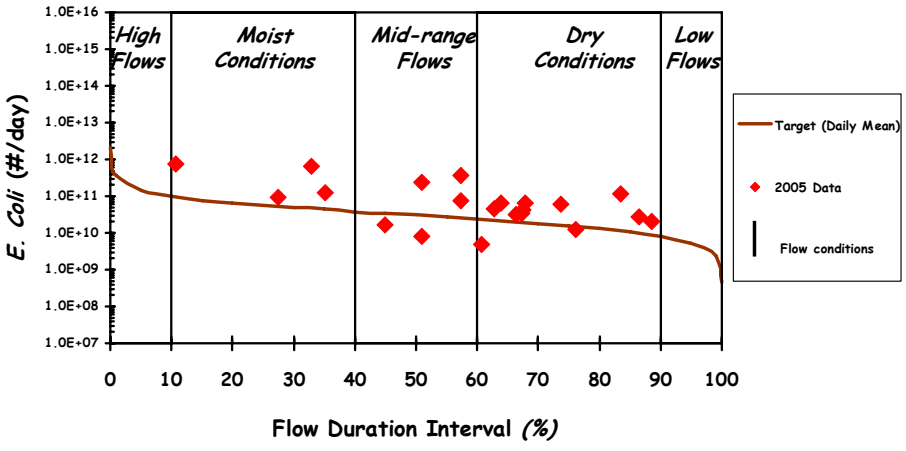
E. Coli Data & USGS Gage Duration Interval 04166000 *2.62 square miles*

Figure G-14

Pebble Creek at 10 Mile Rd

Load Duration Curve *(2005 Monitoring Data)*

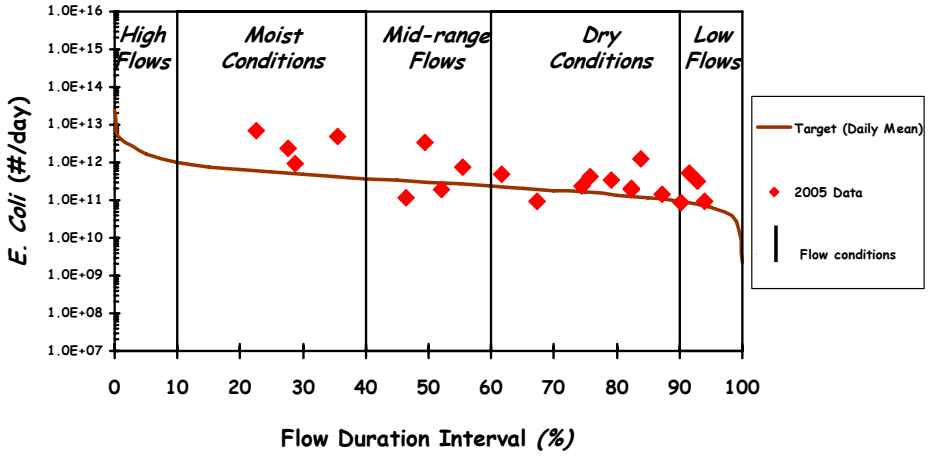
Site: G47



E. Coli Data & USGS Gage Duration Interval 04166000 *10.05 square miles*

Figure G-15

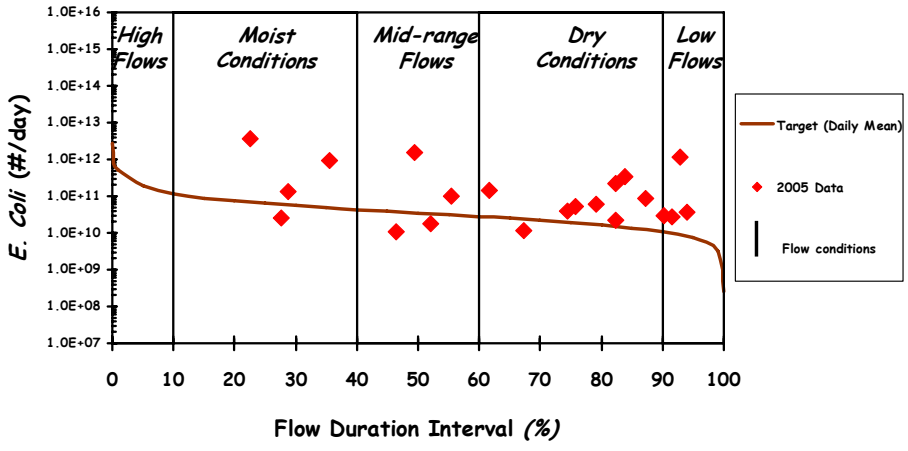
Main Rouge at Beech Road
Load Duration Curve *(2005 Monitoring Data)*
Site: US5



E. Coli Data & USGS Gage Duration Interval 04166100 *86.89 square miles*

Figure G-16

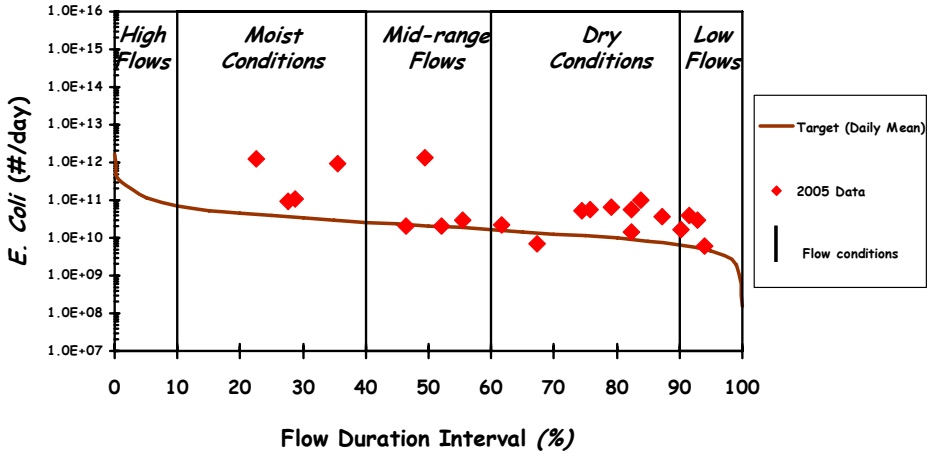
Evans Ditch at Tamarack off 10 Mile Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: H44



E. Coli Data & USGS Gage Duration Interval 04166100 *10.21 square miles*

Figure G-17

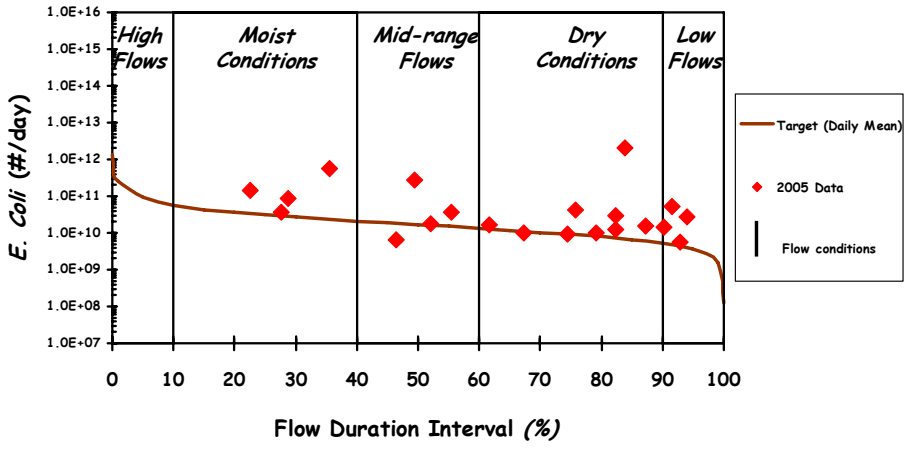
Evans Ditch at 9 Mile Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: US6



E. Coli Data & USGS Gage Duration Interval 04166100 *6.12 square miles*

Figure G-18

Evans Ditch at Berg Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: M05



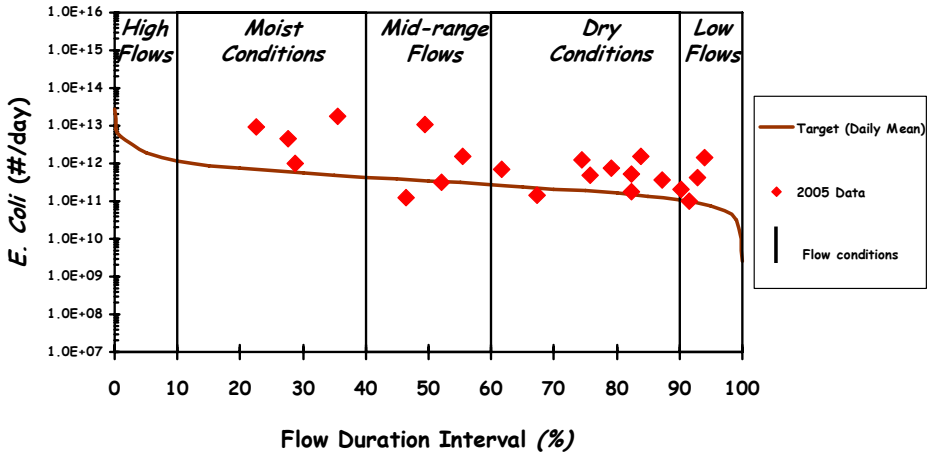
E. Coli Data & USGS Gage Duration Interval 04166100 *4.92 square miles*

Figure G-19

Main Rouge north of 7 Mile Rd at Bonnie Brook Golf Course

Load Duration Curve *(2005 Monitoring Data)*

Site: M15



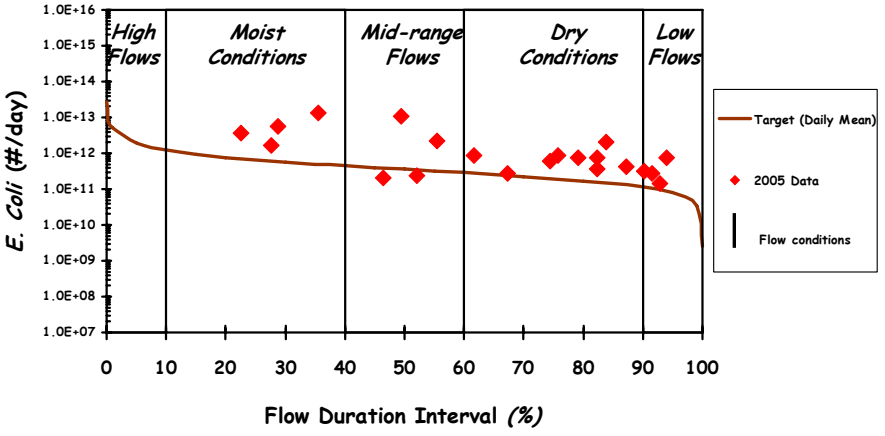
E. Coli Data & USGS Gage Duration Interval 04166100 *100.74 square miles*

Figure G-20

Main Rouge at Fenkell Rd

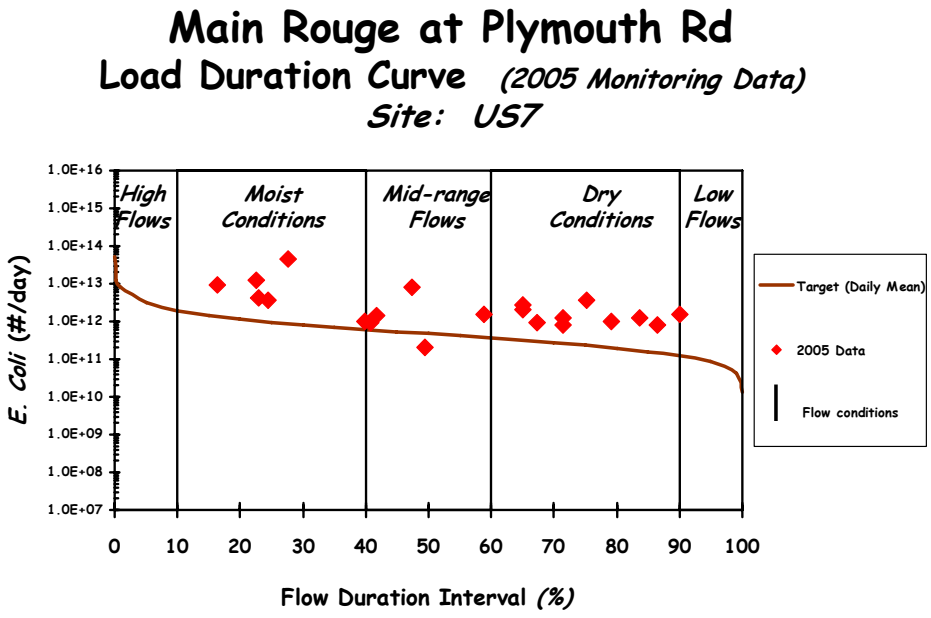
Load Duration Curve *(2005 Monitoring Data)*

Site: G43



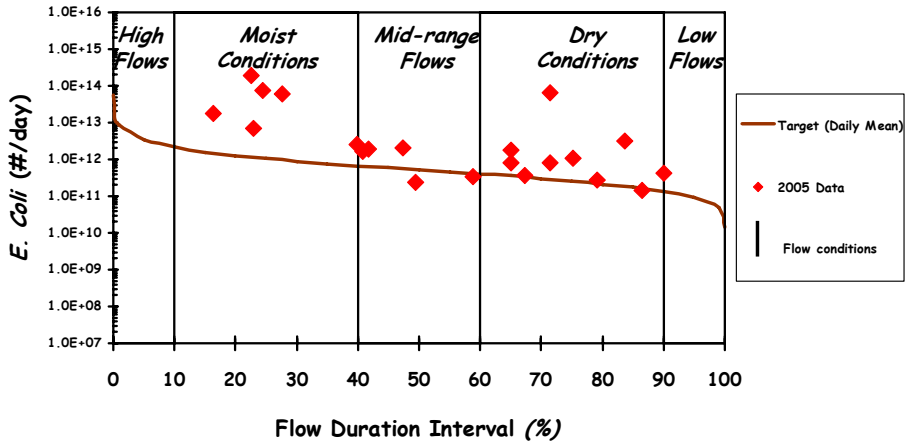
E. Coli Data & USGS Gage Duration Interval 04166100 *105.36 square miles*

Figure G-21



E. Coli Data & USGS Gage Duration Interval 04166500 *184.26 square miles*

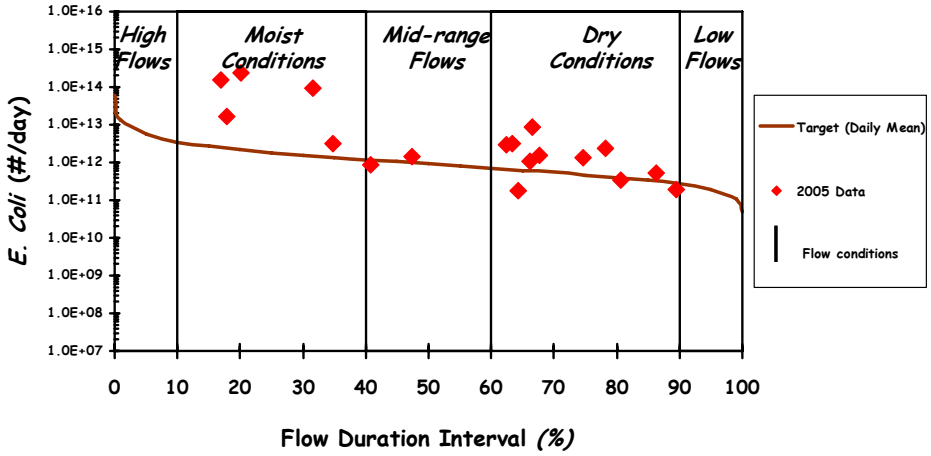
Figure G-22



E. Coli Data & USGS Gage Duration Interval 04166500 *199.74 square miles*

Figure G-23

Main Rouge at Ford Mansion
Load Duration Curve *(2005 Monitoring Data)*
Site: M10

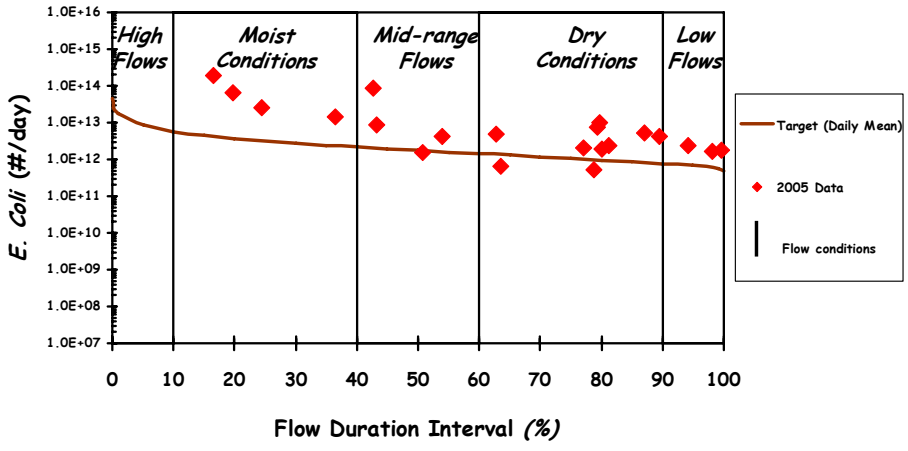


E. Coli Data & USGS Gage Duration Interval
04166500 + 04167000

304.48 square miles

Figure G-24

Main Rouge at Rotunda Dr
Load Duration Curve *(2005 Monitoring Data)*
Site: US8/G41



E. Coli Data & USGS Gage Duration Gauge Interval
04166500 + 04167000 + 04168400

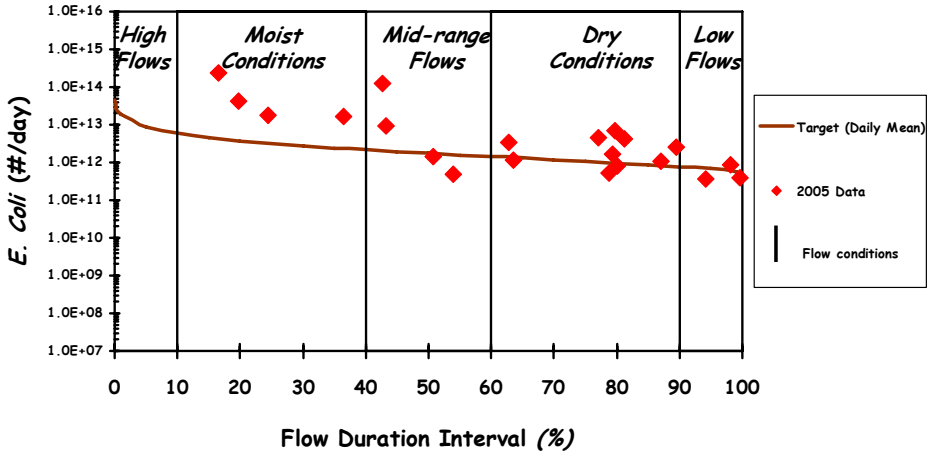
402.36 square miles

Figure G-25

Main Rouge at Greenfield Rd

Load Duration Curve *(2005 Monitoring Data)*

Site: M12



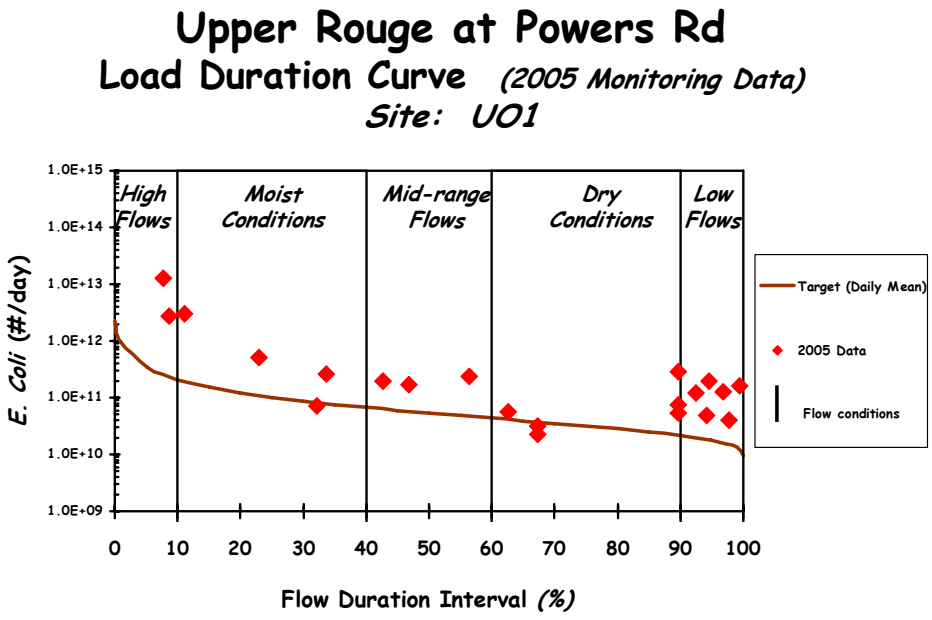
E. Coli Data & USGS Gage Duration Gauge Interval
04166500 + 04167000 + 04168400

403.54 square miles

APPENDIX H

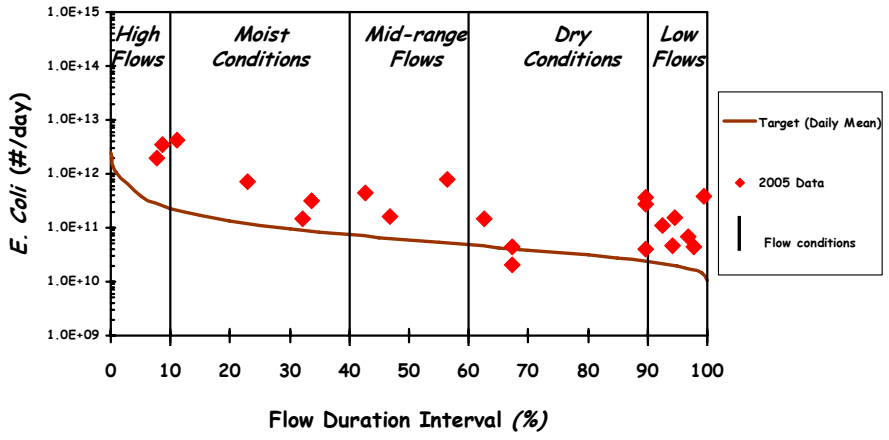
LOAD DURATION CURVES
UPPER ROUGE RIVER
2005 MDEQ DATA

Figure H-1



E. Coli Data & USGS Gage 04166470 Duration Interval *17.72 square miles*

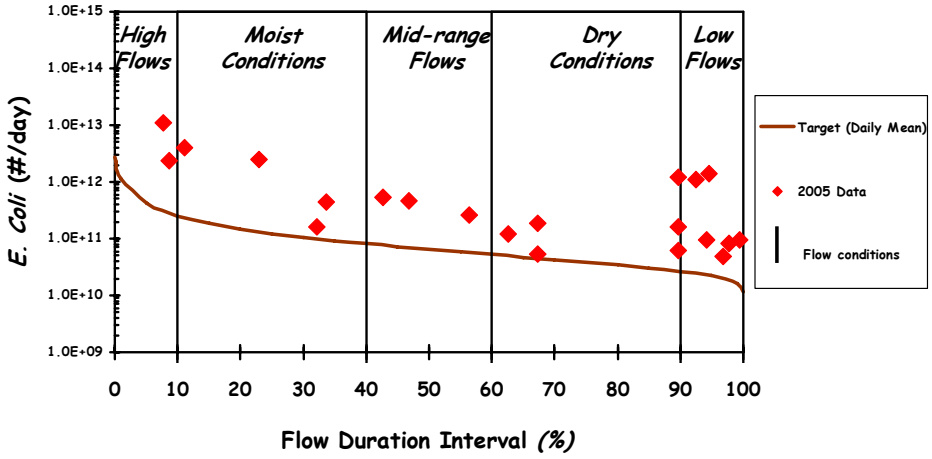
Figure H-2



E. Coli Data & USGS Gage 04166470 Duration Interval *19.46 square miles*

Figure H-3

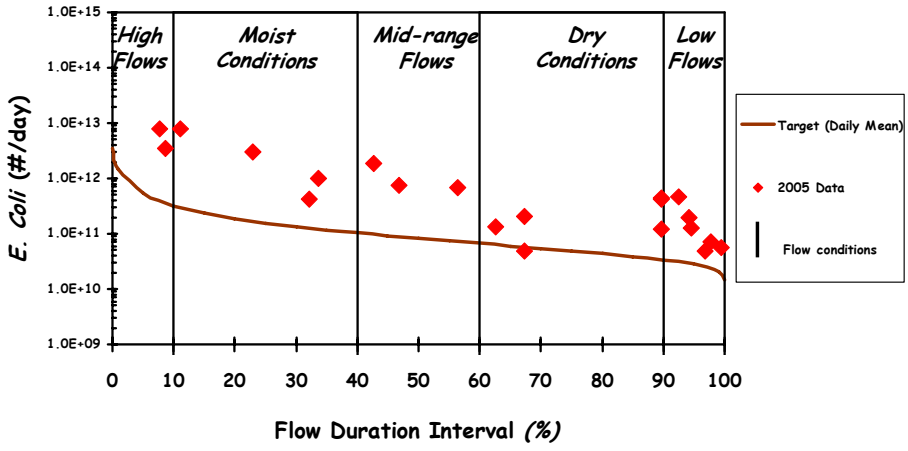
Upper Rouge at Inkster Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G71



E. Coli Data & USGS Gage 04166470 Duration Interval *21.64 square miles*

Figure H-4

Upper Rouge at Graham Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: UO2



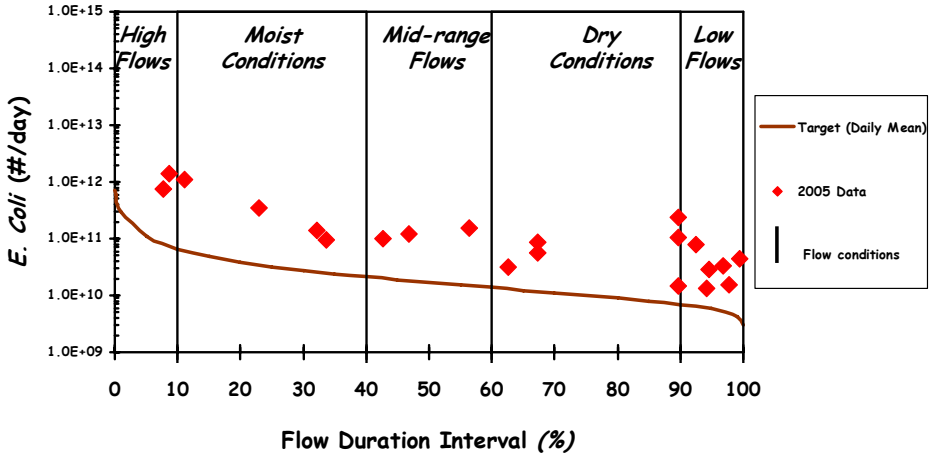
E. Coli Data & USGS Gage 04166470 Duration Interval *27.40 square miles*

Figure H-5

Tarabusi Creek at 7 Mile Rd

Load Duration Curve *(2005 Monitoring Data)*

Site: U17



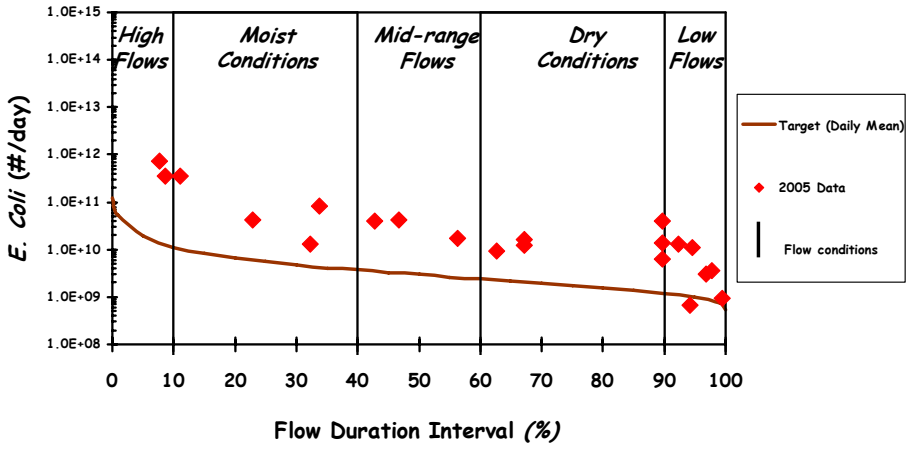
E. Coli Data & USGS Gage 04166470 Duration Interval *5.64 square miles*

Figure H-6

Tributary to Tarabusi Creek at 8 Mile Rd

Load Duration Curve *(2005 Monitoring Data)*

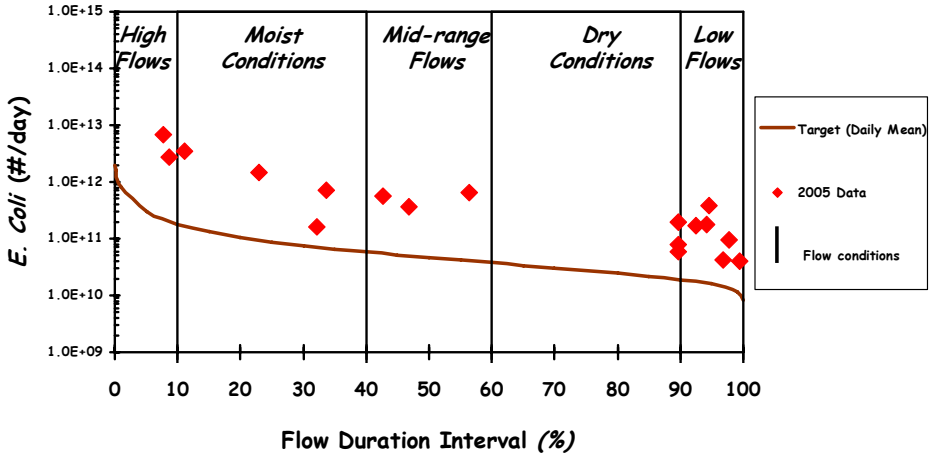
Site: G19



E. Coli Data & USGS Gage 04166470 Duration Interval *0.97 square miles*

Figure H-7

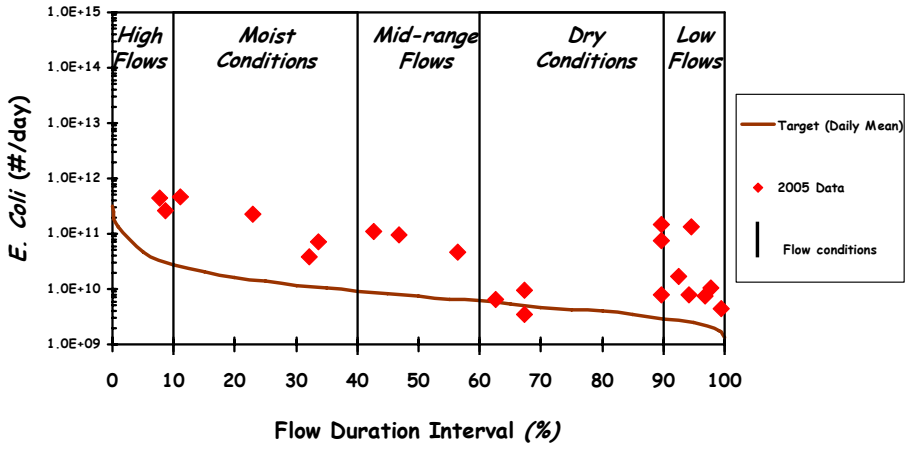
Bell Branch at Riverside Street
Load Duration Curve *(2005 Monitoring Data)*
Site: U14



E. Coli Data & USGS Gage 04166470 Duration Interval *15.43 square miles*

Figure H-8

Bell Branch at 6 Mile Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: U15



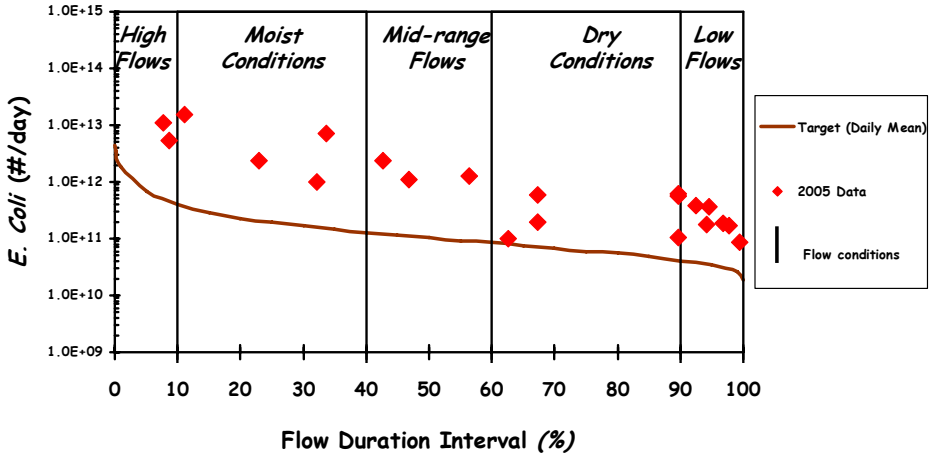
E. Coli Data & USGS Gage 04166470 Duration Interval *2.41 square miles*

Figure H-9

Bell Branch at Inkster Rd

Load Duration Curve *(2005 Monitoring Data)*

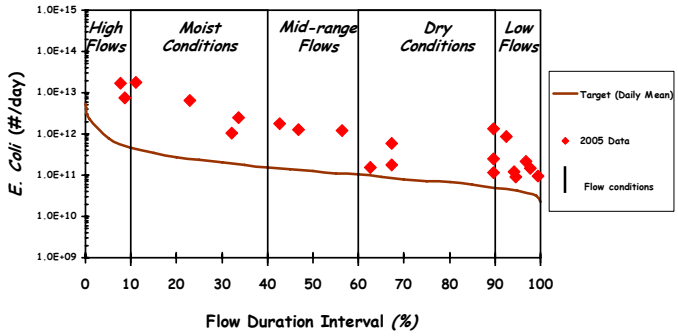
Site: U03



E. Coli Data & USGS Gage 04166470 Duration Interval *33.97 square miles*

Figure H-10

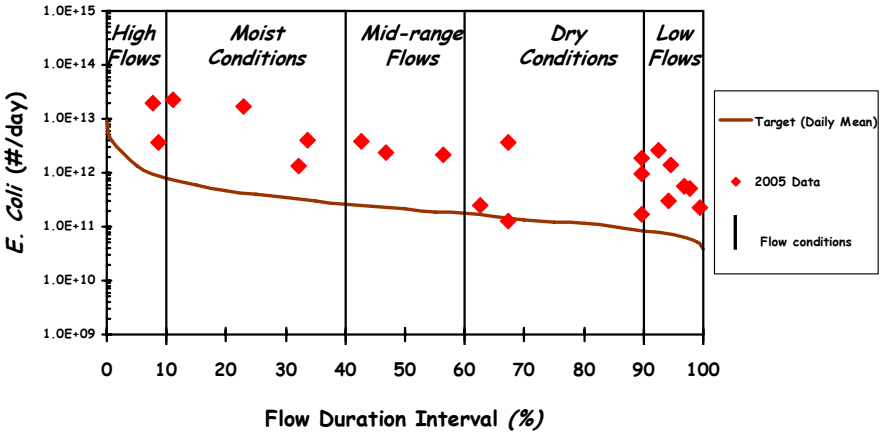
Bell Branch at Beech Daly Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: U04



E. Coli Data & USGS Gage 04166470 Duration Interval *41.01 square miles*

Figure H-11

Upper Rouge at Telegraph
Load Duration Curve *(2005 Monitoring Data)*
Site: U05



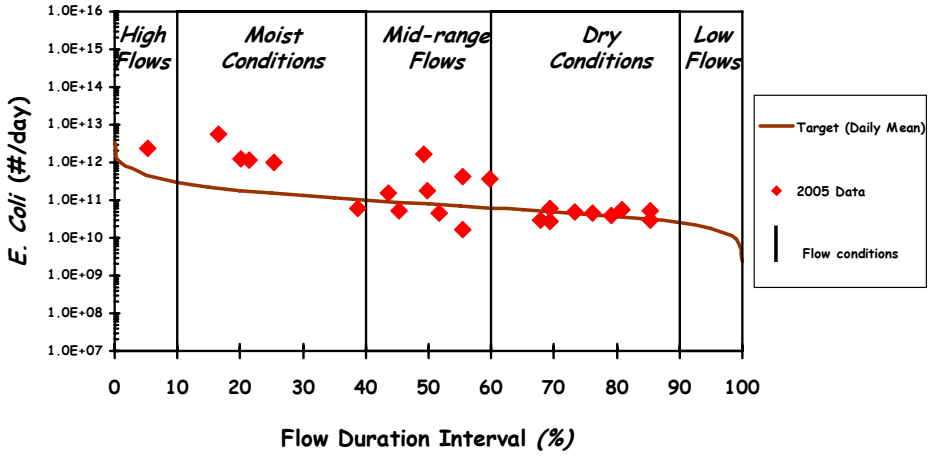
E. Coli Data & USGS Gage 04166470 Duration Interval *69.35 square miles*

APPENDIX I

LOAD DURATION CURVES
MIDDLE ROUGE RIVER
2005 MDEQ DATA

Figure I-1

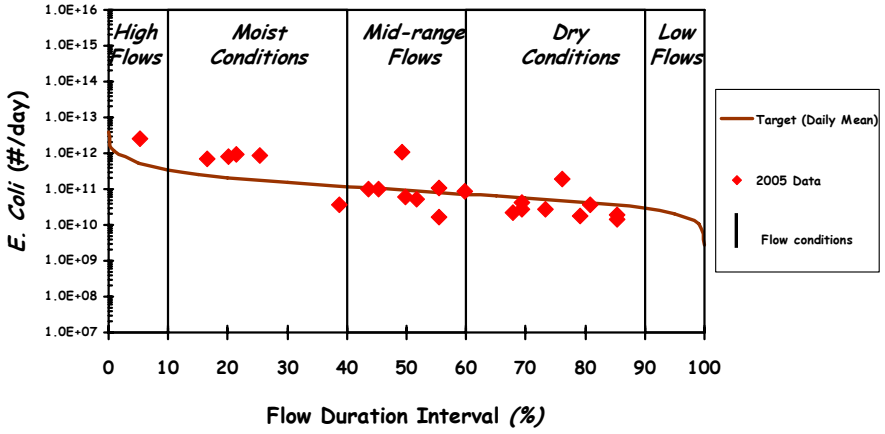
Middle Rouge at Old Novi/Baseline
Load Duration Curve *(2005 Monitoring Data)*
Site: G03



E. Coli Data & USGS Gage Duration Interval *22.62 square miles*

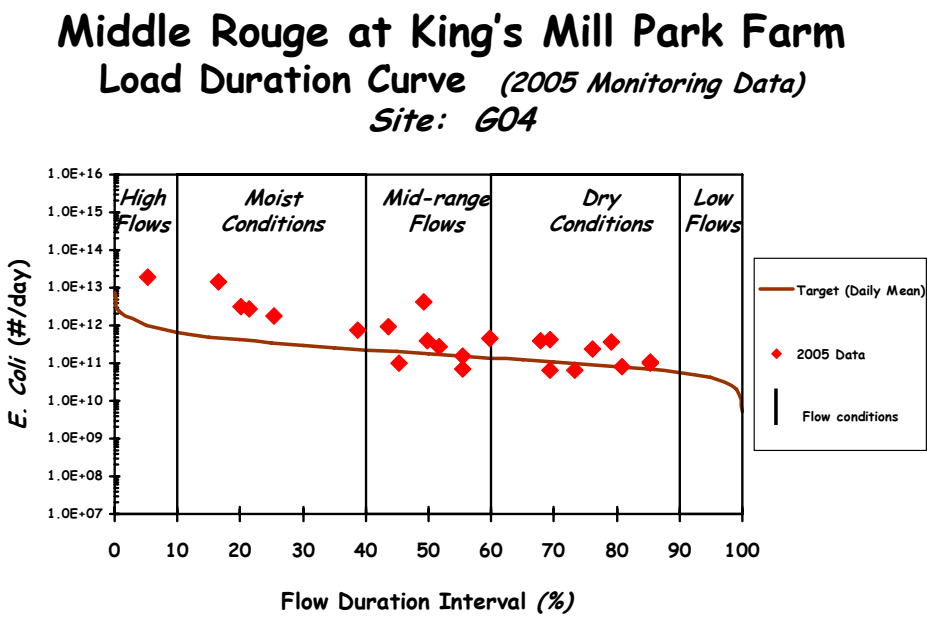
Figure I-2

Johnson Creek at 7 Mile/Sheldon
Load Duration Curve *(2005 Monitoring Data)*
Site: D03



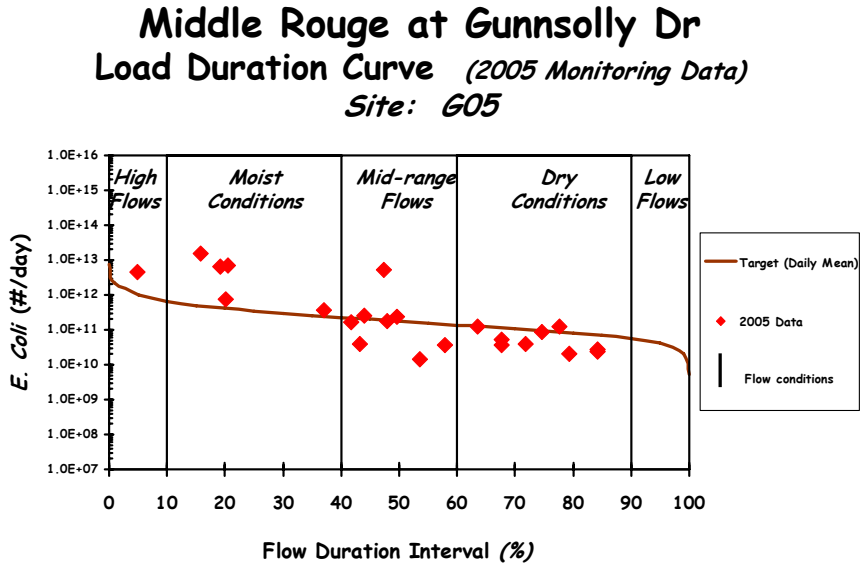
E. Coli Data & USGS Gage Duration Interval *26.14 square miles*

Figure I-3



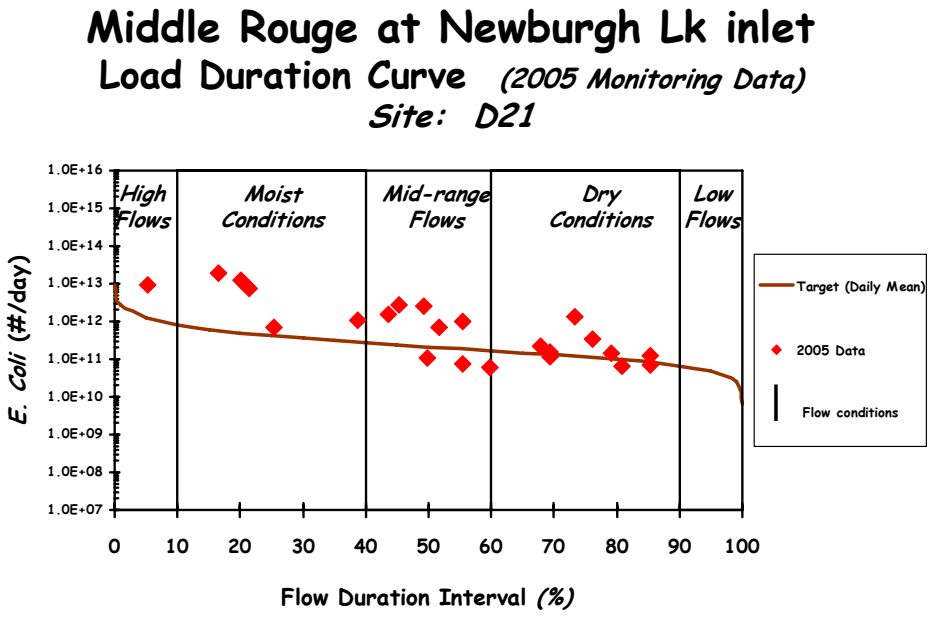
E. Coli Data & USGS Gage Duration Interval *50.75 square miles*

Figure I-4



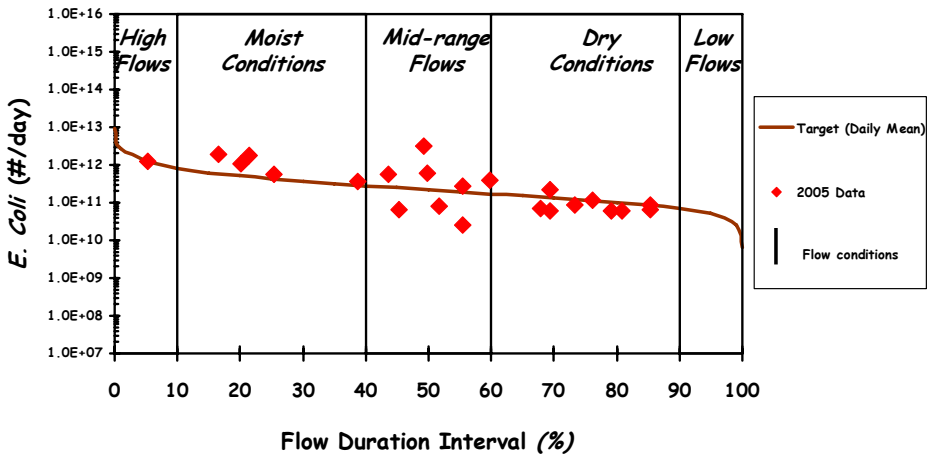
E. Coli Data & USGS Gage Duration Interval *59.93 square miles*

Figure I-5



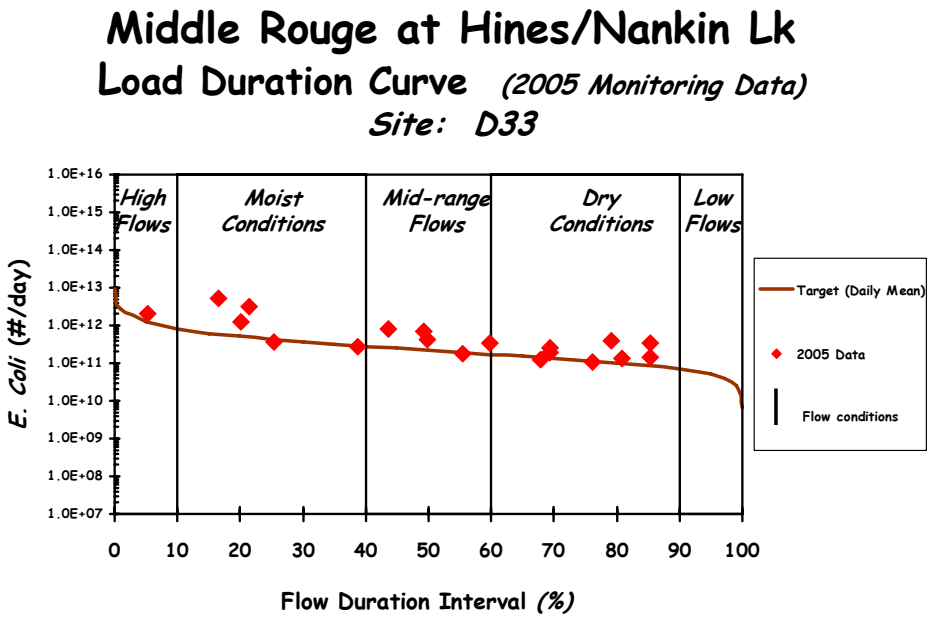
E. Coli Data & USGS Gage Duration Interval *61.05 square miles*

Figure I-6



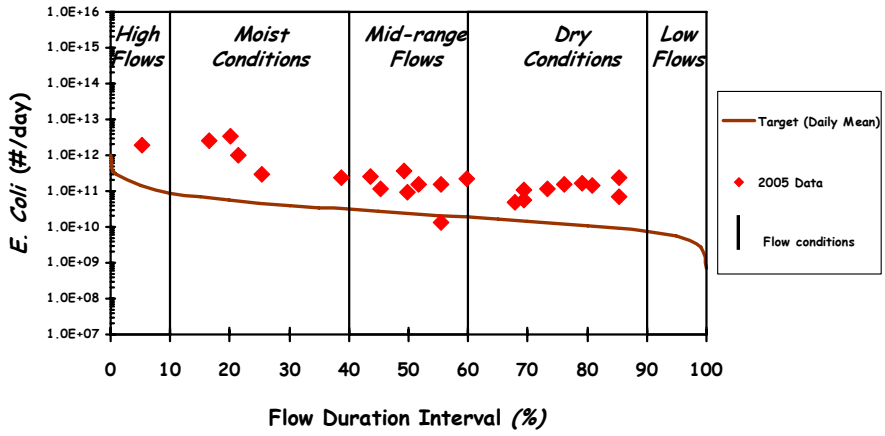
E. Coli Data & USGS Gage Duration Interval *62.50 square miles*

Figure I-7



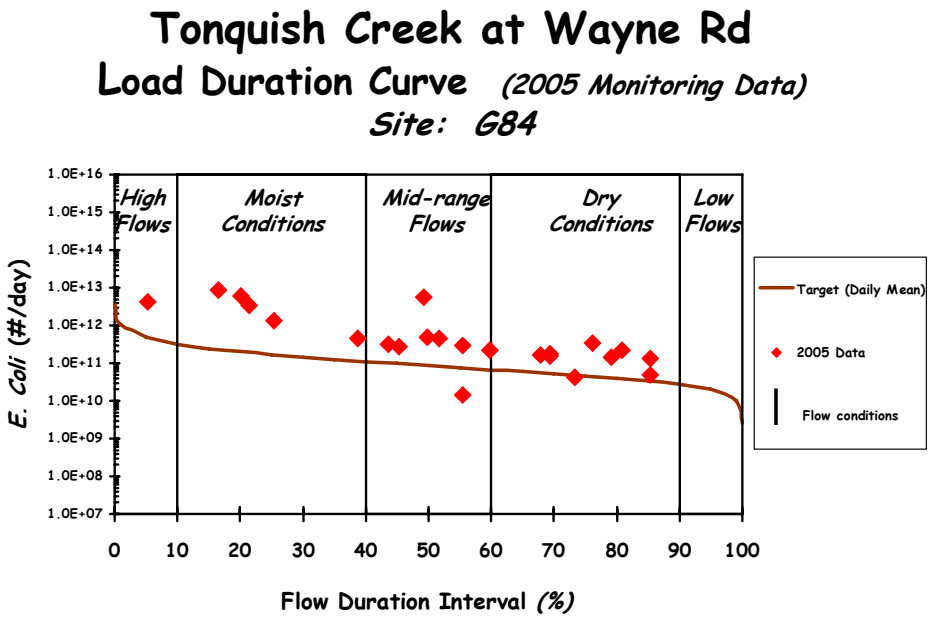
E. Coli Data & USGS Gage Duration Interval *62.84 square miles*

Figure I-8



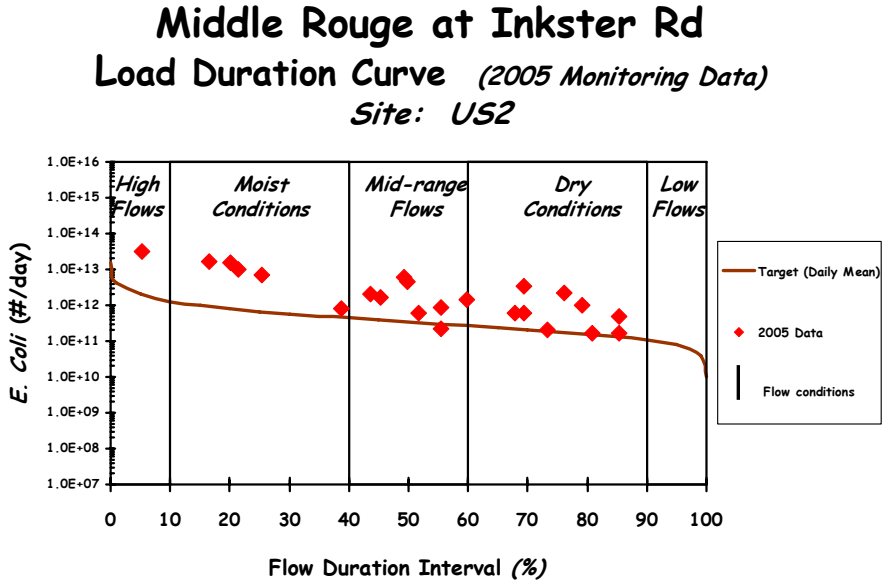
E. Coli Data & USGS Gage Duration Interval *6.83 square miles*

Figure I-9



E. Coli Data & USGS Gage Duration Interval *24.75 square miles*

Figure I-10



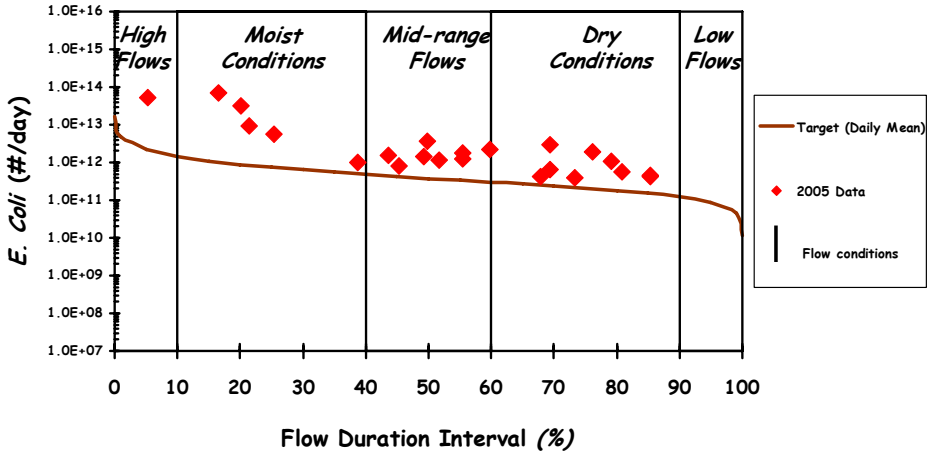
E. Coli Data & USGS Gage Duration Interval *98.39 square miles*

Figure I-11

Middle Rouge at Hines/Ford Rd

Load Duration Curve *(2005 Monitoring Data)*

Site: D06



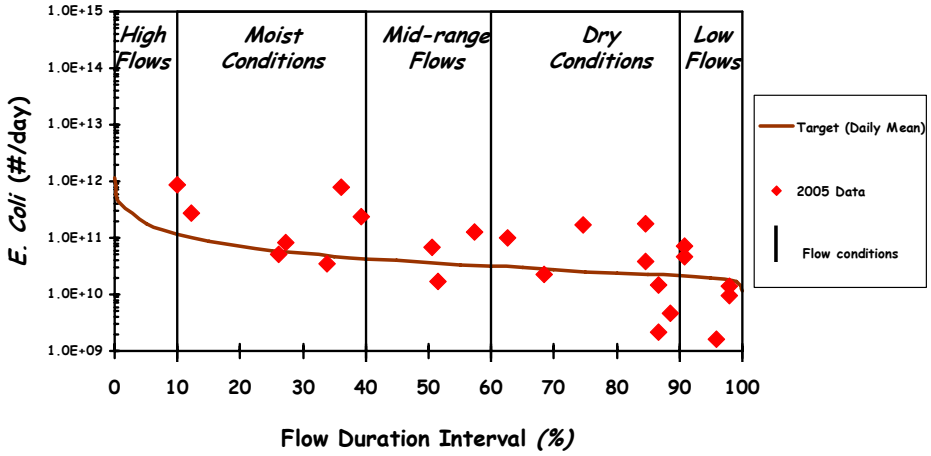
E. Coli Data & USGS Gage Duration Interval *109.33 square miles*

APPENDIX J

LOAD DURATION CURVES
LOWER ROUGE RIVER
2005 MDEQ DATA

Figure J-1

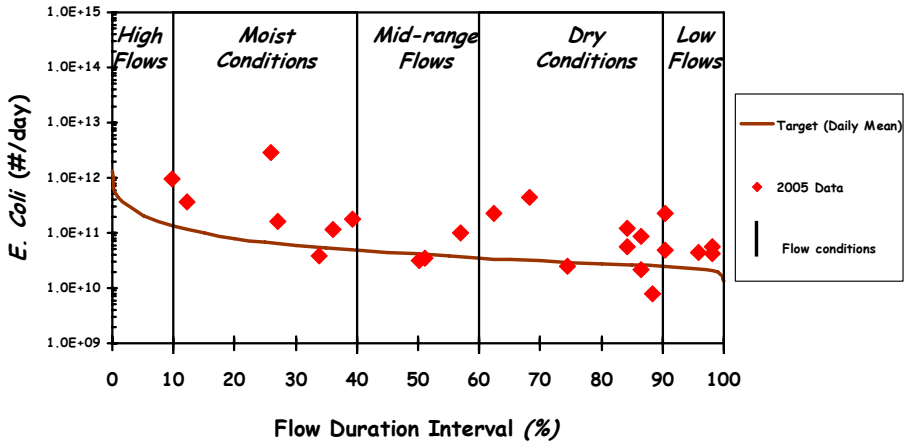
Lower Rouge at Denton Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G200



E. Coli Data & USGS Gage 04168400 Duration Interval *7.86 square miles*

Figure J-2

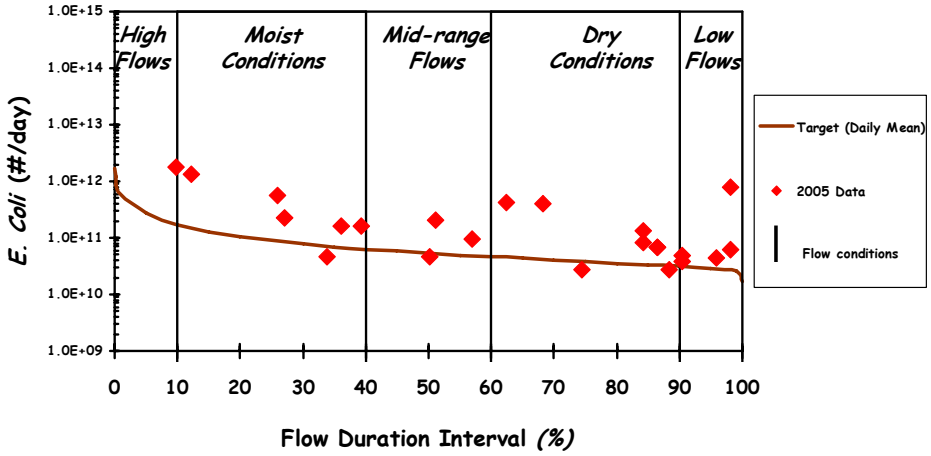
Lower Rouge at Beck Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: L01



E. Coli Data & USGS Gage 04168400 Duration Interval *8.97 square miles*

Figure J-3

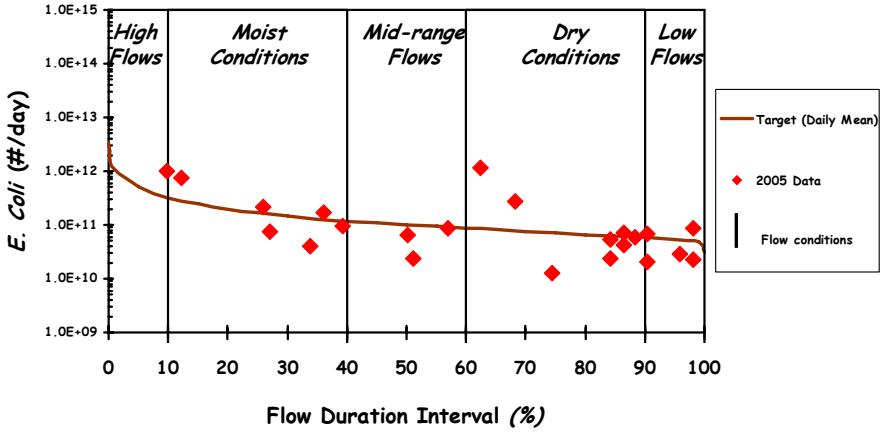
Fowler Creek at Beck Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G93



E. Coli Data & USGS Gage 04168400 Duration Interval *11.64 square miles*

Figure J-4

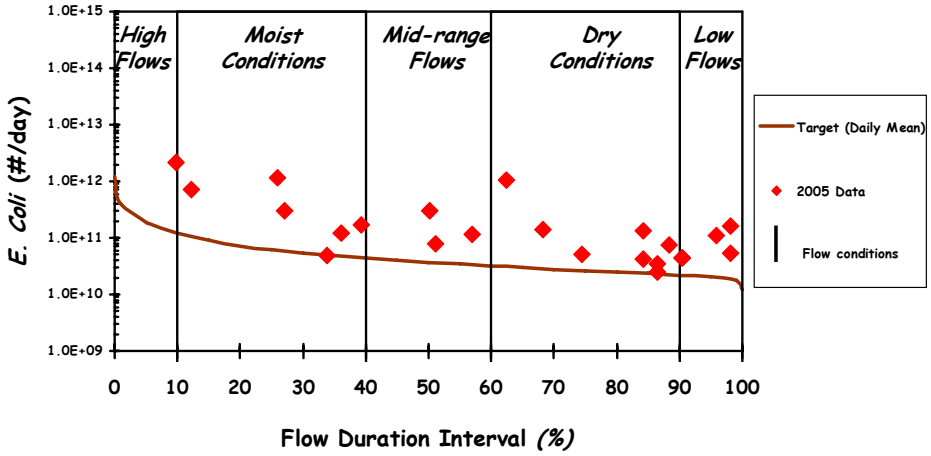
Lower Rouge at Canton Center Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G65



E. Coli Data & USGS Gage 04168400 Duration Interval *21.88 square miles*

Figure J-5

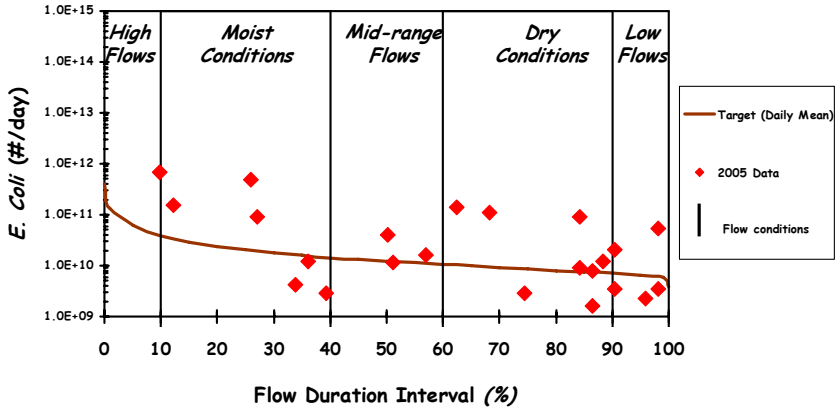
Sines Drain at Sheldon Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G94



E. Coli Data & USGS Gage 04168400 Duration Interval *8.09 square miles*

Figure J-6

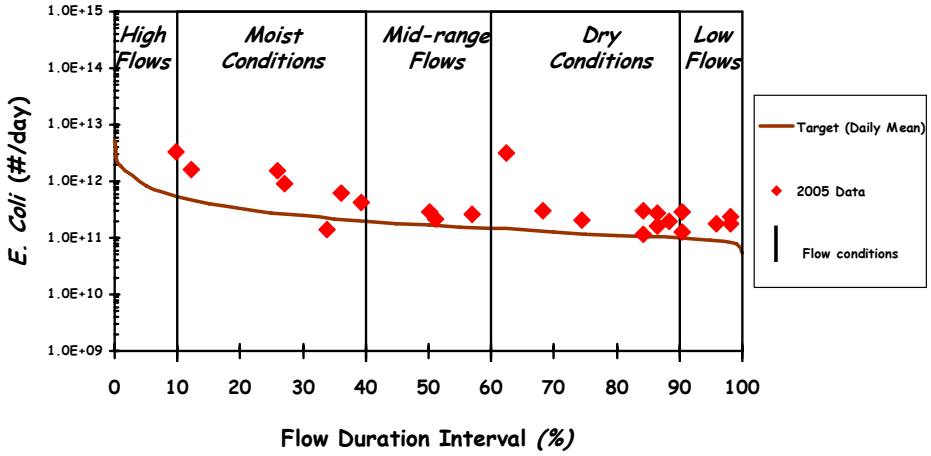
McKinstry Drain at Michigan Ave
Load Duration Curve *(2005 Monitoring Data)*
Site: L51



E. Coli Data & USGS Gage 04168400 Duration Interval *2.65 square miles*

Figure J-7

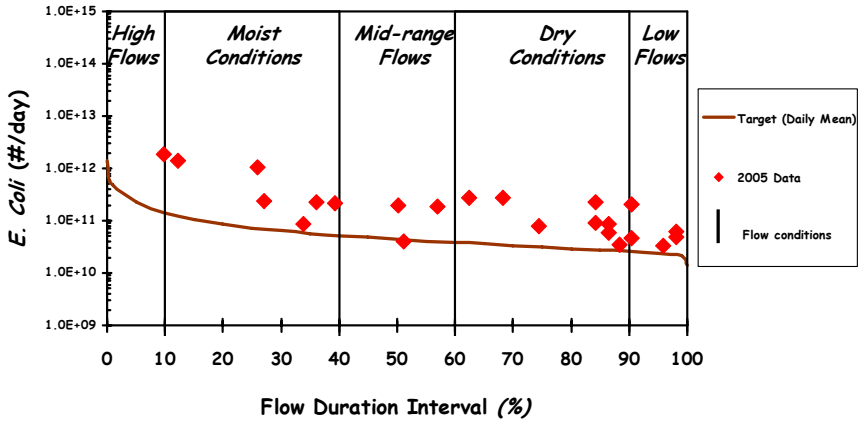
Lower Rouge at Haggerty Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G92



E. Coli Data & USGS Gage 04168400 Duration Interval *36.5 square miles*

Figure J-8

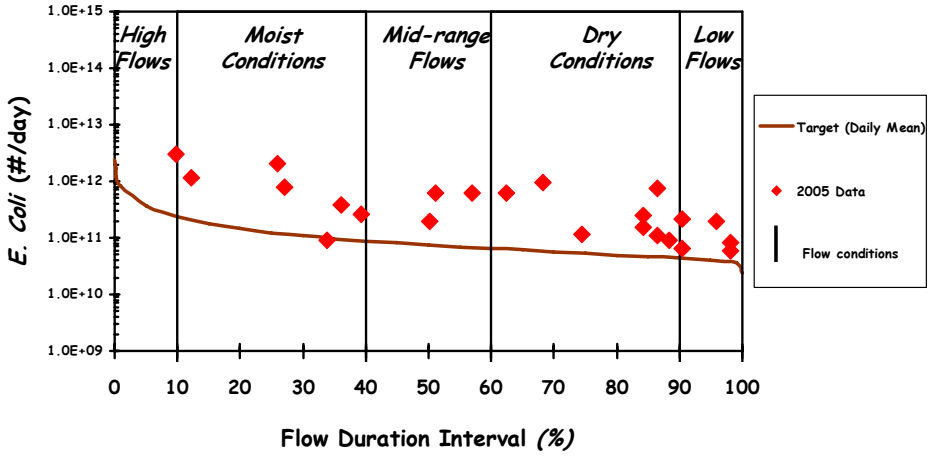
Fellows Creek at Ford Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G211



E. Coli Data & USGS Gage 04168400 Duration Interval *9.58 square miles*

Figure J-9

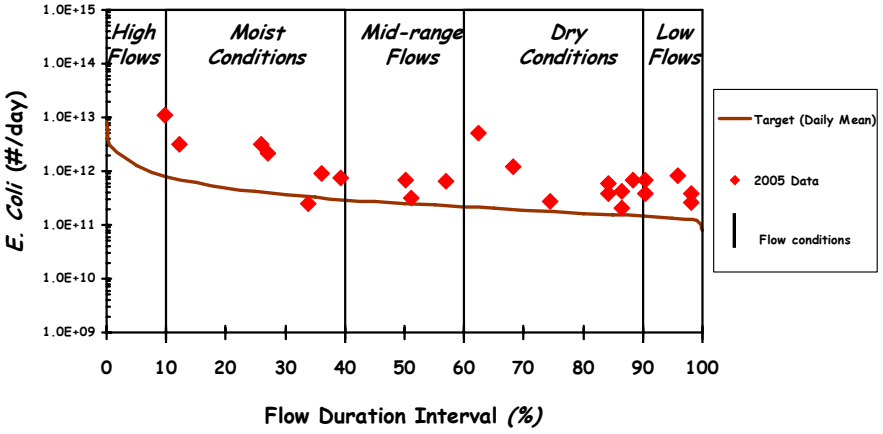
Fellows Creek at Palmer Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: L02



E. Coli Data & USGS Gage 04168400 Duration Interval *16.2 square miles*

Figure J-10

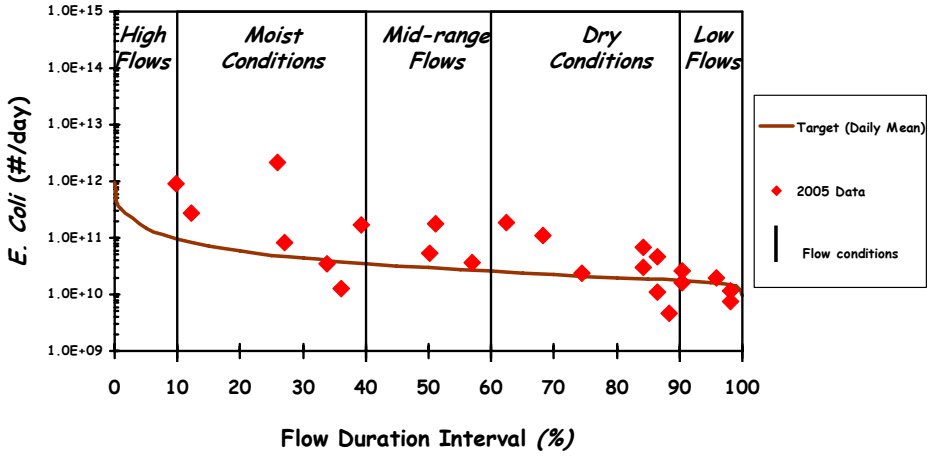
Lower Rouge at Hannan Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: L07



E. Coli Data & USGS Gage 04168400 Duration Interval *54.5 square miles*

Figure J-11

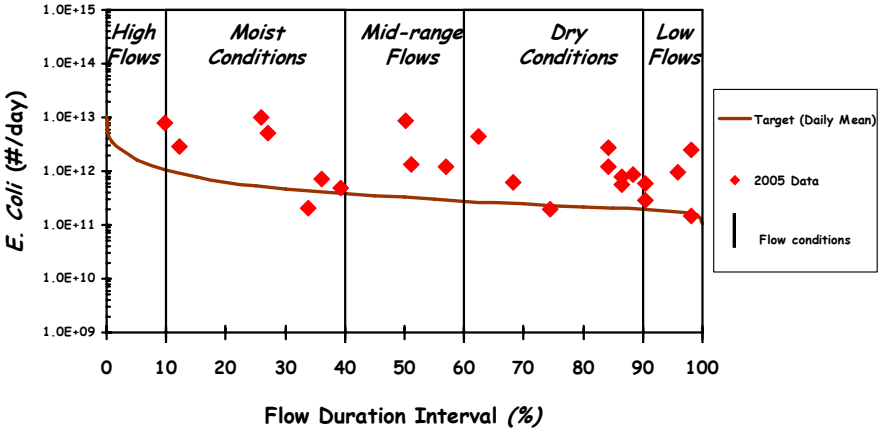
McClaughrey Drain at Annapolis
Load Duration Curve *(2005 Monitoring Data)*
Site: G64



E. Coli Data & USGS Gage 04168400 Duration Interval *6.46 square miles*

Figure J-12

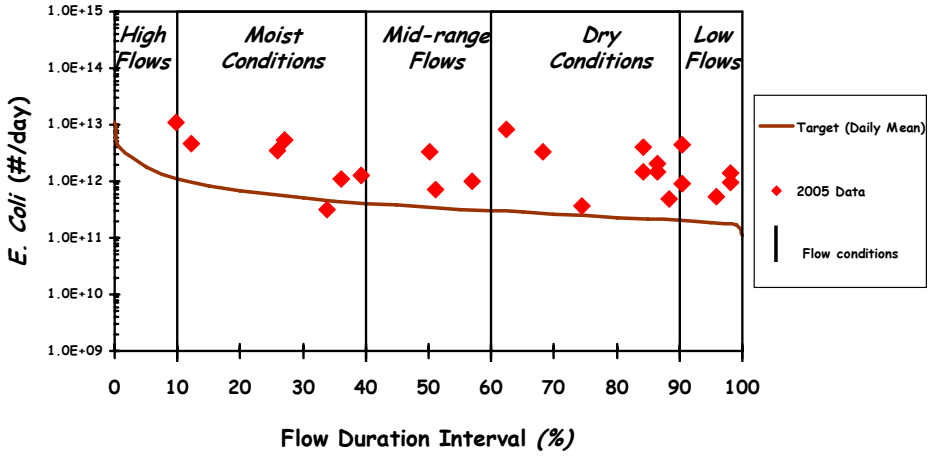
Lower Rouge at Wayne Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: LO6



E. Coli Data & USGS Gage 04168400 Duration Interval *70.5 square miles*

Figure J-13

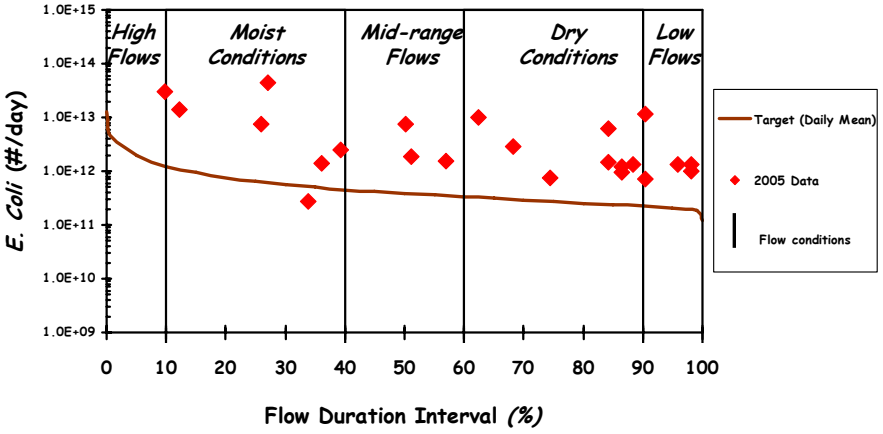
Lower Rouge at Henry Ruff Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G97



E. Coli Data & USGS Gage 04168400 Duration Interval *75.7 square miles*

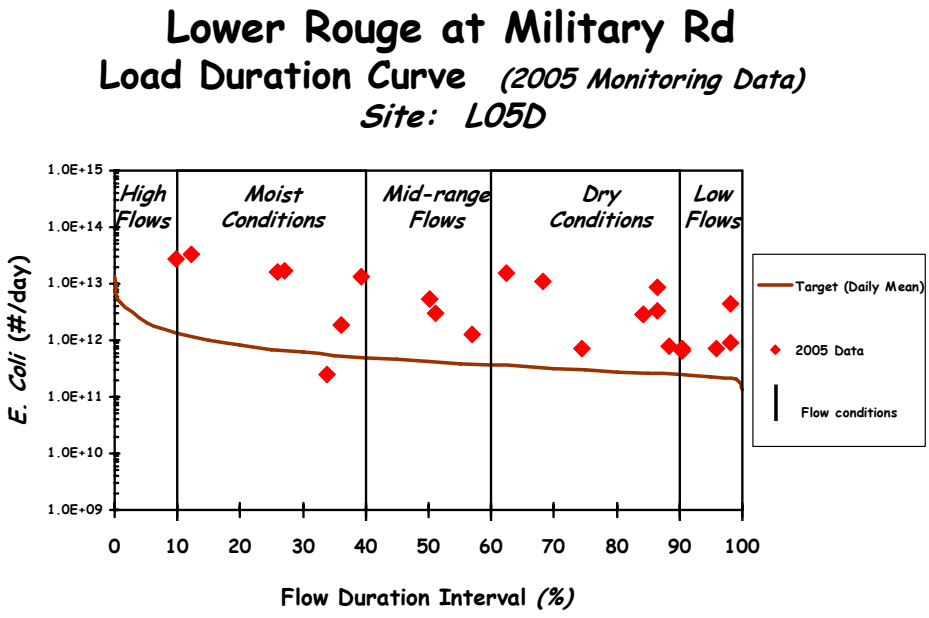
Figure J-14

Lower Rouge at John Daly Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: G98



E. Coli Data & USGS Gage 04168400 Duration Interval *84.0 square miles*

Figure J-15



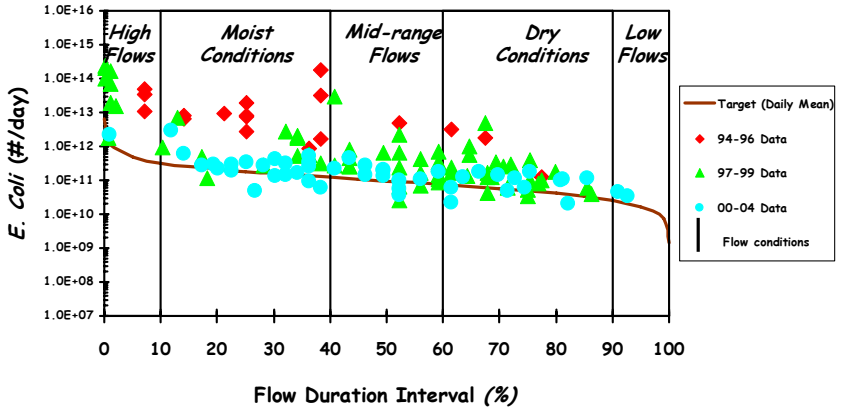
E. Coli Data & USGS Gage 04168400 Duration Interval *91.2 square miles*

APPENDIX K

LOAD DURATION CURVES
ROUGE RIVER
1994-2004 ARC/RPO DATA

Figure K-1

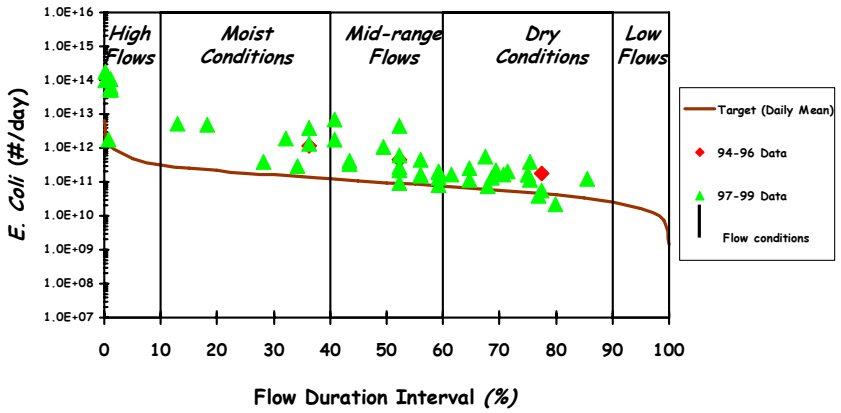
Main Rouge at Maple Rd
Load Duration Curve *(RPO Monitoring Data)*
Site: G45



E. Coli Data & USGS Gage Duration Interval 04166000 *33.3 square miles*

Figure K-2

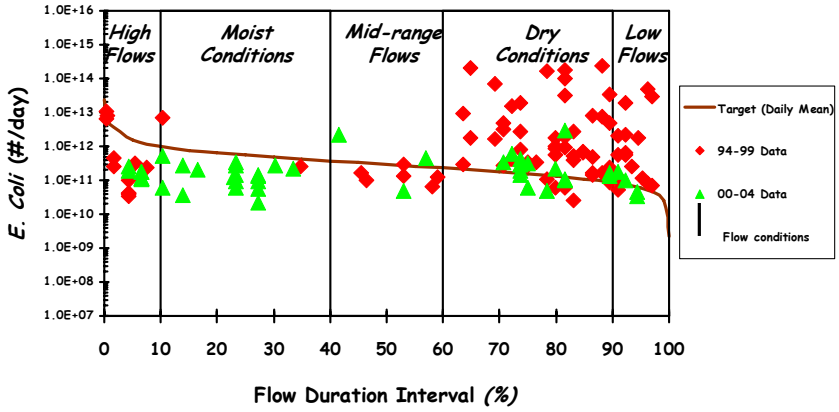
Main Rouge at Lahser Rd
Load Duration Curve *(RPO Monitoring Data)*
Site: M03



E. Coli Data & USGS Gage Duration Interval 04166000 *33.3 square miles*

Figure K-3

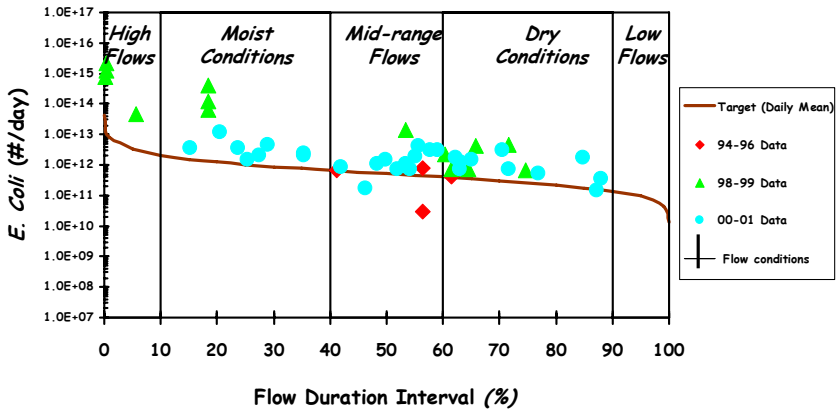
Main Rouge at Beech Road
Load Duration Curve *(RPO Monitoring Data)*
Site: US5



E. Coli Data & USGS Gage Duration Interval 04166100 *87.9 square miles*

Figure K-4

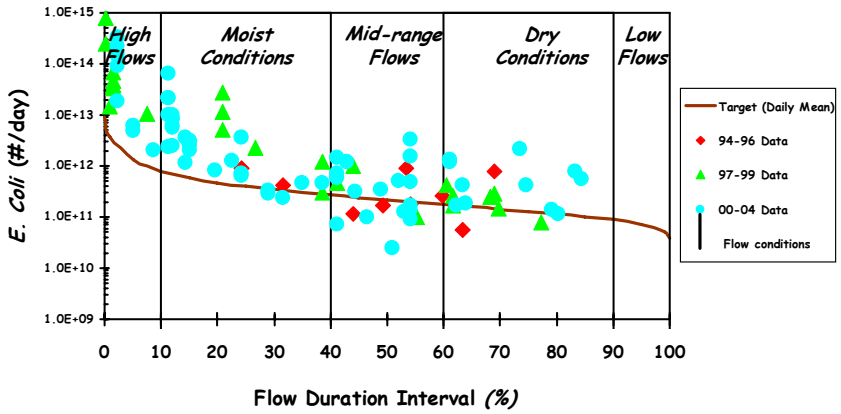
Main Rouge at Plymouth Rd
Load Duration Curve *(RPO Monitoring Data)*
Site: US7



E. Coli Data & USGS Gage Duration Interval 04166500 *187 square miles*

Figure K-5

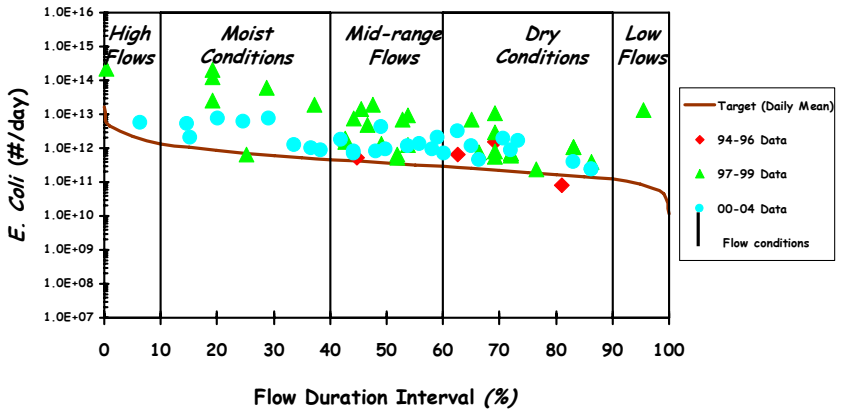
Upper Rouge at Telegraph
Load Duration Curve *(RPO Monitoring Data)*
Site: U05



E. Coli Data & USGS Gage 04166470 Duration Interval *69.35 square miles*

Figure K-6

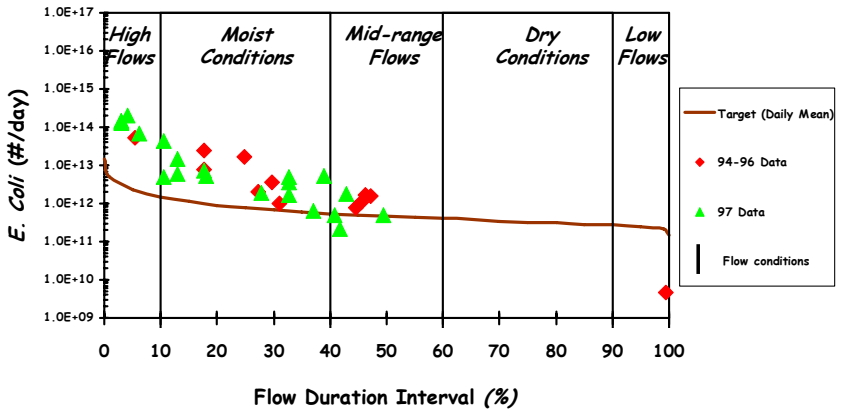
Middle Rouge at Hines/Ford Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: D06



E. Coli Data & USGS Gage 416700 Duration Interval *109.33 square miles*

Figure K-7

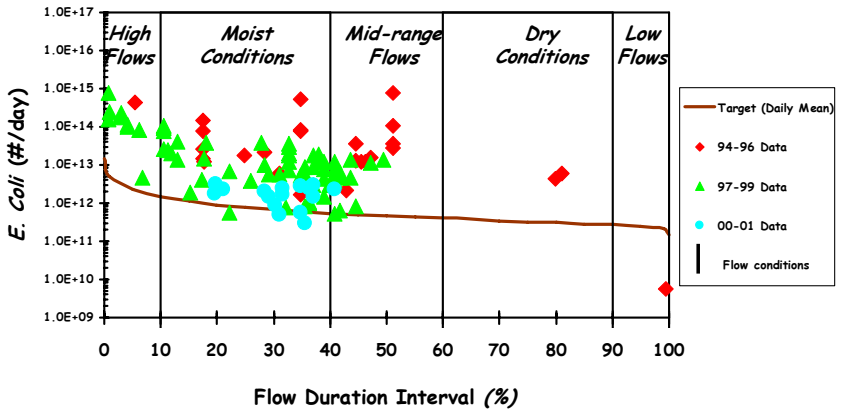
Lower Rouge at Wayne Rd
Load Duration Curve *(2005 Monitoring Data)*
Site: L06



E. Coli Data & USGS Gage 04168000 Duration Interval *70.5 square miles*

Figure K-8

Lower Rouge at John Daly Rd
Load Duration Curve *(RPO Monitoring Data)*
Site: G98



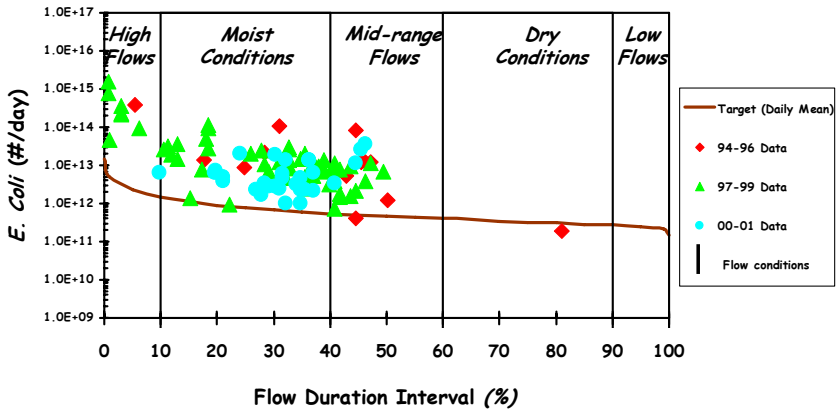
E. Coli Data & USGS Gage 04168000 Duration Interval *84.0 square miles*

Figure K-9

Lower Rouge at Military Rd

Load Duration Curve *(RPO Monitoring Data)*

Site: L05



E. Coli Data & USGS Gage 04168000 Duration Interval *91.2 square miles*

APPENDIX L

NPDES PERMITTED DISCHARGES TO THE ROUGE RIVER

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING WATER
Individual Permit					
MDOT MS4	MI0057364	Statewide	---	---	---
* St Marys Cement Co	MI0004243	Wayne	42.2833	-83.1367	Rouge River
Detroit WWTP	MI0022802	Wayne	42.2842	-83.1281	various
Birmingham CSO RTB	MI0025534	Oakland	42.5406	-83.2281	Rouge River
Dearborn CSO	MI0025542	Wayne	---	---	Rouge River
River Rouge CSO RTB	MI0028819	Wayne	42.2792	-83.1314	Rouge River
Oakland Co-Acacia Park CSO RTB	MI0037427	Oakland	42.5231	-83.2456	Rouge River
* Severstal North America Inc	MI0043524	Wayne	42.2978	-83.1578	Rouge River
* Double Eagle Steel Coating Co	MI0044415	Wayne	42.3119	-83.1583	Rouge River
Bloomfield Village CSO RTB	MI0048046	Oakland	42.5358	-83.2481	Un. Trib. Rouge River
* Dearborn Ind Generation Plt	MI0056235	Wayne	42.3053	-83.1528	Rouge River
* Carmeuse Lime-River Rouge	MI0057126	Wayne	42.2792	-83.1292	Rouge River
* Dearborn CSO Const Dewatering	MI0057738	Wayne	42.3064	-83.2156	Rouge River
* Dearborn CSO Const Dewater 2	MI0057886	Wayne	42.3000	-83.1997	Rouge River
*** General Permit MIG080000**	**Wastewater from Cleanup of Water Contaminated by Gasoline & Related Petroleum Products**				
BP Products NA Inc-River Rouge	MIG080778	Wayne	42.2767	-83.1248	Rouge River
Sunoco-River Rouge Term	MIG081067	Wayne	42.2954	-83.1539	Rouge River
Sunoco-River Rouge Term	MIG081067	Wayne	42.2954	-83.1539	Rouge River
Michigan Fuels Inc	MIG081075	Oakland	42.4812	-83.2857	Rouge River
Former Total Sta 4351	MIG081110	Oakland	42.5010	-83.3081	Un. Trib. Pebble Creek
*** General Permit MIG250000**	**Non Contact Cooling Water**				
Detroit Diesel Corp	MIG250058	Wayne	42.3758	-83.2694	Rouge River
Ford-Rouge Mfg Complex	MIG250460	Wayne	42.3058	-83.1639	Rouge River
General Permit MIG619000	**Municipal Separate Storm Sewer System**				
Beverly Hills MS4-Oakland	MIG610005	Oakland	42.5253	-83.2642	Rouge River
Bingham Farms MS4-Oakland	MIG610006	Oakland	42.5069	-83.2856	Franklin Br. Rouge River
Lathrup Village MS4-Oakland	MIG610013	Oakland	42.5031	-83.2225	Rouge River
Allen Park MS4-Wayne	MIG610020	Wayne	42.2447	-83.2222	---
Pontiac MS4-Oakland	MIG610023	Oakland	---	---	---
Southfield MS4-Oakland	MIG610027	Oakland	42.4883	-83.2861	---
Melvindale MS4-Wayne	MIG610029	Wayne	42.2917	-83.1708	Rouge River
Auburn Hills MS4-Oakland	MIG610031	Oakland	42.6250	-83.2208	---
Franklin MS4-Oakland	MIG610041	Oakland	42.5000	-83.3083	Rouge River
Oakland Co MS4	MIG610042	Oakland	42.5875	-83.2917	---
Birmingham MS4-Oakland	MIG610044	Oakland	42.5417	-83.2208	---
Troy MS4-Oakland	MIG610053	Oakland	---	---	---
Rochester PS	MIG610250	Oakland	---	---	---
Orchard Lake MS-Oakland	MIG610270	Oakland	---	---	---
Rochester Hills MS4-Oakland	MIG610283	Oakland	---	---	---
Bloomfield Hills MS4-Oakland	MIG610284	Oakland	---	---	---
Oak Park MS4-Oakland	MIG610285	Oakland	---	---	---
Avondale PS MS4-Oakland	MIG610294	Oakland	---	---	---
General Permit MIS040000	**Stormwater Discharges from Municipal Separate Storm Sewer Systems - Jurisdictional Permit**				
Bloomfield Twp MS4-Oakland	MIS040099	Oakland	42.5603	-83.2992	---
W Bloomfield Twp MS4-Oakland	MIS040102	Oakland	42.5639	-83.3611	---

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING WATER
*** General Permit MIG760000**	**Public Swimming Pool Wastewater**				
Orchard Ridge Campus-OCC	MIG760012	Oakland	42.4900	-83.3700	Minnow Pond Drain
*** General Permit MIG679000**	**Hydrostatic Pressure Test Water**				
Buckeye Terminals-Detroit	MIG670079	Wayne	42.2811	-83.1419	Rouge River
BP Products NA Inc-River Rouge	MIG670081	Wayne	42.2767	-83.1248	Rouge River
Sunoco-River Rouge Term	MIG670329	Wayne	42.2954	-83.1539	Rouge River
General Permit MIS210000	**Stormwater Discharges from Industrial Activities**				
Levy-Dearborn-Falcon Trucking	MIS210252	Wayne	42.3158	-83.1508	Rouge River
Levy-Dearborn-Stacy Trucking	MIS210253	Wayne	42.3106	-83.1406	Rouge River
Levy-Detroit Plt 6	MIS210254	Wayne	42.2903	-83.1592	Rouge River
Levy-Dearborn Plt 2	MIS210255	Wayne	42.3147	-83.1453	Baby Creek
Koenig Fuel-Plymouth Yard	MIS210256	Wayne	42.3714	-83.2753	Ashcroft-Sherwood Drain
Trend Tool Inc-Livonia	MIS210268	Wayne	42.3728	-83.3664	Shaw Drain
Steel Industries Inc Plt 5	MIS210270	Wayne	42.3728	-83.3689	Shaw Drain
Arlans Manufacturing	MIS210290	Oakland	42.4442	-83.2781	Rouge River
Wisne Center-Southfield	MIS210293	Oakland	42.4444	-83.2781	Rouge River
Progressive Tool & Industries	MIS210299	Oakland	42.4456	-83.2781	Rouge River
Resource Recovery-FCR Detroit	MIS210303	Oakland	42.4442	-83.2386	Rouge River
Superior Materials Plt 32	MIS210311	Wayne	42.2853	-83.1231	Rouge River
Allied Waste-Southfield	MIS210314	Oakland	42.4456	-83.2420	Rouge River
GM-Powertrain Div-Livonia	MIS210318	Wayne	42.3761	-83.3331	Shaw Drain
Waste Mgt of Mich-Detroit N	MIS210324	Oakland	42.4442	-83.2303	Rouge River
Dearborn Sausage Co	MIS210332	Wayne	42.3042	-83.1472	Rouge River
Accum-Matic Systems Livonia	MIS210335	Wayne	42.3711	-83.3669	Rouge River
Kopacz Industrial Painting Inc	MIS210346	Wayne	42.3744	-83.3528	Shaw Drain
Fittings Prod Co-Livonia	MIS210349	Wayne	42.3772	-83.3139	Bell Branch
Veolia ES Solid Waste Midwest	MIS210358	Wayne	42.3047	-83.1753	Rouge River
Causley Trucking-Melvindale	MIS210369	Wayne	42.2858	-83.1842	Rouge River
Argent Limited-Livonia	MIS210370	Wayne	42.3714	-83.3644	Shaw Drain
Peterson Spring-Southfield	MIS210391	Oakland	42.4458	-83.2781	Rouge River
AAA Industries-Detroit	MIS210405	Wayne	42.3764	-83.2792	Rouge River
United States Gypsum Co	MIS210411	Wayne	42.2792	-83.1319	Rouge River
Ryan Transportation	MIS210440	Wayne	42.3728	-83.3722	Shaw Drain
MSD Stamping LLC-Livonia	MIS210591	Wayne	42.3728	-83.3700	Shaw Drain
O Keller Tool Engineering Co	MIS210593	Wayne	42.3772	-83.3139	Bell Branch
Crystal Auto Parts-Dearborn	MIS210655	Wayne	42.3189	-83.1642	Rouge River
AAR Cargo Systems-Livonia	MIS210672	Wayne	42.3772	-83.3139	Livonia storm sewer
Country Fresh LLC-Livonia	MIS210780	Wayne	42.3711	-83.3558	Shaw Drain
Detroit Diesel Corporation	MIS210789	Wayne	42.3767	-83.2682	Rouge River
4 M Industries-Livonia	MIS210802	Wayne	42.3736	-83.3799	Ryder Drain
Bernal Inc-Rochester Hills	MIS210812	Oakland	42.6358	-83.1953	Sprague Br. River Rouge
J & J Machine Products	MIS210855	Wayne	42.3755	-83.3117	Rouge River
X-Cel Industries Inc	MIS210857	Oakland	42.4446	-83.2803	Tributary to Rouge River
International Wholesale Inc	MIS210880	Oakland	42.4455	-83.2469	Owens Drain
Ideal Recycling Inc	MIS210916	Oakland	42.4459	-83.2322	Rouge River
Larry Ross Garage Inc	MIS210922	Oakland	42.4520	-83.2758	Rouge River
CDM Machine Co Inc	MIS210925	Wayne	42.3765	-83.2782	Rouge River
Maro Precision Tool Co	MIS210947	Wayne	42.3775	-83.2292	Wayne County Storm Sys

Individual permits and COCs in the Main Branch of the Rouge River watershed

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING WATER
Turbine Tool & Gage Inc	MIS210955	Wayne	42.3740	-83.3651	Rouge River
Welz Tool Machine & Boring C	MIS210965	Wayne	42.3705	-83.3551	Rouge River
Ford-Rouge Mfg Complex	MIS210970	Wayne	42.3058	-83.1639	Rouge River
Great Lakes Petroleum Termin	MIS210981	Wayne	42.3244	-83.2217	Rouge River
Ambassador Steel-Southfield	MIS210986	Oakland	42.4450	-83.2662	Rouge River
General Permit MIS220000	**Stormwater Discharges with Required Monitoring**				
Great Lakes Agg-River Rouge	MIS220028	Wayne	42.2661	-83.1286	River Rouge
General Permit MIS310000	**Stormwater from Industrial Activities**				
Americane Sugar Refining LLC	MIS310603	Wayne	42.3539	-83.1248	Rouge River

* discharge not considered a source of *E. coli*

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING
Individual					
MDOT MS4	MI0057364	Statewide	---	---	---
Commerce Twp WWTP	MI0025071	Oakland	42.5458	-83.4625	Seeley Drain
Wayne Co/RDFrd/Livonia CSO	MI0051535	Wayne	42.4061	-83.2947	Upper Rouge River
*** General Permit MIG250000**	**Non Contact Cooling Water**				
Robert Bosch-Farmington Hills	MIG250066	Oakland	42.4914	-83.4233	Seeley Drain
Borg Warner TorqTransfer Sys	MIG250485	Wayne	42.3817	-83.3608	Bell Branch
General Permit MIG619000	**Municipal Separate Storm Sewer System**				
Farmington MS4-Oakland	MIG610010	Oakland	42.4683	-83.3872	---
Farmington Hills MS4-Oakland	MIG610011	Oakland	42.4828	-83.3919	---
Livonia MS4-Wayne	MIG610015	Wayne	42.3917	-83.3500	---
Redford Twp MS4-Wayne	MIG610016	Wayne	42.4028	-83.2953	---
Commerce Twp MS4-Oakland	MIG610033	Oakland	---	---	---
Wayne Co MS4	MIG610040	Wayne	42.4083	-83.2917	---
General Permit MIS040000	**Stormwater Discharges from Municipal Separate Storm Sewer Systems - Jurisdictional Permit**				
Farmington Hill PS MS4-Oakland	MIS040047	Oakland	---	---	---
Livonia PS MS4-Wayne	MIS040054	Wayne	---	---	---
Northville PS MS4-Wayne	MIS040078	Wayne	42.4366	-83.4511	---
General Permit MIS210000	**Stormwater Discharges from Industrial Activities**				
Specialty Steel Treating-FHill	MIS210007	Oakland	42.4408	-83.3564	Upper Rouge River
Nagle Paving Co-Livonia	MIS210282	Wayne	42.3747	-83.4053	Rouge River
Sure Fit Metal Products	MIS210288	Wayne	42.3800	-83.3458	Shaw Drain
Diamond Automation	MIS210294	Oakland	42.4614	-83.4344	Upper River Rouge
Washers Inc-Livonia	MIS210295	Wayne	42.3767	-83.3697	Belle Branch
BASF Corp-Livonia	MIS210296	Wayne	42.3775	-83.4017	Barlow Drain
Lyon Manufacturing-Livonia	MIS210316	Wayne	42.3778	-83.4119	River Rouge
US Fabricating-Walled Lake	MIS210333	Oakland	42.5408	-83.4378	Seeley Drain
Quality Metalcraft Inc	MIS210342	Wayne	42.3767	-83.3681	Shaw Drain
Standard Die & Fabricating Inc	MIS210345	Wayne	42.3772	-83.3881	Barlow Drain
Sales & Engineering-Livonia	MIS210347	Wayne	42.3797	-83.3681	Shaw Drain
UPS-Livonia	MIS210362	Wayne	42.3831	-83.3381	Rouge River
Tru-Line-31100 Industrial	MIS210377	Wayne	42.3789	-83.3461	Shaw Drain
Tru-Line-30844 Industrial	MIS210378	Wayne	42.3806	-83.3450	Shaw Drain
Tru-Line-30622 Industrial	MIS210379	Wayne	42.3806	-83.3431	Shaw Drain
Dept Army-AMSA 134G	MIS210382	Wayne	42.3817	-83.3828	Barlow Drain
Giffin-Farmington Hills	MIS210389	Oakland	42.4606	-83.4278	Upper River Rouge
ATW-Adv Tech & Testing-Livonia	MIS210394	Wayne	42.3789	-83.3789	Barlow Drain
Applied Process-Livonia	MIS210413	Wayne	42.3733	-83.4114	Rouge River
Cass Erectors-Livonia	MIS210422	Wayne	42.3792	-83.3789	Barlow Drain
Plastomer Corp-Livonia	MIS210423	Wayne	42.3808	-83.4147	Patter Drain
Mcgean-Rohco Inc	MIS210432	Wayne	42.3811	-83.4228	Gunn Branch
Ford-Livonia-Transmission Plt	MIS210444	Wayne	42.3678	-83.3992	River Rouge
Ideal Fabricators-Livonia	MIS210537	Wayne	42.3825	-83.3453	Shaw Drain
Fendt Builders-Farmington	MIS210587	Oakland	42.4525	-83.3858	Tarabusi Creek
City of Livonia DPS-Livonia LF	MIS210590	Wayne	42.3769	-83.3664	Shaw Drain
Williams Diversified-Livonia	MIS210602	Wayne	42.3781	-83.3528	Shaw Drain
Quigley Industries-Farm Hills	MIS210626	Oakland	42.4706	-83.4297	Walled Lake

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING
Guardian Manufacturing-Livonia	MIS210633	Wayne	42.3719	-83.4017	River Rouge
CSM Manufacturing Corp-Plt 1	MIS210642	Oakland	42.4711	-83.4247	Walled Lake
State Fabricators Inc	MIS210656	Oakland	42.4411	-83.3461	Upper Rouge River
Wayne Craft-Livonia	MIS210666	Wayne	42.3803	-83.3886	Barlow Drain
Lockwood Manufacturing-Livonia	MIS210667	Wayne	42.3778	-83.3456	River Rouge
Piedmont Concrete Inc	MIS210675	Oakland	42.4411	-83.3397	Upper River Rouge
Carlesimo Products Inc	MIS210682	Oakland	42.4411	-83.3383	Upper Rouge River
Quality Metalcraft-Livonia	MIS210683	Wayne	42.3767	-83.3697	Bell Branch
TAG Mfg-Farmington Hills	MIS210691	Oakland	42.4642	-83.4211	Tarabusi Creek
Webasto Roof-Livonia	MIS210692	Wayne	42.3786	-83.4092	Gunn Branch
FedEx Ground	MIS210709	Wayne	42.3742	-83.4222	Newburgh Lake
Producto Chemicals	MIS210714	Wayne	42.3800	-83.3458	Bell Branch
Integrated Manufacturing Inc	MIS210762	Oakland	42.4592	-83.4225	Tarabusi Creek
Microheat Inc-Farmington Hills	MIS210769	Oakland	42.4956	-83.4197	Seeley Drain
First Tech Safety Sys-Plymouth	MIS210806	Wayne	42.4366	-83.4511	Tonquish Creek
Tramar Industries-Redford	MIS210810	Wayne	42.3803	-83.2906	Bell Branch
EFTEC-Farmington Hills Plant	MIS210843	Oakland	42.4588	-83.4321	River Rouge
Gehring LP	MIS210858	Oakland	42.4782	-83.3943	Upper Rouge River
Quality Metalcraft Inc-Livonia	MIS210868	Wayne	42.3775	-83.3702	Hawkins Drain
Master Automatic Inc-Plymouth	MIS210870	Wayne	42.3903	-83.4389	Rouge River
NYX Inc-Livonia-Schoolcraft Rd	MIS210875	Wayne	42.3817	-83.3508	Shaw Drain
NYX Inc-Livonia-28100 Plymouth	MIS210876	Wayne	42.3822	-83.3311	Shaw Drain
NYX Inc-Livonia-38700 Plymouth	MIS210877	Wayne	42.3795	-83.4288	Newburgh Lake
Steel Industries Inc-Fullerton	MIS210928	Wayne	42.3826	-83.3120	Rone Drain
American Specialty Oil Co	MIS210930	Wayne	42.3807	-83.3852	Barlow Drain
Roush Industries-Plymouth Road	MIS210934	Wayne	42.3695	-83.3993	Rouge River
Roush Mfg-Bldg B28	MIS210936	Wayne	42.3693	-83.4041	Rouge River
Michigan Dairy	MIS210949	Wayne	42.3821	-83.3360	Rouge River
Roush Industries-Bldg 7 & B13	MIS210953	Wayne	42.3695	-83.3993	Rouge River
Atlas Tube Inc	MIS210958	Wayne	42.3796	-83.4241	Hines Creek
Mid-Michigan Recycling	MIS210959	Wayne	42.3772	-83.3663	River Rouge
Beaver Aerospace-11825	MIS210996	Wayne	42.3771	-83.3850	Rouge River

* discharge not considered a source of *E. coli*

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING
Individual Permit					
MDOT MS4	MI0057364	Statewide	---	---	---
Oakland Co Walled Lk/Novi WWTF	MI0024287	Oakland	42.5086	-83.4978	Finley Drain
* Wayne Co-Lift Station 1A	MI0026123	Wayne	42.3292	-83.2486	Middle Rouge River
***** Arbor Hills Remediation Area	MI0045713	Wayne	42.4014	-83.5458	trib to Johnson Drain
Wayne Co/Dearborn Heights CSO	MI0051489	Wayne	42.3444	-83.2731	Upper Rouge River
Salem Twp WWTP	MI0054798	Washtenaw	42.3994	-83.5781	trib to Johnson Drain
*** General Permit MIG250000**	**Non Contact Cooling Water**				
Rock Tool & Machine-Plymouth	MIG250484	Wayne	42.3858	-83.5029	trib to Tonquish Creek
General Permit MIG619000	**Municipal Separate Storm Sewer System**				
Westland MS4-Wayne	MIG610001	Wayne	42.3167	-83.3736	---
Dearborn Heights MS4-Wayne	MIG610009	Wayne	42.3256	-83.3014	---
Garden City MS4-Wayne	MIG610012	Wayne	42.3206	-83.3425	---
Northville MS4-Oakland	MIG610024	Oakland	42.4375	-83.4875	---
Walled Lake MS4-Oakland	MIG610028	Oakland	---	---	---
Novi MS4-Oakland	MIG610030	Oakland	42.4656	-83.4428	---
Plymouth MS4-Wayne	MIG610032	Wayne	42.3681	-83.4528	---
Lyon Twp MS4-Oakland	MIG610034	Oakland	---	---	---
Wixom MS4-Oakland	MIG610035	Oakland	---	---	---
Plymouth Twp MS4-Wayne	MIG610038	Wayne	42.3875	-83.4708	---
Plymouth-Canton PS MS4-Wayn	MIG610343	Wayne	---	---	---
General Permit MIS040000	**Stormwater Discharges from Municipal Separate Storm Sewer Systems - Jurisdictional Permit**				
Wayne-Westland PS MS4-Wayn	MIS040060	Wayne	---	---	Tonquish Creek
Novi PS MS4-Oakland	MIS040076	Oakland	---	---	---
Northville PS MS4-Wayne	MIS040078	Wayne	---	---	---
Northville Twp MS4-Oakland	MIS040109	Oakland	42.4361	-83.4806	---
General Permit MIS210000	**Stormwater Discharges from Industrial Activities**				
Hercules Drawn Steel-Canton	MIS210006	Wayne	42.3431	-83.4542	Rouge River
C & B Machiner-Livonia	MIS210269	Wayne	42.3697	-83.4094	Middle River Rouge
Metaltec Steel Abrasive-Canton	MIS210286	Wayne	42.3517	-83.4467	Deer Drain
Wisne Automation & Engineering	MIS210292	Oakland	42.4664	-83.4661	Walled Lake
Lacy Tool-Novi	MIS210298	Oakland	42.4733	-83.4450	Bishop Creek
Temperform Corp-Novi	MIS210306	Oakland	42.4767	-83.4744	Walled Lake
Plymouth Plating Works	MIS210307	Wayne	42.3500	-83.4583	Tonquish Creek
Xmation	MIS210313	Oakland	42.4664	-83.4689	Walled Lake
Vico Products-Plymouth	MIS210317	Wayne	42.3589	-83.4508	Tonquish Creek
Baron Drawn Steel Corporation	MIS210320	Wayne	42.3489	-83.4531	Tonquish Creek
Caparo Vehicle Components Inc	MIS210330	Oakland	42.4839	-83.4894	Middle Rouge River
Fendt Transit Mix-Novi	MIS210334	Oakland	42.4783	-83.4761	Walled Lake
Tower Automotive-Plymouth	MIS210336	Wayne	42.3825	-83.4775	Middle River Rouge
Packaging Corp Amer-Plymouth	MIS210340	Wayne	42.3822	-83.4806	Tonquish Creek
E & E Manufacturing-Plymouth	MIS210343	Wayne	42.3725	-83.4483	Middle Rouge River
Hercules Drawn Steel Corp	MIS210348	Wayne	42.3742	-83.4264	Newburgh Lake
US Postal Service-Livonia	MIS210361	Wayne	42.3697	-83.3522	Shaw Drain
CSX Transportation-Plymouth	MIS210364	Wayne	42.3797	-83.4678	Middle Rouge River
Cadillac Asphalt-Plt 3A-Wixom	MIS210392	Oakland	42.4964	-83.4503	Novi Lyon Drain

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING
National Concrete Products	MIS210415	Wayne	42.3625	-83.4583	Tonquish Creek
Sun Plastic Coating-Plymouth	MIS210421	Wayne	42.3564	-83.4597	Tonquish Creek
Nat Block Co-Westland	MIS210431	Wayne	42.3236	-83.4239	Willow Creek
E & E Mfg Co-Plymouth	MIS210522	Wayne	42.3722	-83.4486	Middle Rouge River
Unco Automotive Products	MIS210531	Wayne	42.3694	-83.4092	Middle River Rouge
Mich Truck Parts-Westland	MIS210538	Wayne	42.3236	-83.4203	Willow Creek
Gil-Mar Mfg-Canton	MIS210553	Wayne	42.3442	-83.4528	Tonquish Creek
Automotive Comp Hold-Sheldon	MIS210588	Wayne	42.3533	-83.4716	Tonquish Creek
NSS Technologies	MIS210592	Wayne	42.3538	-83.4519	Tonquish Creek
Westside Flame Hardening	MIS210611	Wayne	42.3297	-83.4175	Willow Creek
Messina Concrete Inc-Plymouth	MIS210617	Wayne	42.3797	-83.4692	Middle Rouge River
Dynamic Metal Treating-Canton	MIS210619	Wayne	42.3431	-83.4522	Tonquish Creek
Tony Angelo-Heltzel 902TA	MIS210636	Oakland	42.4886	-83.5103	various
Tony Angelo-Heltzel 902 BC	MIS210637	Oakland	42.4886	-83.5103	various
Tony Angelo-Rex Model S	MIS210638	Oakland	42.4886	-83.5103	various
Tony Angelo-Heltzel 1000	MIS210639	Oakland	42.4886	-83.5103	various
NSS Technologies-Canton	MIS210641	Wayne	42.3458	-83.4528	Tonquish Creek
Northfield Mfg Inc-Westland	MIS210647	Wayne	42.3269	-83.4211	Willow Creek
Tony Angelo-Hagan Model	MIS210662	Oakland	42.4886	-83.5103	various
Global CNC Industries	MIS210677	Wayne	42.3689	-83.4092	Rouge River
Key Plastics-Plymouth	MIS210681	Wayne	42.3731	-83.4372	Middle Rouge River
Inch Memorials-Northville	MIS210685	Wayne	42.4247	-83.4742	Johnson Drain
General Filters Inc-Novi	MIS210696	Oakland	42.4819	-83.4803	Rouge River
Great Lakes Agg-Northville	MIS210732	Washtenaw	42.4111	-83.5725	Rouge River
Novi Industries-Autotech	MIS210748	Oakland	42.4825	-83.4831	Walled Lake
Biologix-Novi	MIS210759	Oakland	42.4824	-83.4881	Walled Lake Branch
SPE Investments LLC	MIS210761	Wayne	42.3417	-83.4569	Tonquish Creek
Novi Automotive Solutions	MIS210763	Oakland	42.5002	-83.5039	Middle River Rouge
Veolia ES Arbor Hills Landfill	MIS210766	Washtenaw	42.3975	-83.5508	trib to Johnson Drain
GDM Tool & Mfg-Canton	MIS210771	Wayne	42.3464	-83.4574	Tonquish Creek
AW Transmission Engineering	MIS210772	Wayne	42.3926	-83.5078	Middle Rouge River
Durr Systems Inc	MIS210776	Wayne	42.3791	-83.4482	Rouge River
J L Becker Co-Plymouth	MIS210778	Wayne	42.3539	-83.4470	Tonquish Creek
Shiloh Ind-Canton-Haggerty	MIS210796	Wayne	42.3381	-83.4500	Tonquish Creek
AW Transmission Eng-Plymouth	MIS210797	Wayne	42.3926	-83.5078	trib to Tonquish Cree
Frito-Lay-Great Lakes Facility	MIS210822	Wayne	42.3875	-83.4875	Tonquish Creek
LOC Performance Prod-Plymouth	MIS210835	Wayne	42.3791	-83.4482	Middle River Rouge
Durcon Laboratory Tops Inc	MIS210860	Wayne	42.3430	-83.4524	---
Hayes Trucking Facility	MIS210881	Oakland	42.4898	-83.4835	Walled Lake Branch
Rock Tool & Machine-Plymouth	MIS210883	Wayne	42.3858	-83.5029	Tramp Hollow Drain
Durable Coatings	MIS210887	Wayne	42.4013	-83.4591	Middle Rouge River
Rofin-Sinar Inc	MIS210902	Wayne	42.3720	-83.4430	Rouge River
Bodycote-Haggerty Road	MIS210903	Wayne	42.3432	-83.4475	Tonquish Creek
Fintex LLC	MIS210911	Wayne	42.3568	-83.3153	Wilson Drain
US Farathane-Westland	MIS210932	Wayne	42.3253	-83.4261	Willow Creek
Schuler-Canton	MIS210951	Wayne	42.3419	-83.4486	Tonquish Creek
Welk-ko Fabricators Inc	MIS210957	Wayne	42.3504	-83.4478	Shaw Drain
Canton Plymouth Mettetal	MIS210971	Wayne	42.3500	-83.4576	Tonquish Creek
Stylecraft Printing Co	MIS210976	Wayne	42.3502	-83.4528	Koss Drain
Reliable Carriers Inc	MIS210991	Wayne	42.3395	-83.4473	Tonquish Creek

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING
General Permit MIS220000	**Stormwater Discharges With Required Monitoring**				
AVL North America Inc	MIS220038	Wayne	42.3819	-83.5125	Tonquish Creek
General Permit MIS310000	**Stormwater from Industrial Activities**				
YRC Inc-Taylor	MIS310046	Wayne	42.4514	-83.4756	---
Waste Mgt of Mich-Romulus	MIS310278	Wayne	42.1614	-83.3053	Sherman Drain

* discharge not considered a source of *E. coli*

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING WATER
MDOT MS4	MI0057364	Statewide	---	---	---
Dearborn CSO	MI0025542	Wayne	---	---	Rouge River
YCUA Regional WWTP	MI0042676	Washtenaw	42.2236	-83.5531	Lower Rouge River
* Ford-Wayne Assembly Plt	MI0046183	Wayne	42.2778	-83.4069	Edmund Creek
Wayne Co/Inkster/Drbrn Hts CSO	MI0051462	Wayne	42.3017	-83.2906	Lower Rouge River
Wayne Co/Inkster CSO	MI0051471	Wayne	42.2967	-83.3092	Lower Rouge River
Wayne Co/Dearborn Heights CSO	MI0051489	Wayne	42.3444	.83.2731	Rouge River
Inkster/Dearborn Heights CSO	MI0051837	Wayne	42.3008	-83.2958	Lower Rouge River
* Visteon Headquarters-Van Buren	MI0057156	Wayne	42.2364	-83.4377	Grace Lake
*** General Permit MIG250000**	**Non Contact Cooling Water**				
Steel Technologies Inc	MIG250070	Wayne	42.2658	-83.4867	McKinstry Drain
General Permit MIG619000	**Municipal Separate Strom Sewer System**				
Westland MS4-Wayne	MIG610001	Wayne	42.3167	-83.3736	---
Dearborn MS4-Wayne	MIG610008	Wayne	42.3039	-83.2431	---
Inkster MS4-Wayne	MIG610014	Wayne	42.2889	-83.3047	Rouge River
Romulus MS4-Wayne	MIG610017	Wayne	---	---	---
Wayne MS4-Wayne	MIG610019	Wayne	42.2786	-83.3719	---
Van Buren Twp MS4-Wayne	MIG610021	Wayne	---	---	---
Melvindale MS4-Wayne	MIG610029	Wayne	42.2917	-83.1708	---
Ypsilanti Twp MS4-Washtenaw	MIG610037	Washtenaw	42.2708	-83.5708	---
Wayne Co MS4	MIG610040	Wayne	--	--	---
Washtenaw CRC MS4	MIG610314	Washtenaw	--	--	---
Washtenaw Co MS4-Washtenaw	MIG610039	Washtenaw	42.3250	-83.5708	---
Willow Run Airport MS4	MIG610368	Wayne	---	---	---
*** General Permit MIG670000**	**Hydrostatic Pressure Test Water**				
Buckeye Terminals-Detroit	MIG670079	Wayne	42.2811	-83.1419	Lower Rouge River
General Permit MIS040000	**Stormwater Discharges from Municipal Separate Sewer Systems - Jurisdictional Permit**				
Canton Twp MS4-Wayne	MIS040108	Wayne	42.3083	-83.4917	---
General Permit MIS210000	**Stormwater Discharges from Industrial Activities**				
Swiss American Screw	MIS210258	Wayne	42.2644	-83.4753	Yost Drain
Worthington Specialty-Canton	MIS210271	Wayne	42.2683	-83.4464	Lower Rouge River
Hajjar Plating-Wayne	MIS210285	Wayne	42.2667	-83.4125	Wilbur Drain
Weiser Recycling Inc	MIS210308	Wayne	42.2758	-83.3931	McClaughrey Drain
L & W Engineering Co-No 2	MIS210322	Wayne	42.2611	-83.4458	Bell Drain
Sauk Trail Development Inc	MIS210356	Wayne	42.2703	-83.4558	Lower Rouge River
Allied Waste-Detroit West	MIS210365	Wayne	42.2679	-83.4136	Rouge River
Mich Foundation Co-Wayne Plt 4	MIS210374	Wayne	42.2686	-83.4161	Rouge River
Imperial Industries-Belleville	MIS210397	Wayne	42.2636	-83.4753	McKinstry Drain
AB Myr Industries-Belleville	MIS210399	Wayne	42.2625	-83.5500	Belleville Lake
Doan Companies-Inkster Plt	MIS210406	Wayne	42.2900	-83.3258	Lower Rouge River
GM-CPC-Romulus Engine	MIS210409	Wayne	42.2612	-83.4040	McClaughrey Drain
General Metal & Abrasive Co	MIS210412	Wayne	42.2514	-83.4142	McClaughrey Drain
Linde Gas North America LLC	MIS210419	Wayne	42.2711	-83.4828	McKinstry Drain
Ford-Wayne Integral Stamping	MIS210420	Wayne	42.2783	-83.4103	Lower Rouge River
Plastipak Packaging	MIS210425	Wayne	42.3122	-83.4181	Hunter Drain
Waste Mgt-Woodland-Van Buren	MIS210435	Wayne	42.2511	-83.4383	Bingell Drain

FACILITY	PERMIT NO	COUNTY	LATITUDE	LONGITUDE	RECEIVING WATER
H & H Metals-Inkster	MIS210437	Wayne	42.2900	-83.3267	Lower Rouge River
Smart-Inkster	MIS210441	Wayne	42.2847	-83.3358	Rouge River
Scrap Busters Auto & Truck	MIS210544	Wayne	42.2728	-83.4258	Bell Drain
Steel Technologies Inc	MIS210585	Wayne	42.2658	-83.4867	McKinstry Drain
L & W Engineering Co-No 1	MIS210600	Wayne	42.2561	-83.4456	Bell Drain
Galaxy Precision Products	MIS210601	Wayne	42.2667	-83.5042	Sines Drain
Broomes Auto Parts	MIS210643	Wayne	42.2733	-83.3994	McClaughrey Drain
Bishop Auto Wrecking-Inkster	MIS210657	Wayne	42.2897	-83.3233	Lower Rouge River
Advanced Material Process	MIS210688	Wayne	42.2797	-83.3728	Lower Rouge River
NYX-Cherry Hill-Westland	MIS210764	Wayne	42.3067	-83.2884	Leng Drain
Powertrain Prod-Canton	MIS210791	Wayne	42.2625	-83.4375	Bell Drain
Plastech Eng Prod-Romulus	MIS210801	Wayne	42.2519	-83.4142	McClaughrey Drain
Ford-Mich Truck Plt	MIS210829	Wayne	42.2751	-83.4139	Lower Rouge River
JB Hunt Transport	MIS210899	Wayne	42.2677	-83.4238	Lower River Rouge
Republic Waste-Wayne Hauling	MIS210923	Wayne	42.2661	-83.3989	Rouge River
Midwest Auto Truck & Spring	MIS210940	Wayne	42.2657	-83.4876	Fisher Drain
Reinhart Industries	MIS210954	Wayne	42.2825	-83.4045	Rouge River
State Wide Boring	MIS210963	Wayne	42.2583	-83.4436	Bell Drain
General Permit MIS220000	**Stormwater discharges with Required Monitoring**				
Red Spot-Westland	MIS220019	Wayne	42.3000	-83.4125	Leng Drain
American Jetway Corp-Wayne	MIS220022	Wayne	42.2792	-83.3750	Boyce Drain
SNF Polychemie Inc-Wayne	MIS220025	Wayne	42.2656	-83.4242	Wilbur Drain
Unistrut International Corp	MIS220040	Wayne	42.2761	-83.3900	McClaughrey Drain
Future Environmental-Wayne	MIS220048	Wayne	42.2677	-83.4238	Edmund Creek
General Permit MIS310000	**Stormwater from Industrial Activities**				
Woodbridge Corp-Romulus	MIS310219	Wayne	42.2833	-83.1958	Carter Drain
Manfredi Motor Transit-Taylor	MIS310432	Wayne	42.2453	-83.2914	Lower Rouge River
General Permit MIS410000	**Stormwater Discharges from Industrial Activities with Required Monitoring**				
Willow Run Airport	MIS410661	Wayne	42.2378	-83.5322	---

* discharge not considered a source of *E. coli*

APPENDIX M

CSO AND SSO DISCHARGE AND *E. COLI* LEVELS

Figure M-1

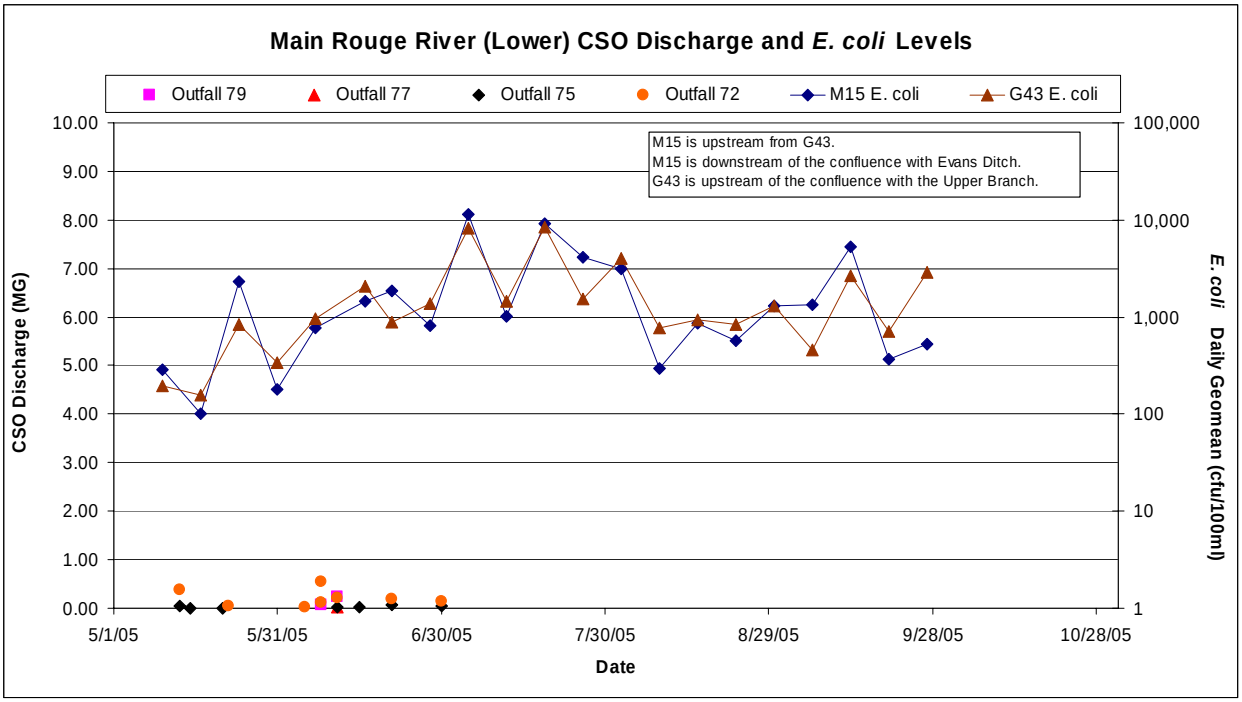


Figure M-2

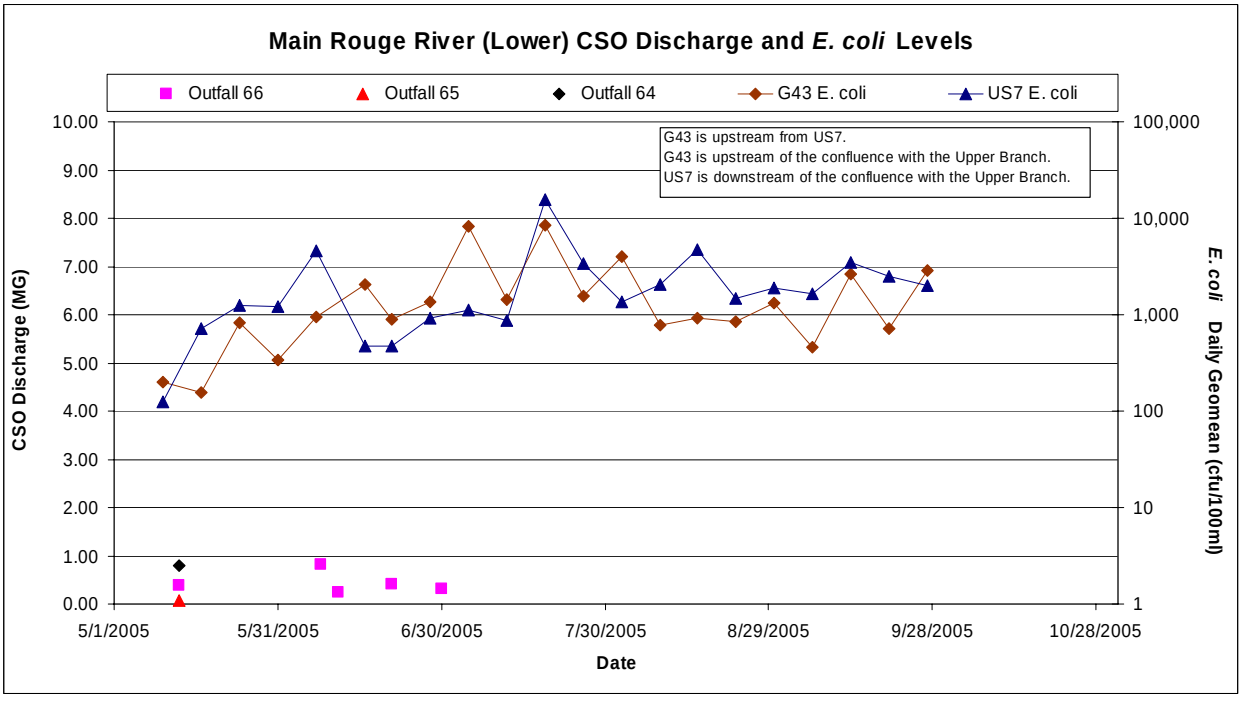


Figure M-3

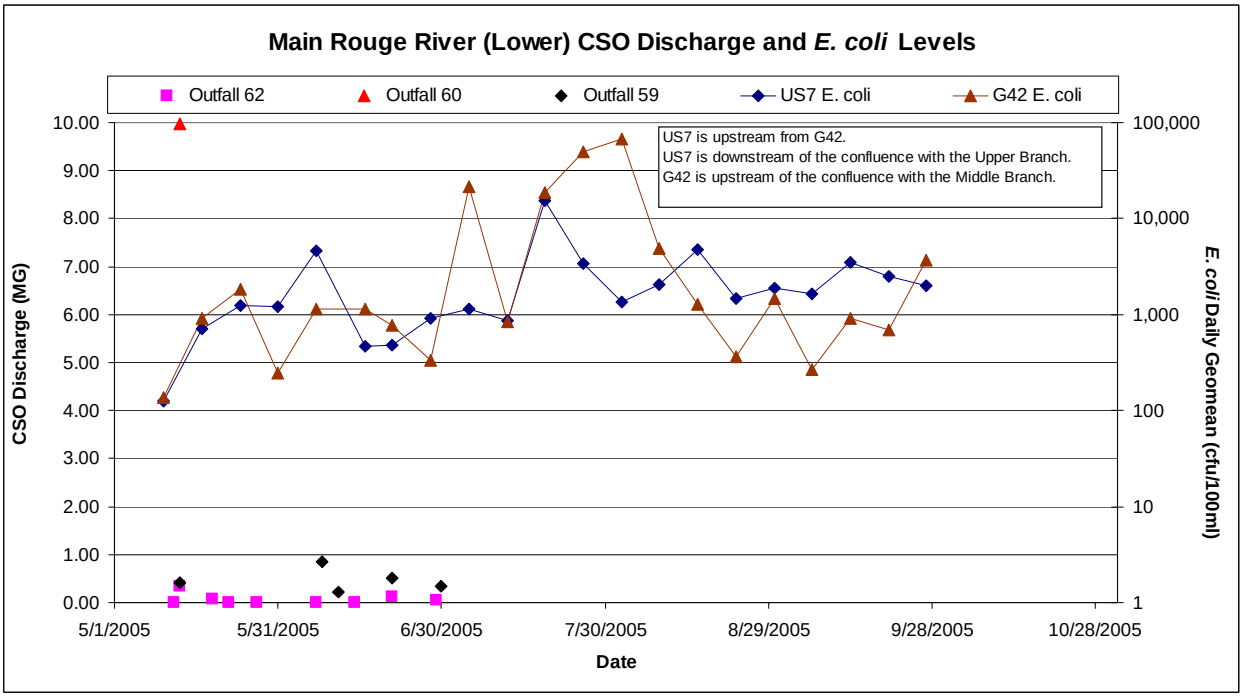


Figure M-4

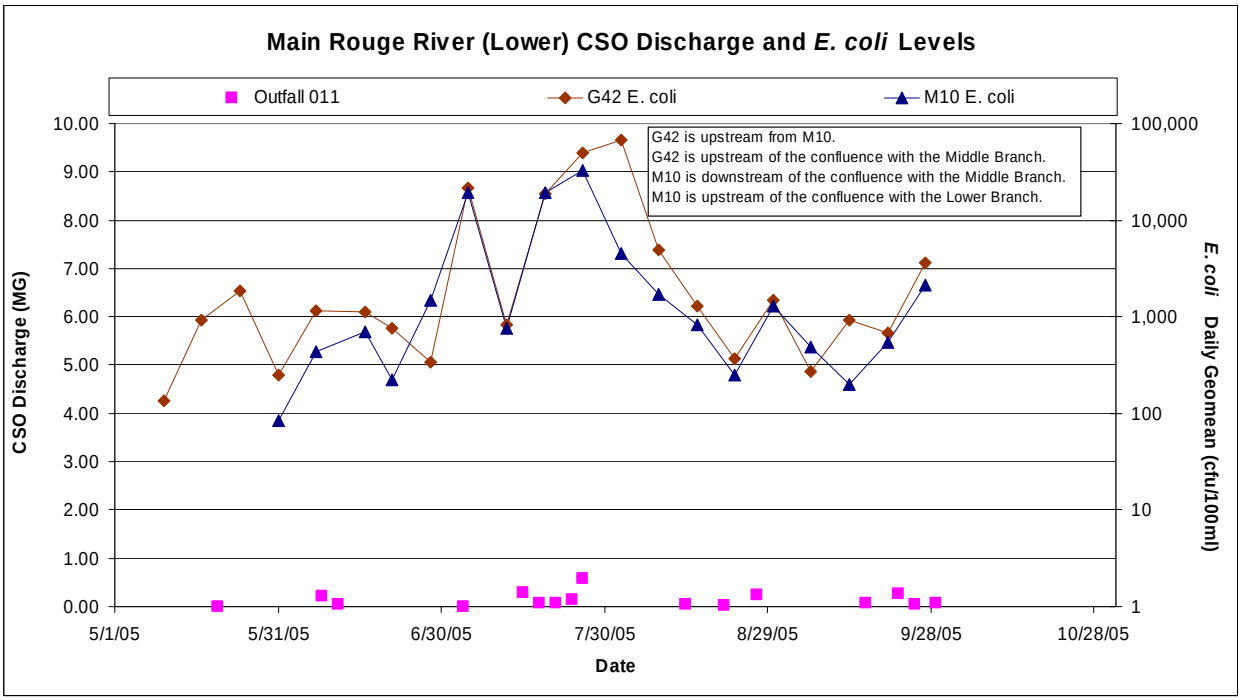


Figure M-5

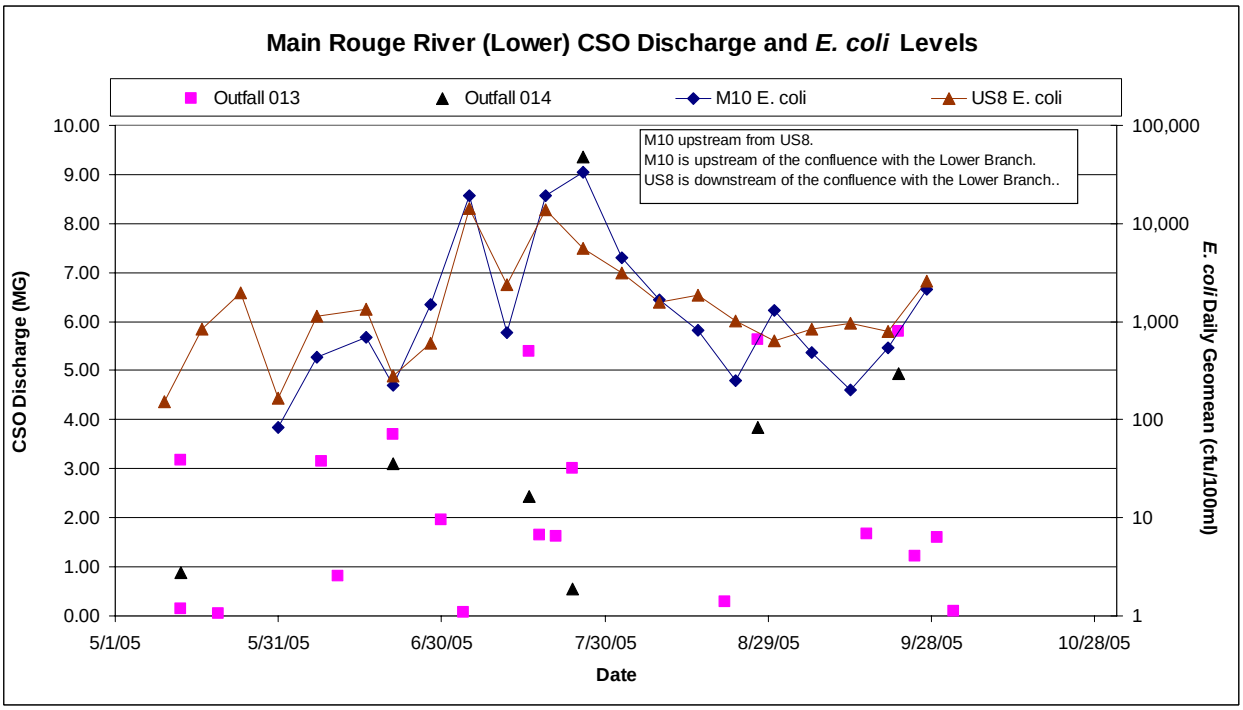


Figure M-6

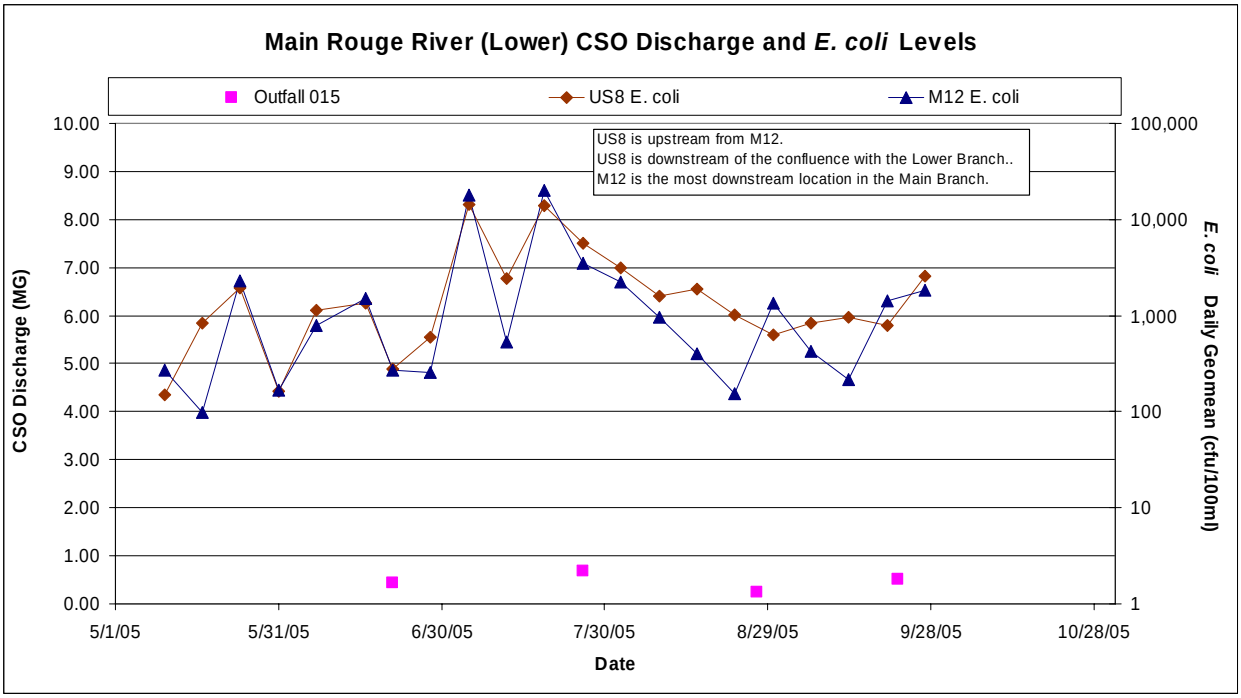


Figure M-7

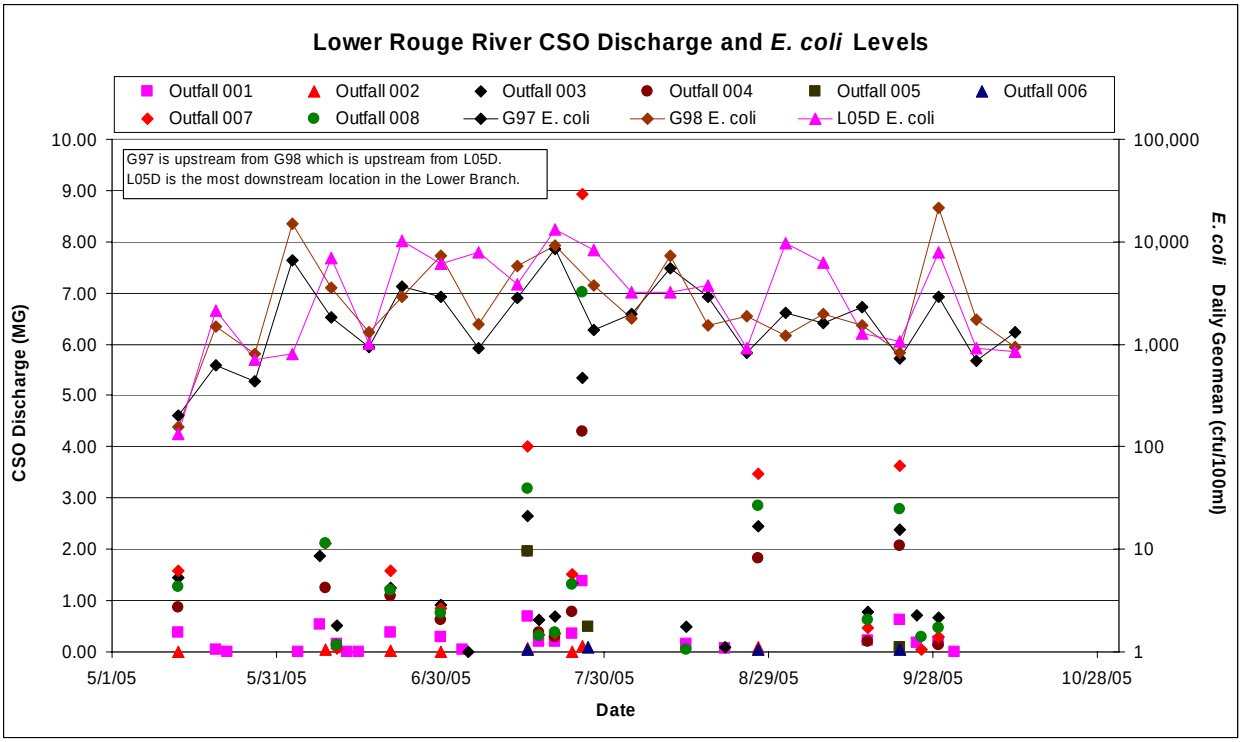


Figure M-8

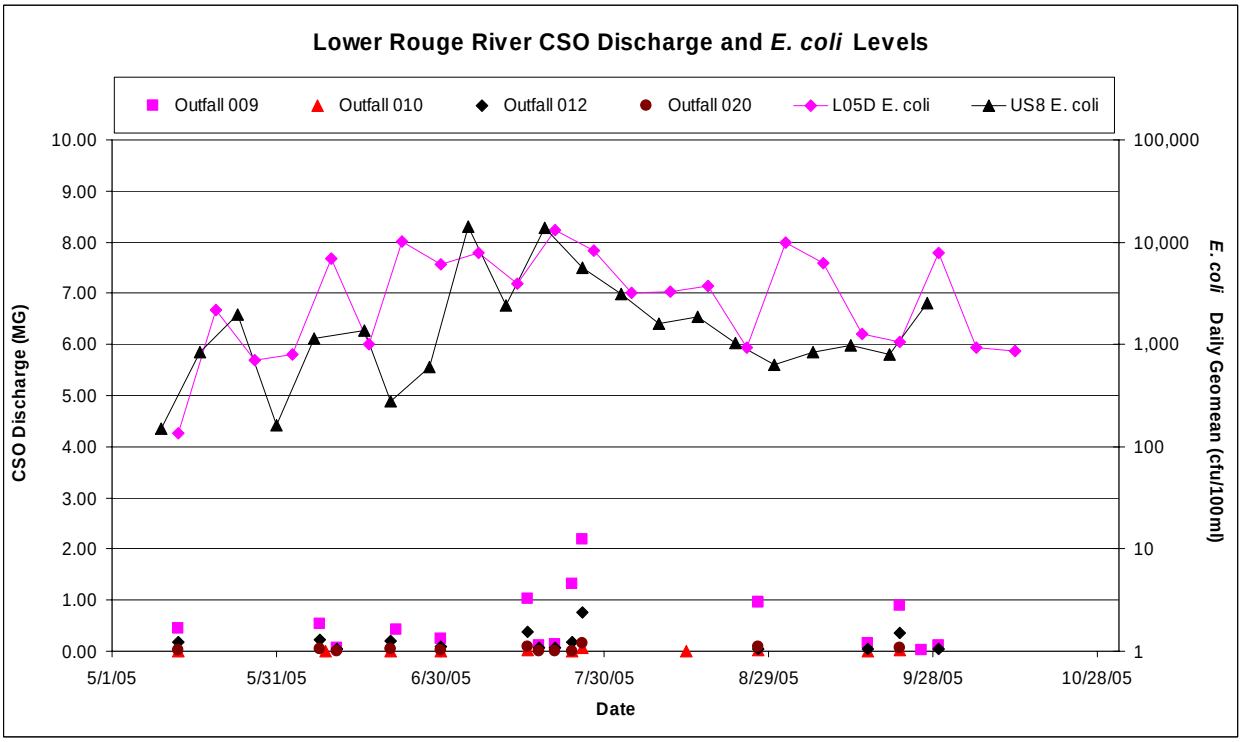
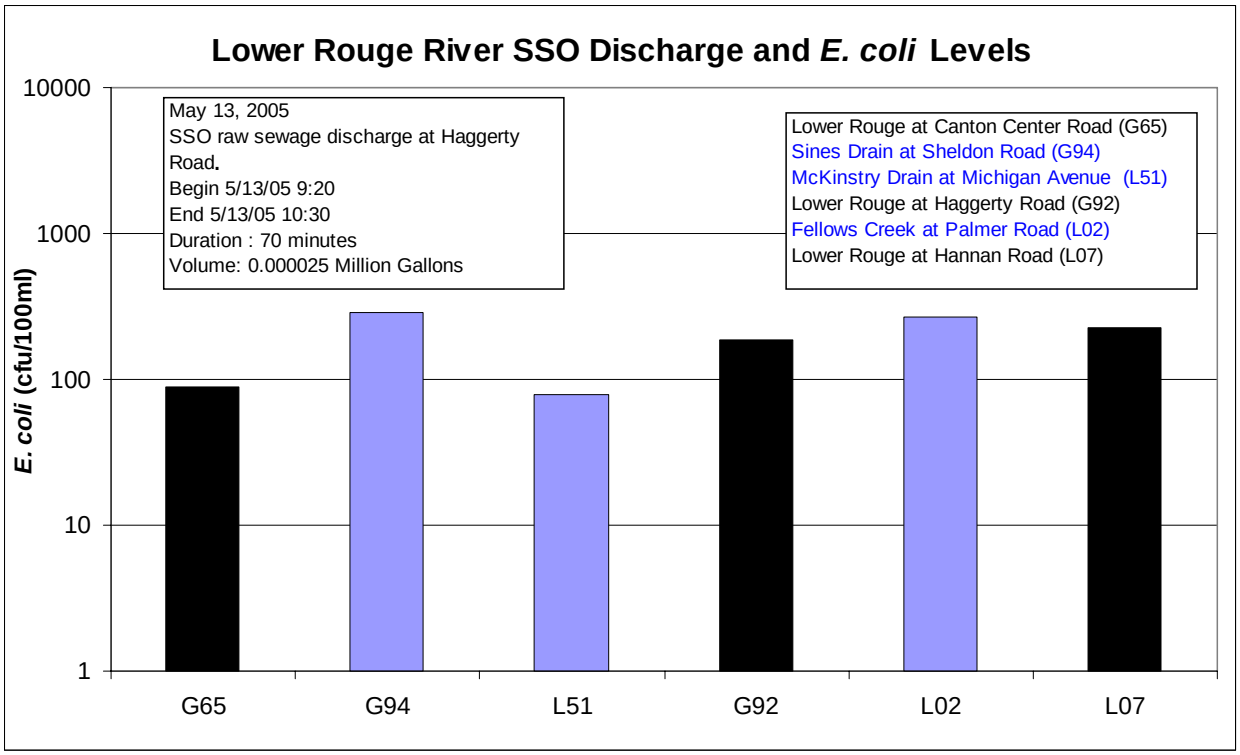


Figure M-9


Lower Rouge River SSO Discharge and E. coli Levels
10000
1000
100
10
1
E. coli (cfu/100ml)
May 13, 2005
SSO raw sewage discharge at Haggerty Road.
Begin 5/13/05 9:20
End 5/13/05 10:30
Duration : 70 minutes
Volume: 0.000025 Million Gallons
Lower Rouge at Canton Center Road (G65)
Sines Drain at Sheldon Road (G94)
McKinstry Drain at Michigan Avenue (L51)
Lower Rouge at Haggerty Road (G92)
Fellows Creek at Palmer Road (L02)
Lower Rouge at Hannan Road (L07)
G65
G94
L51
G92
L02
L07

APPENDIX N

GAUGE INFORMATION AND ASSUMPTIONS

Branch	USGS Gage	Gage Description	Gauge Drainage Area (square miles)	Gage Flow Dates*	Watershed Drainage Area (square miles)**	Rationale
Main	4166500	River Rouge at Detroit	187	10/1997 - 10/2008	466	Main branch flows were calculated by adding flows from gauges 4166500 + 4167000 + 4168400. Gage 4166500 was used in order to capture flow from the Upper branch, and upper reaches of the Main branch. The periods of record for the Upper and Middle branch gauges have been truncated to match the period of record for the Lower branch gage.
	4167000	Middle River Rouge Near Garden City	99.9	10/1997 - 10/2008		
	4168400	Lower River Rouge at Dearborn	91.0	10/1997 - 10/2008		
Upper	4166470	Upper Rouge at Detroit	67.3	10/1997 - 12/2005; 5/2008 - 10/2008	69.3	Gage period of record is 10/97-12/05 and 5/08-10/08
Middle	4167000	Middle River Rouge Near Garden City	99.9	10/1930 - 10/2008	112.7	Entire period of record used.
Lower	4168400	Lower River Rouge at Dearborn	91.0	10/1997 - 10/2008	95.5	Gage period of record truncated to reflect YUCA WWTP influence starting from 1997.

* Gage flow dates do not reflect complete period of record for USGS Gages.

** Watershed drainage areas are based on data obtained from Wayne County.