Hickory Branch (Subsegment 030802), Louisiana, Draft TMDL for Fecal Coliform

Prepared for:

Louisiana Department of Environmental Quality, Water Quality Assessment Division,

Total Maximum Daily Load Program

Prepared by:

Tetra Tech, Inc.
10306 Eaton Place, Suite 340
Fairfax, VA 22030

August 2010

CONTENTS

EXECUTIVE SUMMARY iii
1. Introduction 1
2. Study Area Description 3
2.1 Calcasieu River Basin—Hickory Branch 3
2.2 Water Quality Data 5
2.3 Water Quality Standards and Criteria 6
2.4 Flow 6
2.5 Identification of Sources 6
3. TMDL Load Calculations 8
3.1 Load Duration Curve Approach 8
3.2 TMDL 10
3.3 Wasteload Allocation (WLA) 10
3.4 Load Allocation (LA) 11
3.5 Margin of Safety (MOS) 12
3.6 Seasonal Variability and Critical Condition 12
4. Monitoring Plan 12
5. Public Participation 13
6. References 13
Appendix A. Fecal Coliform Bacteria Monitoring Data 15
Appendix B. Load Duration Curve Plots 16
Appendix C. Load Duration Curve Calculations 18

Tables

Table ES-1. Summary of fecal coliform bacteria TMDL for Hickory Branch iii
Table 2-1. Subsegment 030802 land use (NLCD 2001) 5
Table 2-2. USGS flow gage information 6
Table 2-3. Summary of LPDES permits in subsegment 030802 7
Table 3-1. Summary of fecal coliform bacteria TMDL for Hickory Branch 10
Table 3-2. WLA summary for subsegment 030802 11
Table A-1. Fecal coliform bacteria data 15
Table A-2. Fecal coliform summary statistics for station 842 15
Table C-1. Summary of summer reductions 18
Table C-2. Load duration curve summer statistics 18
Table C-3. Flow duration curve summer values 19
Table C-4. Summary of winter reductions 28
Table C-5. Load duration curve winter statistics 28
Table C-6. Flow duration curve winter values 29

Figures

Figure 1-1. Hickory Branch (subsegment 030802) location and monitoring. 2
Figure 2-1. Land use in Hickory Branch (subsegment 030802). 4
Figure 2-2. Fecal coliform data for station 842. 5
Figure 3-1. Summer flow duration curve for gage 08014800. 9
Figure B-1. Winter flow duration curve for gage 08014800. 16
Figure B-2. Winter load duration curve. 16
Figure B-3. Summer flow duration curve for gage 08014800. 17
Figure B-4. Summer load duration curve. 17

EXECUTIVE SUMMARY

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's Water Quality Planning and Management Regulations (Title 40 of the *Code of Federal Regulations* Part 130) require states to identify waterbodies that are not meeting water quality standards and to develop total maximum daily loads (TMDLs) of pollutants for those waterbodies. A TMDL establishes the amount of a pollutant that a waterbody can assimilate without exceeding its water quality standard for that pollutant. TMDLs provide the scientific basis for a state to establish water quality-based controls to reduce pollution from both point and nonpoint sources in order to restore and maintain the quality of the state's water resources (USEPA 1991).

A TMDL for a given pollutant and waterbody is composed of the sum of individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include an implicit or explicit margin of safety (MOS) to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

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

This fecal coliform TMDL has been developed for Hickory Branch, from the headwaters to the West Fork Calcasieu River. Hickory Branch flows for 45 miles from its headwaters to the West Fork Calcasieu River. The Calcasieu River begins in the hills west of Alexandria, Louisiana and flows south for 160 miles to the Gulf of Mexico. The mouth of the river is 30 miles east of the Texas-Louisiana state border. The basin encompasses the hill region of the state, the terrace region, and a section of the coastal marsh. The upper end of the basin consists of pine forested hills, while the lower end of the basin consists of brackish and salt marshes. Originally, much of the area was covered by tall prairie grasses, among which were scattered clumps of trees.

The fecal coliform TMDL for Hickory Branch was calculated using a load duration curve approach. The load duration curve methodology illustrates allowable loading at a wide range of streamflow conditions. The steps for applying the methodology were (1) developing a flow duration curve; (2) converting the flow duration curve to load duration curves; (3) plotting observed loads with load duration curves; (4) calculating the TMDL, MOS, WLA, and LA; and (5) calculating percent reductions. Most fecal coliform bacteria TMDLs are developed on a seasonal basis (i.e., calculating allowable loads and percent reductions for both summer and winter) because of the state's seasonal water quality criteria.

The reductions for fecal coliform bacteria at the monitoring station on Hickory Branch are no reduction during the winter months and 64 percent in the summer (Table ES-1).

Table ES-1. Summary of fecal coliform bacteria TMDL for Hickory Branch

Season	TMDL (MPN/day)	WLA (MPN/day)	LA (MPN/day)	Explicit MOS (MPN/day)	Percent reduction
Winter	9.87E+12	3.08E+08	7.90E+12	1.97E+12	0%
Summer	5.10E+11	3.08E+08	4.07E+11	1.02E+11	64%

Note: MPN = most probable number.

1. Introduction

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA's) Water Quality Planning and Management Regulations (Title 40 of the *Code of Federal Regulations* [CFR] Part 130) require states to develop total maximum daily loads (TMDLs) of pollutants for waterbodies that are not supporting their designated uses, even if pollutant sources have implemented technology-based controls. A TMDL establishes the maximum allowable load (mass per unit of time) of a pollutant that a waterbody is able to assimilate and still support its designated uses. The maximum allowable load is determined on the basis of the relationship between pollutant sources and in-stream water quality. A TMDL provides the scientific basis for a state to establish water quality-based controls to reduce pollution from both point and nonpoint sources in order to restore and maintain the quality of the state's water resources (USEPA 1991).

A TMDL for a given pollutant and waterbody is composed of the sum of individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include an implicit or explicit margin of safety (MOS) to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

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

This fecal coliform TMDL has been developed for Hickory Branch, from the headwaters to the West Fork Calcasieu River. Hickory Branch is in the Calcasieu River Basin in southwestern Louisiana (Figure 1-1). Hickory Branch flows for 45 miles from its headwaters to the West Fork Calcasieu River.

Since 2000, Hickory Branch has been included on the state's section 303(d) list of impaired waterbodies. In 2000, Hickory Branch was not supporting its designated use of fish and wildlife propagation because of cadmium, copper, lead, and metals, and was not supporting the primary contact recreation designated use because of pathogens. Suspected sources of impairment included natural and unknown sources. The state's 2002 303(d) list includes only total fecal coliform as a cause of non-support for the primary contact recreation designated use with wildlife other than waterfowl as the suspected cause (LDEQ 2001). The state's *2004 Louisiana Water Quality Inventory: Integrated Report* (*Integrated Report*) includes impairments of the fish and wildlife propagation designated use due to nutrients and low dissolved oxygen (both unknown sources) and mercury (source identified as atmospheric deposition–toxics and unknown sources). The primary contact recreation designated use is also listed on the state's 2004 *Integrated Report* as impaired due to total fecal coliform from wildlife other than waterfowl. The 2006 *Integrated Report* has the primary contact recreation designated use not being supported and total fecal coliform listed as the cause of impairment for this subsegment. The suspected source of impairment is wildlife other than waterfowl. The fish and wildlife propagation designated use is also listed as not supported because of mercury and low dissolved oxygen, with atmospheric deposition-toxics and unknown as suspected sources for mercury and unknown for low dissolved oxygen (LDEQ 2007a). The state's draft 2008 *Integrated Report* lists fecal coliform as the cause of impairment for both the primary and secondary contact recreation designated uses. The suspected sources of the impairments are natural sources, nonpoint sources, sewage discharges from unsewered areas, and wildlife other than waterfowl. The sources of impairment for the fish and wildlife propagation designated use include natural conditions, natural sources, and silviculture plantation management for the low dissolved oxygen impairment (LDEQ 2008). Fecal coliform data from 2005 and 2009 support the current use impairment listing for primary contact recreation and show violations of the secondary contact recreation criterion for Hickory Branch.

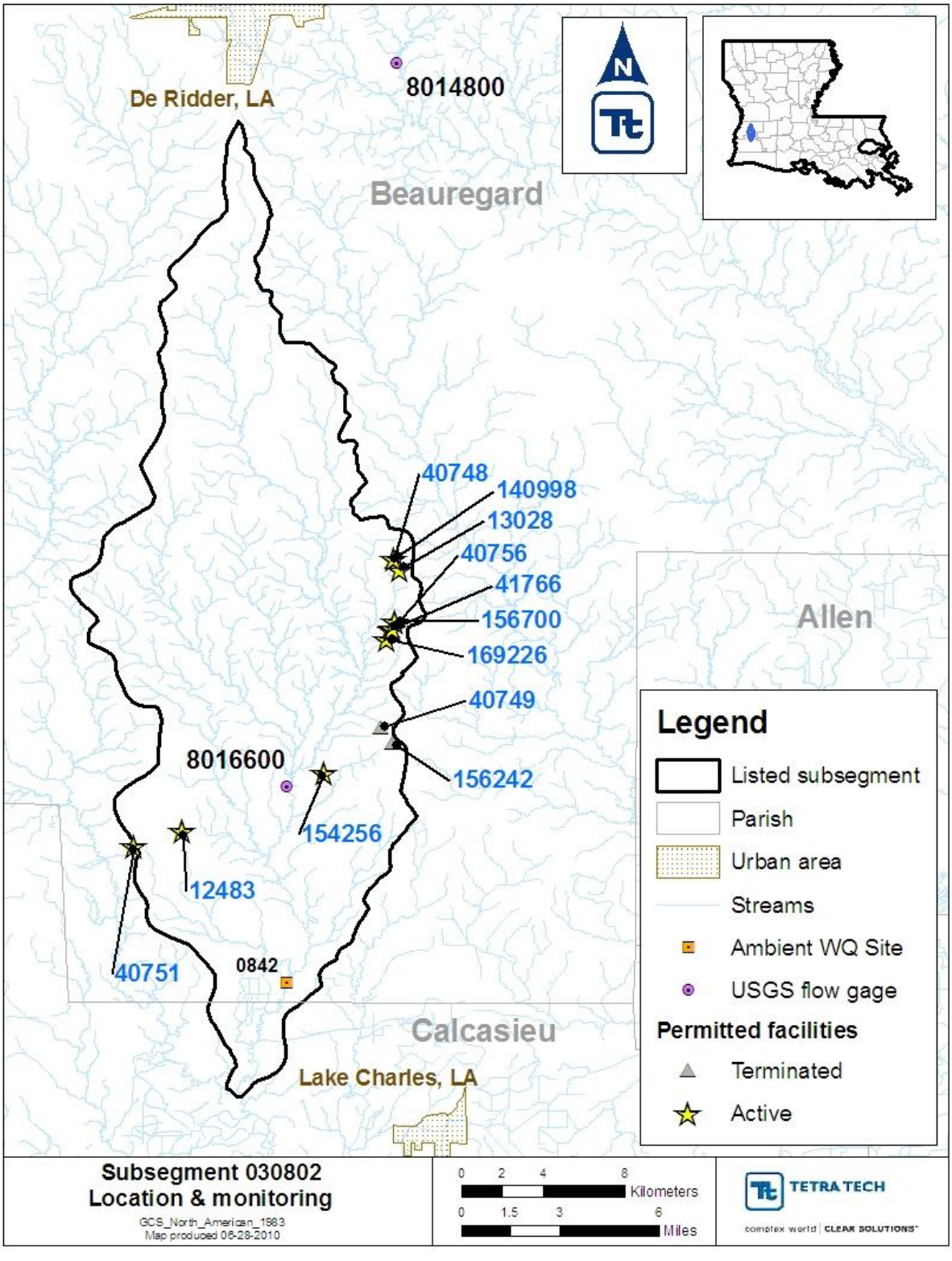

Figure 1-1. Hickory Branch (subsegment 030802) location and monitoring.

The fecal coliform TMDL for Hickory Branch was calculated using a load duration curve approach. The load duration curve methodology illustrates allowable loading at a wide range of streamflow conditions. The steps for applying the methodology were (1) developing a flow duration curve; (2) converting the flow duration curve to load duration curves; (3) plotting observed loads with load duration curves; (4) calculating the TMDL, MOS, WLA, and LA; and (5) calculating percent reductions. Most fecal coliform TMDLs are developed on a seasonal basis (i.e., calculating allowable loads and percent reductions for both summer and winter) because of the state's seasonal water quality criteria.

2. Study Area Description

2.1 Calcasieu River Basin—Hickory Branch

This fecal coliform TMDL has been developed for Hickory Branch, from the headwaters to the West Fork Calcasieu River (subsegment 030802). Hickory Branch is in the Calcasieu River Basin in southwestern Louisiana. Hickory Branch flows for 72.4 kilometers (45 miles) from its headwaters to the West Fork Calcasieu River. The Calcasieu River begins in the hills west of Alexandria, Louisiana, and flows south for 257.4 kilometers (160 miles) to the Gulf of Mexico. The mouth of the river is 48.3 kilometers (30 miles) east of the Texas-Louisiana state border. The basin encompasses the hill region of the state, the terrace region, and a section of the coastal marsh. The upper end of the basin consists of pine forested hills, while the lower end of the basin consists of brackish and salt marshes. This nearly north-south-oriented drainage basin includes portions of nine parishes—Cameron, Vermillion, Calcasieu, Jefferson Davis, Beauregard, Allen, Vernon, Rapides, and Natchitoches—and is made up of 39 subsegments (LDEQ 2004).

Originally, much of the area was covered by tall prairie grasses, among which were scattered clumps of trees. The hill region includes the longleaf pine forests, maximum elevations and relief, dendritic and trellis drainage, interior salt domes, wolds or cuestas (hard sedimentary rock), ironstone, excellent surface water and groundwater resources, mature soils, and the oldest rocks in the state. The soil types consist of coastal plain soils and flatwoods soils. Vegetation includes longleaf pine forests (longleaf pines, slash pines, some hardwoods) and bottomland hardwoods (cottonwood, sycamore, willow, water oaks, gum, maple, loblolly pine) (LDEQ 2003b).

The terrace region includes intermediate elevations and relief, older alluvium, and a large percentage of tabular surfaces. The terraces range from flatwoods to prairies. The flatwoods are characterized by low relief, mixed longleaf forests, bagols, pimple mounds, dendritic drainage, and flatwoods soils. Vegetation includes flatwoods (longleaf pine, oak, palmetto, wiregrass), cypress forests (cypress, tupelo), and bottomland hardwoods. The prairies are characterized by low relief, prairie grassland, prairie soils, pimple mounds, dendritic streams, ice-age channels, and platin or marais (small, shallow undrained ponds in the prairies). Vegetative cover consists of prairie vegetation (bluestem, broomsedge), cypress forests, and bottomland hardwoods (LDEQ 2003b).

The state's draft 2008 *Integrated Report* lists fecal coliform as the cause of impairment for both the primary and secondary contact recreation designated uses. The suspected sources of the impairments are natural sources, nonpoint sources, sewage discharges from unsewered areas, and wildlife other than waterfowl. The sources of impairment for the fish and wildlife propagation designated use include natural conditions, natural sources, and silviculture pantation management for the dissolved oxygen impairment (LDEQ 2008).

Land use data from the 2001 National Land Cover Database (NLCD) were used in Table 2-1 and Figure 2-1. NLCD 2001 is a land-cover database composed of land cover, impervious surface, and canopy density data. NLCD 2001 uses improved classification algorithms, which result in data with

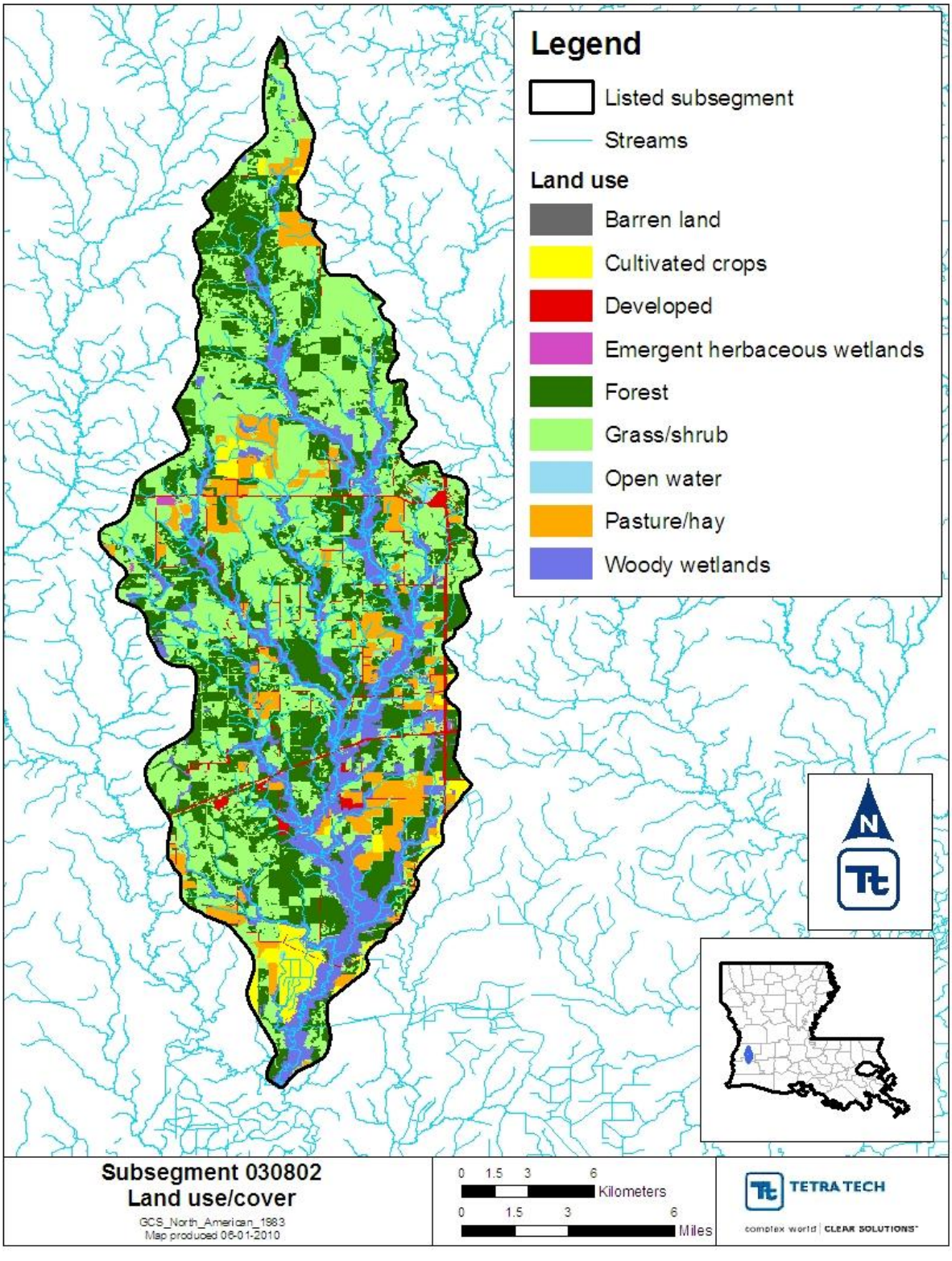

Figure 2-1. Land use in Hickory Branch (subsegment 030802).

more precise rendering of spatial boundaries between the 16 classes than those obtained using NLCD 1992 (USEPA 2007).

Table 2-1. Subsegment 030802 land use (NLCD 2001)

Land use	Percent
Open water	0.27%
Developed	2.61%
Barren land	0.11%
Forest	29.85%
Grass/shrub	39.12%
Pasture/hay	8.07%
Cultivated crops	2.91
Woody wetlands	16.81%
Emergent herbaceous wetlands	0.25%

2.2 Water Quality Data

There is one water quality station with fecal coliform data on Hickory Branch. Station 842 (Hickory Branch east southeast of DeQuincy, Louisiana) had 24 fecal coliform observations collected in 2005, 2008, and 2009. Three of the fecal coliform observations collected (May 17, 2005; August 16, 2005; and July 22, 2009) exceeded the water quality criterion for primary contact recreation. Three of the fecal coliform observations collected (January 10, 2005; January 31, 2005; and March 31, 2005) exceeded the water quality criterion for secondary contact recreation. Of the water quality samples collected after 2004, 12.5 percent exceeded the water quality criterion for primary contact recreation and 12.5 percent exceeded that for secondary contact recreation on Hickory Branch. Appendix A contains the raw water quality data.

The fecal coliform data were plotted over time for the subsegment (Figure 2-2). The exceedances occurred during January, March, May, and August. No distinct seasonal trends or patterns can be seen in the water quality data.

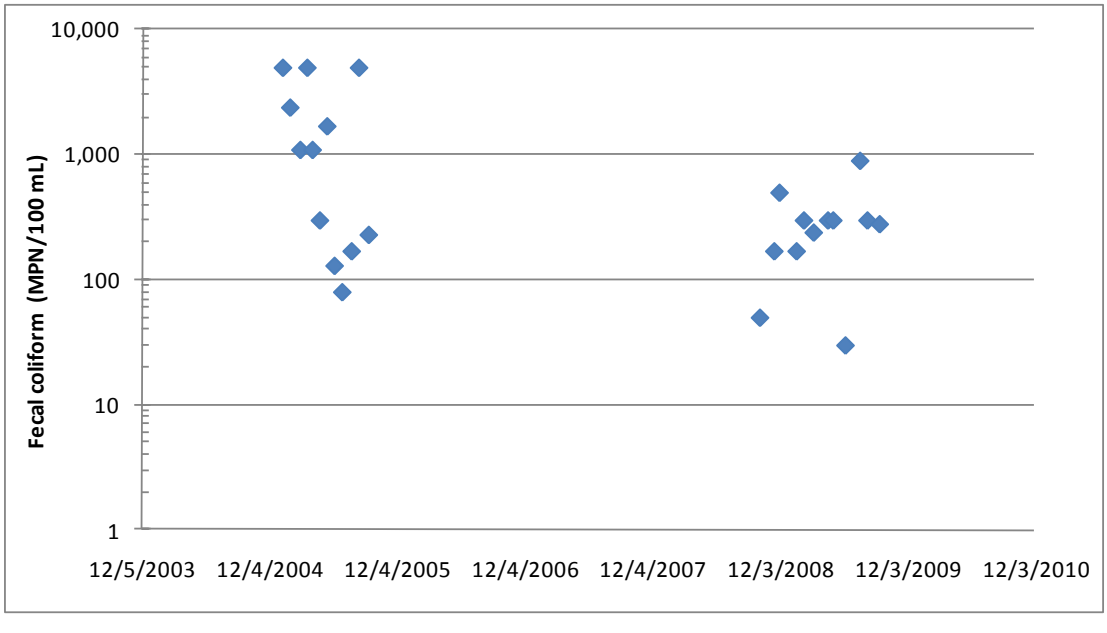

Figure 2-2. Fecal coliform data for station 842.

2.3 Water Quality Standards and Criteria

The designated uses for subsegment 030802 include primary contact recreation, secondary contact recreation, and propagation of fish and wildlife. Primary contact recreation includes any recreational or other water contact activity that involves prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable. Examples of that type of water use include swimming, water skiing, and diving (LDEQ 2007b). Secondary contact recreation includes any recreational or other water contact activity in which prolonged or regular full-body contact with the water is either incidental or accidental, and the probability of ingesting appreciable amounts of water is minimal. Examples of that type of water use include fishing, wading, and boating (LDEQ 2007b). The criteria for protection of aquatic life are based on acute and chronic concentrations in fresh and marine waters and were developed primarily for attainment of the fish and wildlife propagation use.

Numeric criteria were used in conjunction with the assessment methodology presented in the Louisiana Department of Environmental Quality's (LDEQ) 305(b) report (LDEQ 2005) to list impaired subsegments. The LDEQ assessment methodology specifies that for primary contact recreation no more than 25 percent of the total samples collected on a monthly or near-monthly basis may exceed a fecal coliform density of 400/100 milliliters (mL). The primary contact recreation criterion applies only during the defined recreational period of May 1 through October 31. During the nonrecreational period of November 1 through April 30, the criterion for secondary contact recreation applies. For secondary contact recreation, no more than 25 percent of the total samples collected on a monthly or near-monthly basis may exceed a fecal coliform density of 2,000/100 mL. The secondary contact recreation criterion applies year-round (LDEQ 2007b).

The Louisiana water quality standards also include an antidegradation policy (*Louisiana Administrative Code* Title 33, Part IX, Section 1109.A), which states that state waters exhibiting high water quality should be maintained at that high level of water quality. If that is not possible, water quality of a level that supports the designated uses of the waterbody should be maintained. The designated uses of a waterbody may be changed to allow a lower level of water quality only through a use attainability study. LDEQ has developed this TMDL to be consistent with the state's antidegradation policy (LDEQ 2000).

2.4 Flow

There are no active flow gages on Hickory Branch. USGS gage 08016600, located on Hickory Branch, recorded daily flows from 1945 through 1957. One comparable USGS gage with recent flow data (08014800) is on Bundick Creek. Information from these gages is summarized in Table 2-2. Flow at 0814800 was not recorded between October 1979 and October 2007.

Table 2-2. USGS flow gage information

Station number	Station name	Drainage area (mi^2)	Minimum date	Maximum date	Minimum flow (cfs)	Average flow (cfs)	Maximum flow (cfs)
08016600	Hickory Branch near Kernan, LA	82.20	09/01/1945	09/30/1957	0	125.86	5,440
08014800	Bundick Creek near DeRidder, LA	120.00	03/01/1956	10/20/2009	10	158.14	7,980

2.5 Identification of Sources

Louisiana's draft 2008 *Integrated Report* identifies wildlife other than waterfowl as the suspected nonpoint source of the fecal coliform bacteria impairment in Hickory Branch, subsegment 030802 (LDEQ 2008).

Information on point source dischargers in the subsegment was obtained from LDEQ files. According to the LDEQ discharger database, 10 current permitted facilities, including a facility with a pending permit (Table 2-3). Additionally there are three facilities with terminated permits.

Table 2-3. Summary of LPDES permits in subsegment 030802

AI #	Permit #	Outfall	Facility name	Exp. date	Facility type	Outfall type	Receiving waterbody
12483	LA0079740	004	TIN Inc dba Temple-Inland - SW Louisiana Lumber Operations	8/31/14	Lumber and Wood Products, Except Furniture	stormwater and wastewater	Cowpen Creek
12483	LA0079740	005	TIN Inc dba Temple-Inland - SW Louisiana Lumber Operations	8/31/14	Lumber and Wood Products, Except Furniture	stormwater and wastewater	Cowpen Creek
12483	LA0079740	007	TIN Inc dba Temple-Inland - SW Louisiana Lumber Operations	8/31/14	Lumber and Wood Products, Except Furniture	stormwater and irrigation effluent	Tiger Glade Creek
12483	LA0079740	107	TIN Inc dba Temple-Inland - SW Louisiana Lumber Operations	8/31/14	Indiv-Minor Industrial	treated sanitary wastewater and non-contact saw filing cooling water	Outfall 007 then unnamed ditch, Tiger Glade Creek
40751	LAG530062	001	Beauregard Fire Protection District #2 - Gordon Fire Dept - Station #5	12/1/12	General Agency Interest	treated sanitary wastewater	ditch - Beckwith Creek
41766	LAG530242	001	Highway 171 Trailer Park	11/8/12	General Agency Interest	treated sanitary wastewater	Horse Branch Creek to Hickory Branch
154256	LAG532476	001	Bosley Construction	11/8/12	Building Construction	treated sanitary wastewater	Hickory Branch to Calcasieu River
154256	LAG532476	002	Bosley Construction	11/8/12	Building Construction	treated sanitary wastewater	Hickory Branch to Calcasieu River
40756	LAG540175	001	South Beauregard High & Elementary School	7/1/13	Educational Services	treated sanitary wastewater	Horse Branch Creek to Hickory Branch
156700	LAG541645	001	B&B Mobile Home Park	6/8/13	Nonclassifiable Establishments	treated sanitary wastewater	Horse Branch Gully, to Hickory Creek, West Fork Calcasieu River
87519	LAG541795	001	Longville Lake Park	6/5/13	General Agency Interest	treated sanitary wastewater	Local drainage ditch to Horse Branch to Hickory Creek to West Fork Calcasieu River
13028	LAG750319	001	Trunkline Gas Co LLC - Longville Compressor Station #48	3/14/14	Gen-LAG75-Exterior Vehicle Wash	stormwater	Horse Branch to Hickory Branch to West Fork Calcasieu River
13028	LAG750319	002a	Trunkline Gas Co LLC - Longville Compressor Station #48	3/14/14	Gen-LAG75-Exterior Vehicle Wash	treated sanitary wastewater	Horse Branch to Hickory Branch to West Fork Calcasieu River
13028	LAG750319	002b	Trunkline Gas Co LLC - Longville Compressor Station #48	3/14/14	Gen-LAG75-Exterior Vehicle Wash	treated sanitary wastewater	Horse Branch to Hickory Branch to West Fork Calcasieu River
140998	LAG750561	001	Kirks Carwash	3/15/14	Nonclassifiable Establishments	vehicle wash wastewater	Horse Branch Gully, to Hickory Creek, West Fork Calcasieu River
169226	LAR10G307		South Beauregard Elementary School	pending	Educational Services	stormwater (construction)	Local ditch to state drainage ditch to Hickory Branch
156242	LAG532880	001	Southwest Louisiana Marine Institute	Terminated	Educational Services		
40749	LAG530065	001	Beauregard Fire Protection District #2 Ragley Fire Dept - Station #3	Terminated	General Agency Interest		
40748	LAG530063	001	Beauregard Fire Protection District #2 Longville Fire Dept - Station #2	Terminated	General Agency Interest		

3. TMDL Load Calculations

A TMDL is the total amount of a pollutant that can be assimilated by the receiving waterbody while still achieving water quality standards. In developing a TMDL, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established, thereby providing the basis for establishing water quality-based controls.

A TMDL for a given pollutant and waterbody is composed of the sum of individual WLAs for point sources and LAs for nonpoint sources and natural background levels. In addition, the TMDL must include an implicit or explicit MOS to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

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

TMDLs are typically expressed as a mass loading (e.g., pounds per day).

Both section 303(d) of the Clean Water Act and the regulations at 40 CFR 130.7 require that TMDLs include an MOS to account for uncertainty in available data or in the actual effect that controls will have on the loading reductions and receiving water quality. The MOS may be expressed explicitly as unallocated assimilative capacity or implicitly using conservative assumptions in establishing the TMDL. For a more detailed discussion of the MOS, see Section 3.4.

3.1 Load Duration Curve Approach

The methodology used to determine the TMDL for subsegment 030802 is the load duration curve. This TMDL represents a continuum of desired loads over all flow conditions, rather than a fixed, single value, because loading capacity varies as a function of the flow present in the stream. The basic elements of this procedure are documented on the Kansas Department of Health and Environment Web site (KDHE 2003). That method was used to illustrate allowable loading for a wide range of flows. The steps for how the methodology was applied for the TMDL in this report are summarized as follows:

1. Develop a flow duration curve.
2. Convert the flow duration curve to a load duration curve for each impairment.
3. Plot observed loads with load duration curves.
4. Calculate TMDL, WLA, LA, and MOS.
5. Calculate percent reductions required to meet water quality standards.

Flow Duration Curve

A flow duration curve was developed for subsegment 030802. Detailed flow information for the subsegment was not available at the water quality monitoring station but was available at a USGS gage in the subsegment. For the purposes of this TMDL, USGS gage 08014800 on Bundick Creek , with a drainage area of 120 square miles, was chosen to represent flow, and only the flows from 2007 and later were used. Flow from that gage was area-weighted to represent the flow from the TMDL subsegment. Subsegment 030802 is 140 square miles.

Daily streamflow measurements were sorted in increasing order, and the percentile ranking of each flow was calculated. The daily streamflow measurements were separated into summer (May through October) and winter (November through April) data sets to accommodate the state’s seasonal fecal coliform bacteria criteria. The load duration methodology requires that the same flow period be used for both developing the flow duration and calculating observed loads from sampling data. For each

season, the flows were then plotted against the corresponding percent flow that exceeds a specific flow to create the flow duration curves.

Figure 3-1 is the flow duration curve for the summer months (May through October). The plot shows the flow (in cubic feet per second) on the Y-axis. The X-axis shows the percentage of days on which the plotted flow is exceeded. Points at the lower end of the plot (0 through 10 percent) represent high-flow conditions, where only 0 through 10 percent of the flow exceeds the plotted point. Conversely, points on the high end of the plot (90 to 100 percent) represent low-flow conditions.

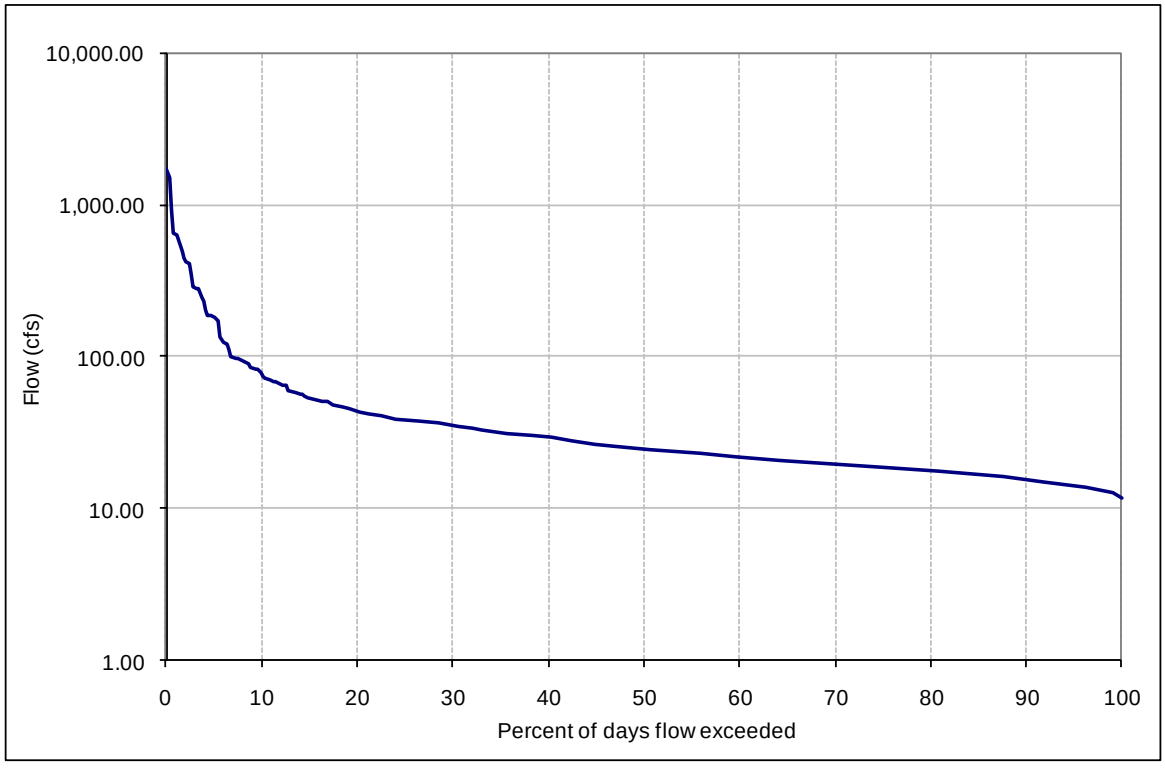

Figure 3-1. Summer flow duration curve for gage 08014800.

Load Duration Curve

The flows from the flow duration curves were multiplied by the appropriate target concentration (Section 2.3) for each season to compute an allowable load duration curve. Each load duration curve is a plot of organism count per day versus the percent flow exceedance from the flow duration curves.

The use of a load duration curve is beneficial when analyzing monitoring data with their corresponding flow information plotted as a load. The approach allows the monitoring data to be placed in relation to their place in the flow continuum. Assumptions of the probable source or sources of the impairment can then be made from the plotted data. The load duration curve shows the calculation of the TMDL at any flow rather than at a single critical flow. The official TMDL number is reported as a single number, but the curve is provided to demonstrate the value of the acceptable load at any flow. That allows for analysis of load cases in the future for different flow regimes.

Observed Loads

For each sampling station and season, observed loads were calculated by multiplying the observed concentration of fecal coliform bacteria by the flow on the sampling day. The observed loads were then plotted versus the percent flow exceedance of the flow on the sampling day and placed on the same plot as the load duration curve. Reductions were applied to the observed loads for each parameter until its water quality criteria and allowable percent exceedance were met to obtain an overall percent reduction for each subsegment. Those plots are shown in Appendix B of this report. The data calculations are shown in Appendix C.

The plots provide visual comparisons between observed and allowable loads under different flow conditions. Observed loads that are plotted above the load duration curve represent conditions where observed water quality concentrations exceed the target concentrations. Observed loads that are plotted below the load duration curve represent conditions where observed water quality concentrations were less than target concentrations (i.e., not exceeding water quality standards).

3.2 TMDL

Table 3-1 presents the TMDLs and allocations for subsegment 030802. Only observed data from during 2005 and after were used in this TMDL. The reduction for fecal coliform bacteria at the monitoring station on Hickory Branch is no reduction during the winter months and 64 percent in the summer. WLAs are discussed in Section 3.3; LAs, in Section 3.4; and MOSs, in Section 3.5.

Table 3-1. Summary of fecal coliform bacteria TMDL for Hickory Branch

Season	TMDL (MPN/day)	WLA (MPN/day)	LA (MPN/day)	Explicit MOS (MPN/day)	Percent reduction
Winter	9.87E+12	3.08E+08	7.90E+12	1.97E+12	0%
Summer	5.10E+11	3.08E+08	4.07E+11	1.02E+11	64%

Note: MPN = most probable number.

3.3 Wasteload Allocation (WLA)

The WLA portion of the TMDL equation is the total loading of a pollutant that is assigned to point sources. The point sources in subsegment 030802 include sanitary and industrial wastewater, and industrial stormwater. Table 3-2 lists the individual fecal coliform WLAs for the point source facilities identified in Section 2.5.

WLAs for fecal coliform bacteria were calculated using monthly average permit limits, when applicable. If a permit does not have a monthly average permit limit, the weekly average permit limit was used. The preferred facility flow was the facility design or expected flow. If neither was available, the average (expected or observed) flows were used to calculate the WLAs. The permit maximum flow was used if the permitted or average flow was not available. The permit maximum flow was usually the maximum flow covered by the specific type of general permit. For example, the Louisiana Pollution Discharge Elimination System Class II Sanitary General Permit covers facilities with flows of up to 25,000 gallons per day. The permit maximum flow sometimes was significantly greater than the expected flow, and therefore the permit maximum was used only when other flows were not available.

$$\text{Flow (gallon/day)} \times \text{concentration (MPN/100 mL)} \times 3{,}785.412 \text{ mL/gallon} = \text{load (MPN/day)}.$$

Table 3-2. WLA summary for subsegment 030802

AI #	Permit #	Outfall	Facility name	Outfall type	Flow type	Flow (gpd)	FCB limit type	Limit (MPN/100 mL)	Load (MPN/d)
12483	LA0079740	004	TIN Inc dba Temple-Inland - SW Louisiana Lumber Operations	stormwater and wastewater	DMR average	2,462,111	none		0.00E+00
12483	LA0079740	005	TIN Inc dba Temple-Inland - SW Louisiana Lumber Operations	stormwater and wastewater	DMR average	1,382,556	none		0.00E+00
12483	LA0079740	007	TIN Inc dba Temple-Inland - SW Louisiana Lumber Operations	stormwater and irrigation effluent	DMR average	1,203,058	none		0.00E+00
12483	LA0079740	107	TIN Inc dba Temple-Inland - SW Louisiana Lumber Operations	treated sanitary wastewater	expected	3,500	weekly ave.	400	5.30E+07
40751	LAG530062	001	Beauregard Fire Protection District #2 - Gordon Fire Dept - Station #5	treated sanitary wastewater	permit max	5,000	weekly ave.	400	7.57E+07
41766	LAG530242	001	Highway 171 Trailer Park	treated sanitary wastewater	DMR average	2,389	monthly ave.	200	1.81E+07
154256	LAG532476	001	Bosley Construction	treated sanitary wastewater	expected	1,200	monthly ave.	200	9.08E+06
154256	LAG532476	002	Bosley Construction	treated sanitary wastewater	expected	1,200	monthly ave.	200	9.08E+06
40756	LAG540175	001	South Beauregard High & Elementary School	treated sanitary wastewater	30-day max	8,640	monthly ave.	200	6.54E+07
156700	LAG541645	001	B&B Mobile Home Park	treated sanitary wastewater	expected	6,000	monthly ave.	200	4.54E+07
87519	LAG541795	001	Longville Lake Park	treated sanitary wastewater	DMR average	446	weekly ave.	400	6.75E+06
13028	LAG750319	001	Trunkline Gas Co LLC - Longville Compressor Station #48	stormwater	not avail.		none		0.00E+00
13028	LAG750319	002a	Trunkline Gas Co LLC - Longville Compressor Station #48	treated sanitary wastewater	DMR average	265	weekly ave.	400	4.00E+06
13028	LAG750319	002b	Trunkline Gas Co LLC - Longville Compressor Station #48	treated sanitary wastewater	DMR average	1,388	weekly ave.	400	2.10E+07
13028	LAG750319			treated sanitary wastewater	permit max	25,000	weekly ave.	400	
13028	LAG750319			treated vehicle wash and sanitary wastewater	permit max	25,000	weekly ave.	400	
13028	LAG750319			wastewaters	not avail.		none		
140998	LAG750561	001	Kirks Carwash	vehicle wash wastewater	DMR average	5,949	none		0.00E+00
169226	LAR10G307	001	Beauregard Parish School Board	stormwater (construction)	not avail.		none		0.00E+00

Note: MPN = most probable number.

LPDES permitted discharges without fecal coliform effluent limitations have been determined to not be sources of fecal coliform. For these dischargers, LDEQ is not providing allocations or permit limits. If at some point in the future, LDEQ determines that any of the discharges may contain fecal coliform, wasteload allocations may be provided along with the appropriate permit conditions.

3.4 Load Allocation (LA)

The LA is the portion of the TMDL assigned to natural background loadings, as well as nonpoint sources such as septic tank leakage, wildlife, and agricultural practices. The LA was calculated for this TMDL by subtracting the WLA and MOS from the total TMDL. LAs were not allocated to separate nonpoint sources because of the lack of available source characterization data. The LA is shown in Table 3-1.

3.5 Margin of Safety (MOS)

The Clean Water Act requires that TMDLs take into consideration a margin of safety. The MOS is the portion of the pollutant loading reserved to account for any uncertainty in the data. There are two ways to incorporate the MOS. One way is to implicitly incorporate it by using conservative model assumptions to develop allocations. The other way is to explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations (USEPA 1991). For this TMDL, an explicit MOS of 20 percent was used; it is presented in Table 3-1.

3.6 Seasonal Variability and Critical Condition

The federal regulations at 40 CFR 130.7 require that TMDLs include seasonal variations and take into account critical conditions for streamflow, loading, and water quality parameters. For this TMDL, fecal coliform bacteria loadings for subsegments with primary contact recreation and secondary contact recreation as the designated uses were determined for winter and summer on the basis of seasonal water quality criteria, thus accounting for seasonality. In addition, the sampling results for all pollutants were plotted over time and reviewed for any seasonal patterns (see Section 2.2). The TMDL was developed over a several-year period, thereby accounting for seasonal variations.

The water quality criteria for fecal coliform bacteria include values that must not be exceeded more than 25 percent of the time (primary and secondary contact recreation) on the basis of the data sampled throughout the year, including during critical and noncritical conditions.

4. Monitoring Plan

LDEQ uses funds provided under section 106 of the Clean Water Act and under the authority of the Louisiana Environmental Quality Act to run a program for monitoring the quality of the state's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations, using appropriate sampling methods and procedures to ensure the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, develop a long-term database for water quality trend analysis, and monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program are used to develop the state's biennial section 305(b) report (*Water Quality Inventory*) and the section 303(d) list of impaired waters. This information is also used to establish priorities for LDEQ's nonpoint source program.

LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled on a 4-year cycle. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the 4-year cycle. Sampling is conducted monthly to yield approximately 12 samples per site during each year the site is monitored. Sampling sites are placed where they are considered representative of the waterbody. Within each basin, all monitored subsegments will be sampled over the year or years specified under each cycle period. Whiskey Chitto Creek would have been monitored with the Calcasieu River Basin in 2004, 2005, 2008, and 2009. Fecal coliform data appears to have been collected in 2007 and 2008. Water quality assessments for the 305(b)/303(d) *Integrated Report* will be conducted for each basin following the last year of its monitoring period. Usually, 125 waterbody subsegments are monitored each month under this program.

Under the current monitoring schedule, approximately one-half of the state's waters are newly assessed for section 305(b) and section 303(d) listing purposes for each biennial cycle, with sampling occurring statewide each year. The 4-year cycle follows an initial 5-year rotation that covered all basins in the state according to the TMDL priorities. Monitoring allows LDEQ to determine whether

any improvement has occurred in water quality after the TMDLs have been implemented. When LDEQ evaluates monitoring results at the end of each year, it may add waterbodies to or remove them from the section 303(d) list of impaired waterbodies.

5. Public Participation

Federal regulations require LDEQ to notify the public and seek comments concerning the TMDLs it prepares. This TMDL was developed under contract to LDEQ, and LDEQ will hold a public review period seeking comments, information, and data from the public and any other interested party. The notice for the public review period will be published in local and state newspapers and on LDEQ's electronic notification system. The TMDL report will be available on LDEQ's TMDL Web site at http://www.deq.louisiana.gov/portal/default.aspx?tabid=1563. The public review period will last for 30 days. LDEQ will review all comments received, and this TMDL might be revised to reflect comments if appropriate.

6. References

KDHE (Kansas Department of Health and Environment). 2003. *Kansas TMDL Curve Methodology*. Kansas Department of Health and Environment, Topeka, KS. <www.kdhe.state.ks.us/tmdl/Data.htm>. Accessed April 21, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2000. *Environmental Regulatory Code,* Part IX. Water Quality Regulations. LAC33:IX.1109.A.

LDEQ (Louisiana Department of Environmental Quality). 2001. *2000 Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. http://www.deq.louisiana.gov/apps/305db/show2.asp?WBID=LA030501. Accessed June 1, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2003a. *2002 Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/tabid/2201/Default.aspx>. Accessed June 2, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2003b. Nonpoint Source Management Plan, Baton Rouge, Louisiana. <http://nonpoint.deq.louisiana.gov/wqa/links/watershedplan/calcasieu/Little%20River%20Implementation.pdf>. Accessed June 1, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2004. *2003 Land Use/Land Cover Classification Calcasieu River Basin.* Nonpoint Source Program.

LDEQ (Louisiana Department of Environmental Quality). 2005. *2004 Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/tabid/2201/Default.aspx>. Accessed June 2, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2007a. *2006 Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/tabid/2201/Default.aspx>. Accessed June 2, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2007b. *Environmental Regulatory Code*. Part IX, Water Quality Regulations. Chapter 11. Surface Water Quality Standards. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/Portals/0/planning/regs/title33/33v09.pdf>. Accessed April 20, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2008. *2008 Draft Final Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/LinkClick.aspx?fileticket=I4PibcgdTUA%3d&tabid=2986>. Accessed April 14, 2010.

USEPA (U.S. Environmental Protection Agency). 1991. *Guidance for Water Quality-Based Decisions: The TMDL Process*. EPA 440/-4-91-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

USEPA (U.S. Environmental Protection Agency). 2007. *Multi-Resolution Land Characteristics Consortium (MRLC), 2001 National Land Cover Data (NLCD 2001).* <http://www.epa.gov/mrlc/nlcd-2001.html>. Accessed May 3, 2010.

Appendix A. Fecal Coliform Bacteria Monitoring Data

Table A-1. Fecal coliform bacteria data

Site	Site number	Collection date[a]	Result (MPN/100 mL)	Designated use exceeded
Hickory Branch east southeast of DeQuincy, Louisiana	842	1/6/99	300	
Hickory Branch east southeast of DeQuincy, Louisiana	842	2/3/99	700	
Hickory Branch east southeast of DeQuincy, Louisiana	842	3/3/99	3,000	SCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	4/7/99	500	
Hickory Branch east southeast of DeQuincy, Louisiana	842	5/5/99	130	
Hickory Branch east southeast of DeQuincy, Louisiana	842	6/2/99	1600	PCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	7/7/99	500	PCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	8/4/99	9,000	PCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	9/8/99	240	
Hickory Branch east southeast of DeQuincy, Louisiana	842	10/6/99	240	
Hickory Branch east southeast of DeQuincy, Louisiana	842	11/3/99	50	
Hickory Branch east southeast of DeQuincy, Louisiana	842	12/8/99	1,700	
Hickory Branch east southeast of DeQuincy, Louisiana	842	1/10/05	5,000	SCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	1/31/05	2,400	SCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	3/1/05	1,100	
Hickory Branch east southeast of DeQuincy, Louisiana	842	3/21/05	5,000	SCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	4/5/05	1,100	
Hickory Branch east southeast of DeQuincy, Louisiana	842	4/26/05	300	
Hickory Branch east southeast of DeQuincy, Louisiana	842	5/17/05	1,700	PCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	6/7/05	130	
Hickory Branch east southeast of DeQuincy, Louisiana	842	6/29/05	80	
Hickory Branch east southeast of DeQuincy, Louisiana	842	7/26/05	170	
Hickory Branch east southeast of DeQuincy, Louisiana	842	8/16/05	5,000	PRC
Hickory Branch east southeast of DeQuincy, Louisiana	842	9/13/05	230	
Hickory Branch east southeast of DeQuincy, Louisiana	842	10/8/08	50	
Hickory Branch east southeast of DeQuincy, Louisiana	842	11/18/08	170	
Hickory Branch east southeast of DeQuincy, Louisiana	842	12/3/08	500	
Hickory Branch east southeast of DeQuincy, Louisiana	842	1/21/09	170	
Hickory Branch east southeast of DeQuincy, Louisiana	842	2/11/09	300	
Hickory Branch east southeast of DeQuincy, Louisiana	842	3/11/09	240	
Hickory Branch east southeast of DeQuincy, Louisiana	842	4/21/09	300	
Hickory Branch east southeast of DeQuincy, Louisiana	842	5/6/09	300	
Hickory Branch east southeast of DeQuincy, Louisiana	842	6/10/09	30	
Hickory Branch east southeast of DeQuincy, Louisiana	842	7/22/09	900	PCR
Hickory Branch east southeast of DeQuincy, Louisiana	842	8/12/09	300	
Hickory Branch east southeast of DeQuincy, Louisiana	842	9/16/09	280	

[a] Data before 2005 were not included in TMDL analysis.

Table A-2. Fecal coliform summary statistics for station 842

Statistic	Value[a]
Minimum (MPN/100 mL)	30
Maximum (MPN/100 mL)	5,000
Average (MPN/100 mL)	1,072.9
Count	24
Percentage of data that violate the PCR criterion	12.5
Percentage of data that violate the SCR criterion	12.5

[a] Data before 2005 were not included in TMDL analysis.

Appendix B. Load Duration Curve Plots

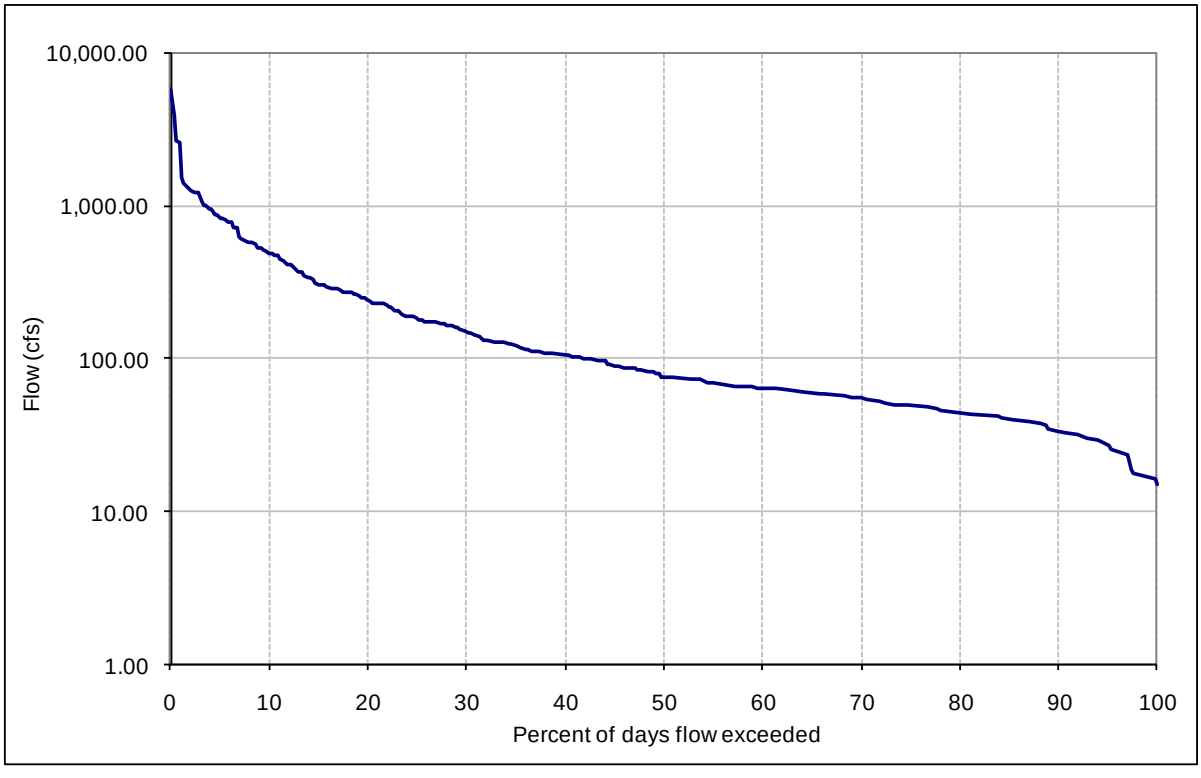

Figure B-1. Winter flow duration curve for gage 08014800.

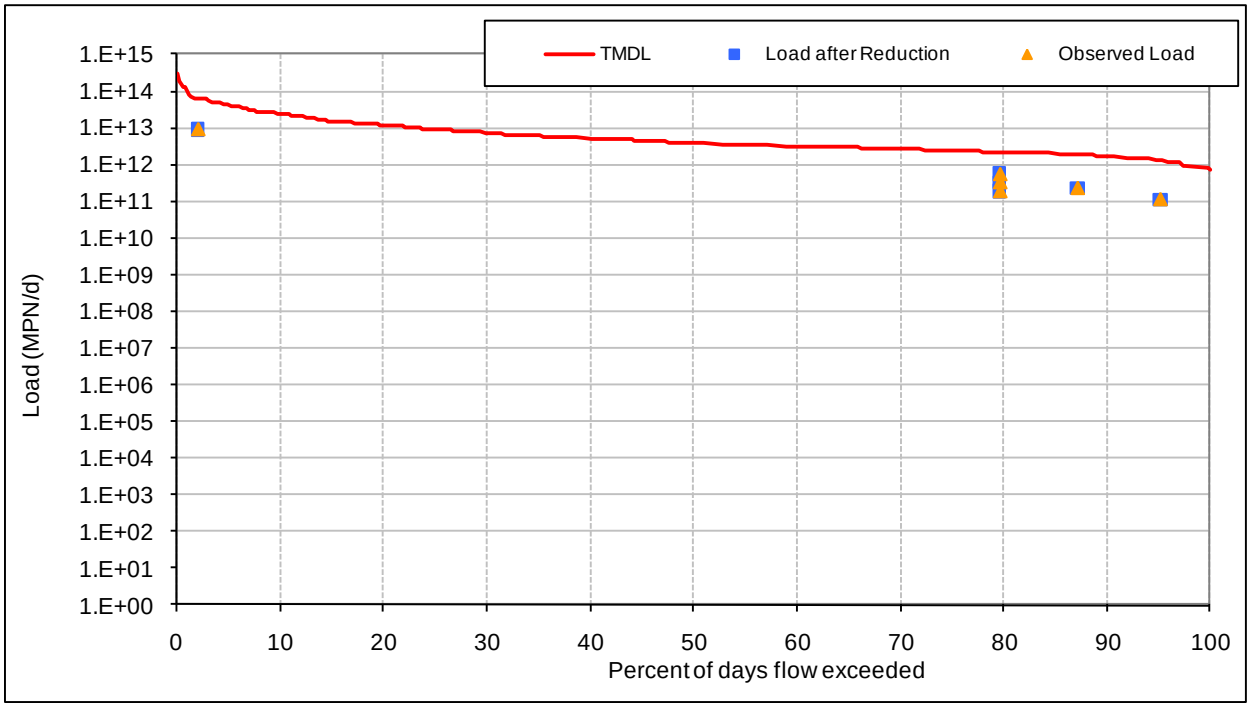

Figure B-2. Winter load duration curve.

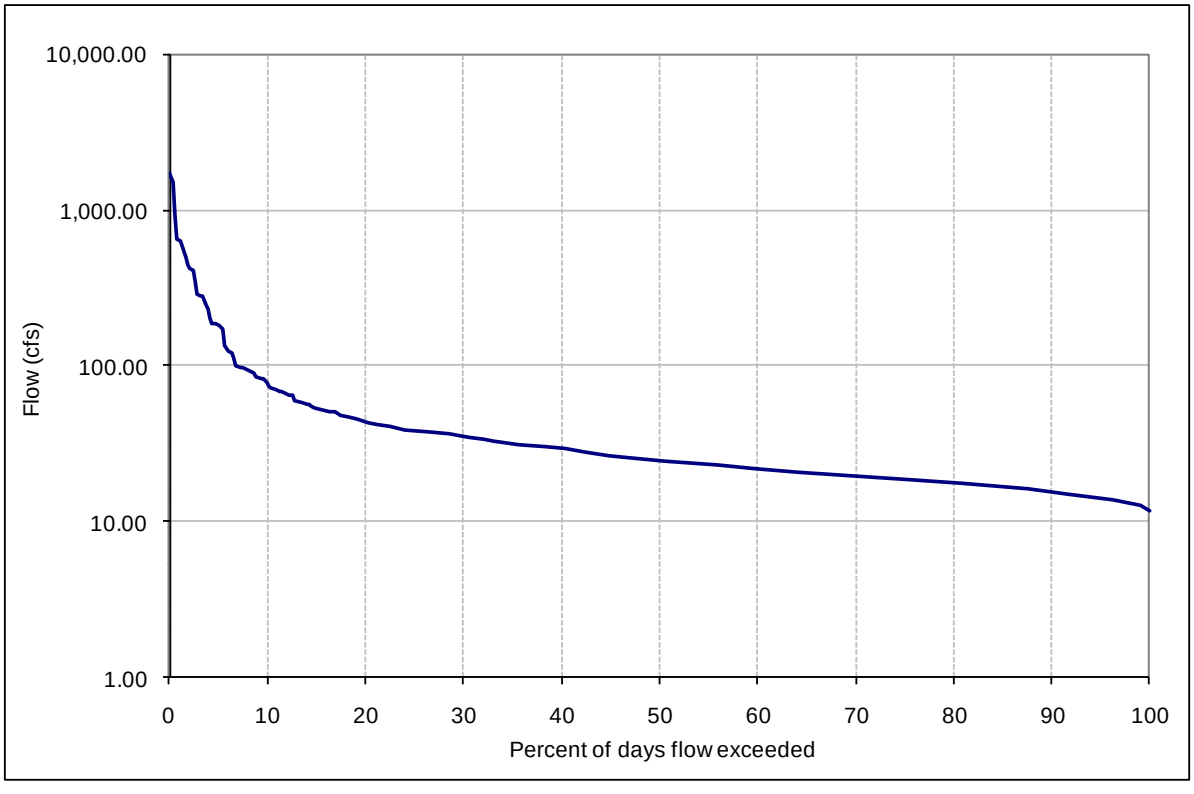

Figure B-3. Summer flow duration curve for gage 08014800.

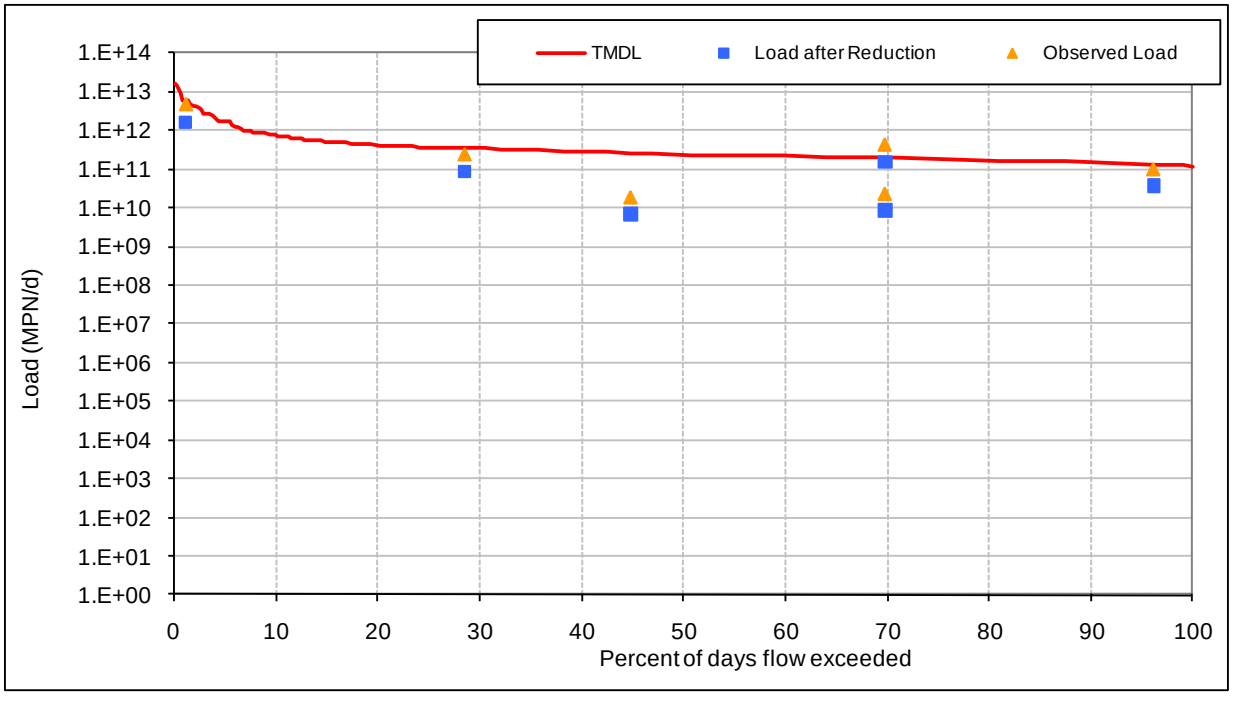

Figure B-4. Summer load duration curve.

Appendix C. Load Duration Curve Calculations

Table C-1. Summary of summer reductions

Date	Observed Concentration (MPN/100 mL)	Area weighted flow on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (MPN/day)	Reduced load (MPN/day)	Allowable load with MOS incorporated (MPN/day)	Reduced load less than or equal to allow load?
7/22/2009	900	19.80315049	69.8	4.360E+11	1.550E+11	1.550E+11	Yes
5/6/2009	300	637.1954892	1.1	4.677E+12	1.663E+12	4.989E+12	Yes
8/12/2009	300	13.97869446	96.2	1.026E+11	3.648E+10	1.094E+11	Yes
9/16/2009	280	36.11162736	28.5	2.474E+11	8.796E+10	2.827E+11	Yes
10/8/2008	50	19.80315049	69.8	2.422E+10	8.613E+09	1.550E+11	Yes
6/10/2009	30	26.79249772	44.8	1.966E+10	6.992E+09	2.098E+11	Yes

Table C-2. Load duration curve summer statistics

Total No. of samples =	6	
MOS =	20%	
WQ standard for =	400	MPN/100 mL
Percent Reduction Required =	64.4	
Allowable percentage of exceedences =	*0%*	
No. of exceedances after reductions =	0	
Sum of flow on sampling day	754	cfs
Sum of current loads	5.507E+12	MPN/d
Flow weighted avg conc	*299*	MPN/100 mL
Average flow	56	cfs
Existing total load	4.059E+11	MPN/d
Existing point source load	3.076E+08	MPN/d
Existing remaining load	4.056E+11	MPN/d
Total allowable loading	5.096E+11	MPN/d
Explicit MOS (20%)	1.019E+11	MPN/d
WLA	3.076E+08	MPN/d
LA	4.074E+11	MPN/d
USGS drainage area (mi^2) =	120.0	
SS drainage area (mi^2) =	139.79	

Table C-3. Flow duration curve summer values

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
						509,590,448,546
8/15/09	10	100.000	11.64891205	0.00	113,999,787,151	0
8/16/09	10	100.000	11.64891205	0.00	113,999,787,151	0
8/17/09	10	100.000	11.64891205	0.00	113,999,787,151	0
8/25/09	10	100.000	11.64891205	1.00	113,999,787,151	1,139,997,872
7/14/09	11	99.000	12.81380326	0.00	125,399,765,867	0
7/15/09	11	99.000	12.81380326	0.00	125,399,765,867	0
8/13/09	11	99.000	12.81380326	0.00	125,399,765,867	0
8/14/09	11	99.000	12.81380326	0.00	125,399,765,867	0
8/18/09	11	99.000	12.81380326	0.00	125,399,765,867	0
8/24/09	11	99.000	12.81380326	0.00	125,399,765,867	0
9/3/09	11	99.000	12.81380326	0.00	125,399,765,867	0
9/4/09	11	99.000	12.81380326	0.00	125,399,765,867	0
9/5/09	11	99.000	12.81380326	0.00	125,399,765,867	0
9/8/09	11	99.000	12.81380326	0.00	125,399,765,867	0
9/9/09	11	99.000	12.81380326	2.80	125,399,765,867	3,511,193,444
7/30/08	12	96.200	13.97869446	0.00	136,799,744,582	0
7/31/08	12	96.200	13.97869446	0.00	136,799,744,582	0
8/1/08	12	96.200	13.97869446	0.00	136,799,744,582	0
8/2/08	12	96.200	13.97869446	0.00	136,799,744,582	0
7/3/09	12	96.200	13.97869446	0.00	136,799,744,582	0
7/4/09	12	96.200	13.97869446	0.00	136,799,744,582	0
7/5/09	12	96.200	13.97869446	0.00	136,799,744,582	0
7/6/09	12	96.200	13.97869446	0.00	136,799,744,582	0
7/13/09	12	96.200	13.97869446	0.00	136,799,744,582	0
8/12/09	12	96.200	13.97869446	0.00	136,799,744,582	0
8/23/09	12	96.200	13.97869446	0.00	136,799,744,582	0
8/26/09	12	96.200	13.97869446	0.00	136,799,744,582	0
8/27/09	12	96.200	13.97869446	0.00	136,799,744,582	0
8/28/09	12	96.200	13.97869446	0.00	136,799,744,582	0
8/29/09	12	96.200	13.97869446	0.00	136,799,744,582	0
9/2/09	12	96.200	13.97869446	0.00	136,799,744,582	0
9/7/09	12	96.200	13.97869446	4.40	136,799,744,582	6,019,188,762
7/20/08	13	91.800	15.14358567	0.00	148,199,723,297	0
7/21/08	13	91.800	15.14358567	0.00	148,199,723,297	0
7/22/08	13	91.800	15.14358567	0.00	148,199,723,297	0
7/23/08	13	91.800	15.14358567	0.00	148,199,723,297	0
7/28/08	13	91.800	15.14358567	0.00	148,199,723,297	0
7/29/08	13	91.800	15.14358567	0.00	148,199,723,297	0
7/2/09	13	91.800	15.14358567	0.00	148,199,723,297	0
7/12/09	13	91.800	15.14358567	0.00	148,199,723,297	0
7/17/09	13	91.800	15.14358567	0.00	148,199,723,297	0
7/18/09	13	91.800	15.14358567	0.00	148,199,723,297	0
8/8/09	13	91.800	15.14358567	0.00	148,199,723,297	0

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
8/9/09	13	91.800	15.14358567	0.00	148,199,723,297	0
8/11/09	13	91.800	15.14358567	0.00	148,199,723,297	0
8/19/09	13	91.800	15.14358567	0.00	148,199,723,297	0
8/21/09	13	91.800	15.14358567	0.00	148,199,723,297	0
9/11/09	13	91.800	15.14358567	4.20	148,199,723,297	6,224,388,378
7/17/08	14	87.600	16.30847687	0.00	159,599,702,012	0
7/18/08	14	87.600	16.30847687	0.00	159,599,702,012	0
7/19/08	14	87.600	16.30847687	0.00	159,599,702,012	0
7/24/08	14	87.600	16.30847687	0.00	159,599,702,012	0
7/27/08	14	87.600	16.30847687	0.00	159,599,702,012	0
10/27/08	14	87.600	16.30847687	0.00	159,599,702,012	0
10/28/08	14	87.600	16.30847687	0.00	159,599,702,012	0
10/29/08	14	87.600	16.30847687	0.00	159,599,702,012	0
10/30/08	14	87.600	16.30847687	0.00	159,599,702,012	0
10/31/08	14	87.600	16.30847687	0.00	159,599,702,012	0
6/27/09	14	87.600	16.30847687	0.00	159,599,702,012	0
6/28/09	14	87.600	16.30847687	0.00	159,599,702,012	0
7/1/09	14	87.600	16.30847687	0.00	159,599,702,012	0
7/7/09	14	87.600	16.30847687	0.00	159,599,702,012	0
7/10/09	14	87.600	16.30847687	0.00	159,599,702,012	0
7/11/09	14	87.600	16.30847687	0.00	159,599,702,012	0
7/27/09	14	87.600	16.30847687	0.00	159,599,702,012	0
7/28/09	14	87.600	16.30847687	0.00	159,599,702,012	0
8/7/09	14	87.600	16.30847687	0.00	159,599,702,012	0
8/10/09	14	87.600	16.30847687	0.00	159,599,702,012	0
8/20/09	14	87.600	16.30847687	0.00	159,599,702,012	0
8/22/09	14	87.600	16.30847687	0.00	159,599,702,012	0
9/1/09	14	87.600	16.30847687	0.00	159,599,702,012	0
9/10/09	14	87.600	16.30847687	0.00	159,599,702,012	0
9/12/09	14	87.600	16.30847687	0.00	159,599,702,012	0
10/1/09	14	87.600	16.30847687	6.70	159,599,702,012	10,693,180,035
7/13/08	15	80.900	17.47336808	0.00	170,999,680,727	0
7/14/08	15	80.900	17.47336808	0.00	170,999,680,727	0
7/15/08	15	80.900	17.47336808	0.00	170,999,680,727	0
7/16/08	15	80.900	17.47336808	0.00	170,999,680,727	0
7/26/08	15	80.900	17.47336808	0.00	170,999,680,727	0
8/11/08	15	80.900	17.47336808	0.00	170,999,680,727	0
8/12/08	15	80.900	17.47336808	0.00	170,999,680,727	0
10/24/08	15	80.900	17.47336808	0.00	170,999,680,727	0
10/25/08	15	80.900	17.47336808	0.00	170,999,680,727	0
10/26/08	15	80.900	17.47336808	0.00	170,999,680,727	0
6/22/09	15	80.900	17.47336808	0.00	170,999,680,727	0
6/23/09	15	80.900	17.47336808	0.00	170,999,680,727	0
6/24/09	15	80.900	17.47336808	0.00	170,999,680,727	0
6/25/09	15	80.900	17.47336808	0.00	170,999,680,727	0

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
6/26/09	15	80.900	17.47336808	0.00	170,999,680,727	0
7/8/09	15	80.900	17.47336808	0.00	170,999,680,727	0
7/9/09	15	80.900	17.47336808	0.00	170,999,680,727	0
7/21/09	15	80.900	17.47336808	0.00	170,999,680,727	0
7/26/09	15	80.900	17.47336808	0.00	170,999,680,727	0
8/6/09	15	80.900	17.47336808	0.00	170,999,680,727	0
9/30/09	15	80.900	17.47336808	5.40	170,999,680,727	9,233,982,759
7/9/08	16	75.500	18.63825928	0.00	182,399,659,442	0
7/10/08	16	75.500	18.63825928	0.00	182,399,659,442	0
8/10/08	16	75.500	18.63825928	0.00	182,399,659,442	0
8/30/08	16	75.500	18.63825928	0.00	182,399,659,442	0
8/31/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/1/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/2/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/3/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/4/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/5/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/6/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/7/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/13/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/14/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/22/08	16	75.500	18.63825928	0.00	182,399,659,442	0
10/23/08	16	75.500	18.63825928	0.00	182,399,659,442	0
6/19/09	16	75.500	18.63825928	0.00	182,399,659,442	0
6/20/09	16	75.500	18.63825928	0.00	182,399,659,442	0
6/21/09	16	75.500	18.63825928	0.00	182,399,659,442	0
7/20/09	16	75.500	18.63825928	0.00	182,399,659,442	0
7/25/09	16	75.500	18.63825928	0.00	182,399,659,442	0
8/5/09	16	75.500	18.63825928	5.70	182,399,659,442	10,396,780,588
7/8/08	17	69.800	19.80315049	0.00	193,799,638,157	0
7/12/08	17	69.800	19.80315049	0.00	193,799,638,157	0
8/9/08	17	69.800	19.80315049	0.00	193,799,638,157	0
8/18/08	17	69.800	19.80315049	0.00	193,799,638,157	0
8/28/08	17	69.800	19.80315049	0.00	193,799,638,157	0
8/29/08	17	69.800	19.80315049	0.00	193,799,638,157	0
9/1/08	17	69.800	19.80315049	0.00	193,799,638,157	0
9/28/08	17	69.800	19.80315049	0.00	193,799,638,157	0
9/29/08	17	69.800	19.80315049	0.00	193,799,638,157	0
9/30/08	17	69.800	19.80315049	0.00	193,799,638,157	0
10/8/08	17	69.800	19.80315049	0.00	193,799,638,157	0
10/9/08	17	69.800	19.80315049	0.00	193,799,638,157	0
10/12/08	17	69.800	19.80315049	0.00	193,799,638,157	0
10/15/08	17	69.800	19.80315049	0.00	193,799,638,157	0
10/21/08	17	69.800	19.80315049	0.00	193,799,638,157	0
6/17/09	17	69.800	19.80315049	0.00	193,799,638,157	0

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
6/18/09	17	69.800	19.80315049	0.00	193,799,638,157	0
7/22/09	17	69.800	19.80315049	0.00	193,799,638,157	0
7/24/09	17	69.800	19.80315049	0.00	193,799,638,157	0
8/31/09	17	69.800	19.80315049	0.00	193,799,638,157	0
9/22/09	17	69.800	19.80315049	0.00	193,799,638,157	0
9/29/09	17	69.800	19.80315049	5.70	193,799,638,157	11,046,579,375
6/20/08	18	64.100	20.96804169	0.00	205,199,616,873	0
6/21/08	18	64.100	20.96804169	0.00	205,199,616,873	0
7/7/08	18	64.100	20.96804169	0.00	205,199,616,873	0
7/25/08	18	64.100	20.96804169	0.00	205,199,616,873	0
9/26/08	18	64.100	20.96804169	0.00	205,199,616,873	0
9/27/08	18	64.100	20.96804169	0.00	205,199,616,873	0
10/11/08	18	64.100	20.96804169	0.00	205,199,616,873	0
10/20/08	18	64.100	20.96804169	0.00	205,199,616,873	0
6/15/09	18	64.100	20.96804169	0.00	205,199,616,873	0
6/16/09	18	64.100	20.96804169	0.00	205,199,616,873	0
6/29/09	18	64.100	20.96804169	0.00	205,199,616,873	0
6/30/09	18	64.100	20.96804169	0.00	205,199,616,873	0
7/23/09	18	64.100	20.96804169	0.00	205,199,616,873	0
7/29/09	18	64.100	20.96804169	0.00	205,199,616,873	0
9/21/09	18	64.100	20.96804169	0.00	205,199,616,873	0
9/28/09	18	64.100	20.96804169	0.00	205,199,616,873	0
10/2/09	18	64.100	20.96804169	4.40	205,199,616,873	9,028,783,142
6/10/08	19	59.700	22.1329329	0.00	216,599,595,588	0
6/15/08	19	59.700	22.1329329	0.00	216,599,595,588	0
6/19/08	19	59.700	22.1329329	0.00	216,599,595,588	0
7/3/08	19	59.700	22.1329329	0.00	216,599,595,588	0
7/4/08	19	59.700	22.1329329	0.00	216,599,595,588	0
8/13/08	19	59.700	22.1329329	0.00	216,599,595,588	0
8/19/08	19	59.700	22.1329329	0.00	216,599,595,588	0
8/20/08	19	59.700	22.1329329	0.00	216,599,595,588	0
8/27/08	19	59.700	22.1329329	0.00	216,599,595,588	0
9/12/08	19	59.700	22.1329329	0.00	216,599,595,588	0
9/24/08	19	59.700	22.1329329	0.00	216,599,595,588	0
9/25/08	19	59.700	22.1329329	0.00	216,599,595,588	0
10/19/08	19	59.700	22.1329329	0.00	216,599,595,588	0
6/14/09	19	59.700	22.1329329	0.00	216,599,595,588	0
8/4/09	19	59.700	22.1329329	3.80	216,599,595,588	8,230,784,632
10/14/07	20	55.900	23.2978241	0.00	227,999,574,303	0
10/15/07	20	55.900	23.2978241	0.00	227,999,574,303	0
10/16/07	20	55.900	23.2978241	0.00	227,999,574,303	0
6/6/08	20	55.900	23.2978241	0.00	227,999,574,303	0
6/7/08	20	55.900	23.2978241	0.00	227,999,574,303	0
6/8/08	20	55.900	23.2978241	0.00	227,999,574,303	0
6/9/08	20	55.900	23.2978241	0.00	227,999,574,303	0

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
6/11/08	20	55.900	23.2978241	0.00	227,999,574,303	0
6/14/08	20	55.900	23.2978241	0.00	227,999,574,303	0
6/22/08	20	55.900	23.2978241	0.00	227,999,574,303	0
6/24/08	20	55.900	23.2978241	0.00	227,999,574,303	0
8/8/08	20	55.900	23.2978241	0.00	227,999,574,303	0
8/17/08	20	55.900	23.2978241	0.00	227,999,574,303	0
8/26/08	20	55.900	23.2978241	0.00	227,999,574,303	0
9/11/08	20	55.900	23.2978241	0.00	227,999,574,303	0
9/23/08	20	55.900	23.2978241	0.00	227,999,574,303	0
10/10/08	20	55.900	23.2978241	0.00	227,999,574,303	0
10/18/08	20	55.900	23.2978241	0.00	227,999,574,303	0
6/13/09	20	55.900	23.2978241	0.00	227,999,574,303	0
9/27/09	20	55.900	23.2978241	5.20	227,999,574,303	11,855,977,864
10/12/07	21	50.700	24.46271531	0.00	239,399,553,018	0
10/13/07	21	50.700	24.46271531	0.00	239,399,553,018	0
6/4/08	21	50.700	24.46271531	0.00	239,399,553,018	0
6/5/08	21	50.700	24.46271531	0.00	239,399,553,018	0
6/12/08	21	50.700	24.46271531	0.00	239,399,553,018	0
6/13/08	21	50.700	24.46271531	0.00	239,399,553,018	0
6/16/08	21	50.700	24.46271531	0.00	239,399,553,018	0
6/17/08	21	50.700	24.46271531	0.00	239,399,553,018	0
6/29/08	21	50.700	24.46271531	0.00	239,399,553,018	0
9/10/08	21	50.700	24.46271531	0.00	239,399,553,018	0
9/22/08	21	50.700	24.46271531	0.00	239,399,553,018	0
6/12/09	21	50.700	24.46271531	0.00	239,399,553,018	0
9/6/09	21	50.700	24.46271531	0.00	239,399,553,018	0
9/23/09	21	50.700	24.46271531	0.00	239,399,553,018	0
9/26/09	21	50.700	24.46271531	3.90	239,399,553,018	9,336,582,568
10/11/07	22	46.800	25.62760651	0.00	250,799,531,733	0
6/3/08	22	46.800	25.62760651	0.00	250,799,531,733	0
7/1/08	22	46.800	25.62760651	0.00	250,799,531,733	0
9/21/08	22	46.800	25.62760651	0.00	250,799,531,733	0
10/17/08	22	46.800	25.62760651	0.00	250,799,531,733	0
6/11/09	22	46.800	25.62760651	0.00	250,799,531,733	0
7/30/09	22	46.800	25.62760651	0.00	250,799,531,733	0
9/20/09	22	46.800	25.62760651	2.00	250,799,531,733	5,015,990,635
10/4/07	23	44.800	26.79249772	0.00	262,199,510,448	0
10/5/07	23	44.800	26.79249772	0.00	262,199,510,448	0
10/7/07	23	44.800	26.79249772	0.00	262,199,510,448	0
10/10/07	23	44.800	26.79249772	0.00	262,199,510,448	0
6/18/08	23	44.800	26.79249772	0.00	262,199,510,448	0
9/9/08	23	44.800	26.79249772	0.00	262,199,510,448	0
9/20/08	23	44.800	26.79249772	0.00	262,199,510,448	0
6/10/09	23	44.800	26.79249772	0.00	262,199,510,448	0
7/19/09	23	44.800	26.79249772	2.40	262,199,510,448	6,292,788,251

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
10/3/07	24	42.400	27.95738892	0.00	273,599,489,163	0
10/8/07	24	42.400	27.95738892	0.00	273,599,489,163	0
10/9/07	24	42.400	27.95738892	0.00	273,599,489,163	0
6/2/08	24	42.400	27.95738892	0.00	273,599,489,163	0
6/28/08	24	42.400	27.95738892	0.00	273,599,489,163	0
7/11/08	24	42.400	27.95738892	0.00	273,599,489,163	0
8/25/08	24	42.400	27.95738892	0.00	273,599,489,163	0
7/16/09	24	42.400	27.95738892	2.00	273,599,489,163	5,471,989,783
10/2/07	25	40.400	29.12228013	0.00	284,999,467,879	0
10/6/07	25	40.400	29.12228013	0.00	284,999,467,879	0
5/13/08	25	40.400	29.12228013	0.00	284,999,467,879	0
6/27/08	25	40.400	29.12228013	0.00	284,999,467,879	0
7/2/08	25	40.400	29.12228013	0.00	284,999,467,879	0
8/15/08	25	40.400	29.12228013	0.00	284,999,467,879	0
6/9/09	25	40.400	29.12228013	0.00	284,999,467,879	0
10/3/09	25	40.400	29.12228013	2.10	284,999,467,879	5,984,988,825
5/12/08	26	38.300	30.28717133	0.00	296,399,446,594	0
5/28/08	26	38.300	30.28717133	0.00	296,399,446,594	0
6/1/08	26	38.300	30.28717133	0.00	296,399,446,594	0
6/26/08	26	38.300	30.28717133	0.00	296,399,446,594	0
8/7/08	26	38.300	30.28717133	0.00	296,399,446,594	0
9/19/08	26	38.300	30.28717133	0.00	296,399,446,594	0
6/3/09	26	38.300	30.28717133	0.00	296,399,446,594	0
8/3/09	26	38.300	30.28717133	0.00	296,399,446,594	0
9/13/09	26	38.300	30.28717133	0.00	296,399,446,594	0
9/25/09	26	38.300	30.28717133	2.60	296,399,446,594	7,706,385,611
10/1/07	27	35.700	31.45206254	0.00	307,799,425,309	0
5/11/08	27	35.700	31.45206254	0.00	307,799,425,309	0
5/27/08	27	35.700	31.45206254	0.00	307,799,425,309	0
6/23/08	27	35.700	31.45206254	0.00	307,799,425,309	0
6/25/08	27	35.700	31.45206254	0.00	307,799,425,309	0
6/30/08	27	35.700	31.45206254	0.00	307,799,425,309	0
9/8/08	27	35.700	31.45206254	0.00	307,799,425,309	0
6/2/09	27	35.700	31.45206254	0.00	307,799,425,309	0
6/8/09	27	35.700	31.45206254	0.00	307,799,425,309	0
10/8/09	27	35.700	31.45206254	2.60	307,799,425,309	8,002,785,058
10/31/07	28	33.100	32.61695374	0.00	319,199,404,024	0
6/1/09	28	33.100	32.61695374	0.00	319,199,404,024	0
8/30/09	28	33.100	32.61695374	0.00	319,199,404,024	0
9/18/09	28	33.100	32.61695374	1.00	319,199,404,024	3,191,994,040
10/30/07	29	32.100	33.78184495	0.00	330,599,382,739	0
5/10/08	29	32.100	33.78184495	0.00	330,599,382,739	0
7/5/08	29	32.100	33.78184495	0.00	330,599,382,739	0
10/16/08	29	32.100	33.78184495	0.00	330,599,382,739	0
5/31/09	29	32.100	33.78184495	0.00	330,599,382,739	0

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
10/9/09	29	32.100	33.78184495	1.60	330,599,382,739	5,289,590,124
5/14/08	30	30.500	34.94673615	0.00	341,999,361,454	0
5/22/08	30	30.500	34.94673615	0.00	341,999,361,454	0
5/23/08	30	30.500	34.94673615	0.00	341,999,361,454	0
5/26/08	30	30.500	34.94673615	0.00	341,999,361,454	0
5/31/08	30	30.500	34.94673615	0.00	341,999,361,454	0
7/6/08	30	30.500	34.94673615	0.00	341,999,361,454	0
6/7/09	30	30.500	34.94673615	0.00	341,999,361,454	0
9/19/09	30	30.500	34.94673615	2.00	341,999,361,454	6,839,987,229
10/29/07	31	28.500	36.11162736	0.00	353,399,340,169	0
5/2/08	31	28.500	36.11162736	0.00	353,399,340,169	0
5/9/08	31	28.500	36.11162736	0.00	353,399,340,169	0
8/14/08	31	28.500	36.11162736	0.00	353,399,340,169	0
8/16/08	31	28.500	36.11162736	0.00	353,399,340,169	0
6/5/09	31	28.500	36.11162736	0.00	353,399,340,169	0
9/16/09	31	28.500	36.11162736	0.00	353,399,340,169	0
9/24/09	31	28.500	36.11162736	2.10	353,399,340,169	7,421,386,144
5/1/08	32	26.400	37.27651857	0.00	364,799,318,885	0
5/21/08	32	26.400	37.27651857	0.00	364,799,318,885	0
9/13/08	32	26.400	37.27651857	0.00	364,799,318,885	0
9/18/08	32	26.400	37.27651857	0.00	364,799,318,885	0
5/30/09	32	26.400	37.27651857	0.00	364,799,318,885	0
6/4/09	32	26.400	37.27651857	0.00	364,799,318,885	0
6/6/09	32	26.400	37.27651857	0.00	364,799,318,885	0
10/5/09	32	26.400	37.27651857	0.00	364,799,318,885	0
10/20/09	32	26.400	37.27651857	2.30	364,799,318,885	8,390,384,334
10/28/07	33	24.100	38.44140977	0.00	376,199,297,600	0
5/8/08	33	24.100	38.44140977	0.00	376,199,297,600	0
10/4/09	33	24.100	38.44140977	0.80	376,199,297,600	3,009,594,381
5/24/08	34	23.300	39.60630098	0.00	387,599,276,315	0
5/30/08	34	23.300	39.60630098	0.00	387,599,276,315	0
9/7/08	34	23.300	39.60630098	0.80	387,599,276,315	3,100,794,211
5/3/08	35	22.500	40.77119218	0.00	398,999,255,030	0
8/24/08	35	22.500	40.77119218	0.00	398,999,255,030	0
5/29/09	35	22.500	40.77119218	0.00	398,999,255,030	0
9/15/09	35	22.500	40.77119218	0.00	398,999,255,030	0
10/6/09	35	22.500	40.77119218	1.30	398,999,255,030	5,186,990,315
5/7/08	36	21.200	41.93608339	0.00	410,399,233,745	0
5/25/08	36	21.200	41.93608339	0.00	410,399,233,745	0
8/6/08	36	21.200	41.93608339	0.00	410,399,233,745	0
10/10/09	36	21.200	41.93608339	1.00	410,399,233,745	4,103,992,337
10/27/07	37	20.200	43.10097459	0.00	421,799,212,460	0
5/20/08	37	20.200	43.10097459	0.00	421,799,212,460	0
9/17/09	37	20.200	43.10097459	0.00	421,799,212,460	0
10/7/09	37	20.200	43.10097459	1.00	421,799,212,460	4,217,992,125

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
5/23/09	39	19.200	45.430757	0.00	444,599,169,891	0
5/28/09	39	19.200	45.430757	0.00	444,599,169,891	0
10/11/09	39	19.200	45.430757	0.80	444,599,169,891	3,556,793,359
8/5/08	40	18.400	46.59564821	0.00	455,999,148,606	0
5/22/09	40	18.400	46.59564821	0.00	455,999,148,606	0
7/31/09	40	18.400	46.59564821	0.00	455,999,148,606	0
10/19/09	40	18.400	46.59564821	1.00	455,999,148,606	4,559,991,486
10/21/07	41	17.400	47.76053941	0.00	467,399,127,321	0
5/26/09	41	17.400	47.76053941	0.60	467,399,127,321	2,804,394,764
8/21/08	43	16.800	50.09032182	0.00	490,199,084,751	0
9/14/09	43	16.800	50.09032182	0.50	490,199,084,751	2,450,995,424
5/6/08	44	16.300	51.25521303	0.00	501,599,063,466	0
9/17/08	44	16.300	51.25521303	0.00	501,599,063,466	0
5/21/09	44	16.300	51.25521303	0.70	501,599,063,466	3,511,193,444
5/19/08	45	15.600	52.42010423	0.00	512,999,042,181	0
5/25/09	45	15.600	52.42010423	0.00	512,999,042,181	0
5/27/09	45	15.600	52.42010423	0.80	512,999,042,181	4,103,992,337
10/26/07	46	14.800	53.58499544	0.30	524,399,020,897	1,573,197,063
8/2/09	47	14.500	54.74988664	0.20	535,798,999,612	1,071,597,999
8/4/08	48	14.300	55.91477785	0.30	547,198,978,327	1,641,596,935
10/22/07	49	14.000	57.07966905	0.00	558,598,957,042	0
5/24/09	49	14.000	57.07966905	0.50	558,598,957,042	2,792,994,785
5/29/08	50	13.500	58.24456026	0.00	569,998,935,757	0
5/20/09	50	13.500	58.24456026	0.00	569,998,935,757	0
8/1/09	50	13.500	58.24456026	0.80	569,998,935,757	4,559,991,486
9/6/08	51	12.700	59.40945146	0.20	581,398,914,472	1,162,797,829
8/3/08	55	12.500	64.06901628	0.30	626,998,829,333	1,880,996,488
5/2/09	56	12.200	65.23390749	0.00	638,398,808,048	0
5/16/09	56	12.200	65.23390749	0.00	638,398,808,048	0
10/12/09	56	12.200	65.23390749	0.80	638,398,808,048	5,107,190,464
10/18/09	58	11.400	67.5636899	0.20	661,198,765,478	1,322,397,531
5/11/09	59	11.200	68.7285811	0.30	672,598,744,193	2,017,796,233
5/10/09	61	10.900	71.05836352	0.00	695,398,701,624	0
5/17/09	61	10.900	71.05836352	0.50	695,398,701,624	3,476,993,508
5/19/09	62	10.400	72.22325472	0.30	706,798,680,339	2,120,396,041
5/18/08	64	10.100	74.55303713	0.20	729,598,637,769	1,459,197,276
5/15/09	67	9.900	78.04771075	0.30	763,798,573,915	2,291,395,722
9/2/08	70	9.600	81.54238436	0.20	797,998,510,060	1,595,997,020
5/1/09	71	9.400	82.70727557	0.00	809,398,488,775	0
5/9/09	71	9.400	82.70727557	0.60	809,398,488,775	4,856,390,933
10/25/07	73	8.800	85.03705798	0.20	832,198,446,205	1,664,396,892
5/18/09	76	8.600	88.53173159	0.30	866,398,382,351	2,599,195,147
10/20/07	78	8.300	90.861514	0.00	889,198,339,781	0
5/5/08	78	8.300	90.861514	0.50	889,198,339,781	4,445,991,699
8/23/08	81	7.800	94.35618762	0.30	923,398,275,927	2,770,194,828

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
10/17/09	83	7.500	96.68597003	0.20	946,198,233,357	1,892,396,467
9/16/08	84	7.300	97.85086123	0.00	957,598,212,072	0
5/8/09	84	7.300	97.85086123	0.50	957,598,212,072	4,787,991,060
5/4/08	86	6.800	100.1806436	0.30	980,398,169,502	2,941,194,509
5/14/09	96	6.500	111.8295557	0.20	1,094,397,956,654	2,188,795,913
9/14/08	103	6.300	119.9837941	0.30	1,174,197,807,660	3,522,593,423
8/22/08	106	6.000	123.4784677	0.30	1,208,397,743,805	3,625,193,231
5/7/09	115	5.700	133.9624886	0.20	1,310,997,552,241	2,621,995,104
10/17/07	146	5.500	170.074116	0.30	1,664,396,892,411	4,993,190,677
10/23/07	150	5.200	174.7336808	0.20	1,709,996,807,271	3,419,993,615
5/17/08	155	5.000	180.5581368	0.30	1,766,996,700,847	5,300,990,103
9/15/08	158	4.700	184.0528104	0.30	1,801,196,636,993	5,403,589,911
10/24/07	160	4.400	186.3825928	0.20	1,823,996,594,423	3,647,993,189
9/5/08	175	4.200	203.8559609	0.30	1,994,996,275,150	5,984,988,825
5/15/08	199	3.900	231.8133498	0.20	2,268,595,764,313	4,537,191,529
10/19/07	208	3.700	242.2973707	0.30	2,371,195,572,750	7,113,586,718
10/16/09	240	3.400	279.5738892	0.20	2,735,994,891,634	5,471,989,783
10/13/09	243	3.200	283.0685629	0.30	2,770,194,827,780	8,310,584,483
5/13/09	250	2.900	291.2228013	0.30	2,849,994,678,786	8,549,984,036
9/3/08	300	2.600	349.4673615	0.20	3,419,993,614,543	6,839,987,229
9/4/08	348	2.400	405.3821394	0.30	3,967,192,592,870	11,901,577,779
5/16/08	358	2.100	417.0310514	0.20	4,081,192,380,021	8,162,384,760
5/3/09	377	1.900	439.1639843	0.30	4,297,791,975,609	12,893,375,927
10/18/07	421	1.600	490.4191974	0.30	4,799,391,039,075	14,398,173,117
5/12/09	499	1.300	581.2807114	0.20	5,688,589,378,856	11,377,178,758
5/6/09	547	1.100	637.1954892	0.30	6,235,788,357,183	18,707,365,072
10/14/09	549	0.800	639.5252716	0.20	6,258,588,314,613	12,517,176,629
10/15/09	790	0.600	920.2640521	0.30	9,005,983,184,963	27,017,949,555
5/5/09	1290	0.300	1502.709655	0.30	14,705,972,542,534	44,117,917,628
5/4/09	1460	0.000	1700.74116	0.00	16,643,968,924,108	0

Table C-4. Summary of winter reductions

Date	Observed Concentration (MPN/100 mL)	Area weighted flow on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (MPN/day)	Reduced load (MPN/day)	Allowable load with MOS incorporated (MPN/day)	Reduced load less than or equal to allow load?
12/3/2008	500	44.2658658	79.6	5.415E+11	5.415E+11	1.733E+12	Yes
2/11/2009	300	44.2658658	79.6	3.249E+11	3.249E+11	1.733E+12	Yes
4/21/2009	300	1258.082502	2	9.234E+12	9.234E+12	4.925E+13	Yes
3/11/2009	240	38.44140977	87.1	2.257E+11	2.257E+11	1.505E+12	Yes
11/18/2008	170	26.79249772	95.1	1.114E+11	1.114E+11	1.049E+12	Yes
1/21/2009	170	44.2658658	79.6	1.841E+11	1.841E+11	1.733E+12	Yes

Table C-5. Load duration curve winter statistics

Total No. of samples =	12	
MOS =	20%	
WQ standard for =	2000	MPN/100 mL
Percent Reduction Required =	0.0	
Allowable percentage of exceedences =	*0%*	
No. of exceedances after reductions =	0	
Sum of flow on sampling day	1,456	cfs
Sum of current loads	1.062E+13	MPN/d
Flow weighted avg conc	*298*	MPN/100 mL
Average flow	215	cfs
Existing total load	1.571E+12	MPN/d
Existing point source load	3.076E+08	MPN/d
Existing remaining load	1.571E+12	MPN/d
Total allowable loading	9.874E+12	MPN/d
Explicit MOS (20%)	1.975E+12	MPN/d
WLA	3.076E+08	MPN/d
LA	7.899E+12	MPN/d
USGS drainage area (mi^2) =	120.0	
SS drainage area (mi^2) =	139.79	

Table C-6. Flow duration curve winter values

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
						9,873,920,564,440
11/6/08	13	100.000	15.14358567	0.20	740,998,616,484	1,481,997,233
11/1/08	14	99.800	16.30847687	0.00	797,998,510,060	0
11/2/08	14	99.800	16.30847687	0.00	797,998,510,060	0
11/3/08	14	99.800	16.30847687	0.00	797,998,510,060	0
11/4/08	14	99.800	16.30847687	0.00	797,998,510,060	0
11/5/08	14	99.800	16.30847687	0.00	797,998,510,060	0
11/7/08	14	99.800	16.30847687	0.00	797,998,510,060	0
11/8/08	14	99.800	16.30847687	0.00	797,998,510,060	0
11/9/08	14	99.800	16.30847687	2.20	797,998,510,060	17,555,967,221
11/10/08	15	97.600	17.47336808	0.30	854,998,403,636	2,564,995,211
11/11/08	16	97.300	18.63825928	0.30	911,998,297,211	2,735,994,892
11/21/08	20	97.000	23.2978241	0.00	1,139,997,871,514	0
11/22/08	20	97.000	23.2978241	0.00	1,139,997,871,514	0
11/23/08	20	97.000	23.2978241	0.00	1,139,997,871,514	0
11/24/08	20	97.000	23.2978241	1.10	1,139,997,871,514	12,539,976,587
11/20/08	21	95.900	24.46271531	0.00	1,196,997,765,090	0
11/25/08	21	95.900	24.46271531	0.50	1,196,997,765,090	5,984,988,825
11/19/08	22	95.400	25.62760651	0.30	1,253,997,658,666	3,761,992,976
11/18/08	23	95.100	26.79249772	0.30	1,310,997,552,241	3,932,992,657
11/8/07	24	94.800	27.95738892	0.00	1,367,997,445,817	0
11/9/07	24	94.800	27.95738892	0.00	1,367,997,445,817	0
11/26/08	24	94.800	27.95738892	0.80	1,367,997,445,817	10,943,979,567
11/7/07	25	94.000	29.12228013	0.00	1,424,997,339,393	0
11/10/07	25	94.000	29.12228013	0.00	1,424,997,339,393	0
11/11/07	25	94.000	29.12228013	0.00	1,424,997,339,393	0
11/28/08	25	94.000	29.12228013	1.10	1,424,997,339,393	15,674,970,733
11/4/07	26	92.900	30.28717133	0.00	1,481,997,232,969	0
11/12/07	26	92.900	30.28717133	0.00	1,481,997,232,969	0
11/17/07	26	92.900	30.28717133	0.90	1,481,997,232,969	13,337,975,097
11/1/07	27	92.000	31.45206254	0.00	1,538,997,126,544	0
11/3/07	27	92.000	31.45206254	0.00	1,538,997,126,544	0
11/6/07	27	92.000	31.45206254	0.00	1,538,997,126,544	0
11/16/07	27	92.000	31.45206254	0.00	1,538,997,126,544	0
11/17/08	27	92.000	31.45206254	1.30	1,538,997,126,544	20,006,962,645
11/2/07	28	90.700	32.61695374	0.00	1,595,997,020,120	0
11/5/07	28	90.700	32.61695374	0.00	1,595,997,020,120	0
11/15/07	28	90.700	32.61695374	0.00	1,595,997,020,120	0
11/29/08	28	90.700	32.61695374	1.10	1,595,997,020,120	17,555,967,221
11/13/07	29	89.600	33.78184495	0.00	1,652,996,913,696	0
11/14/07	29	89.600	33.78184495	0.60	1,652,996,913,696	9,917,981,482
3/10/09	30	89.000	34.94673615	0.30	1,709,996,807,271	5,129,990,422
11/27/08	31	88.700	36.11162736	0.00	1,766,996,700,847	0
3/9/09	31	88.700	36.11162736	0.50	1,766,996,700,847	8,834,983,504

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
3/5/09	32	88.200	37.27651857	0.00	1,823,996,594,423	0
3/6/09	32	88.200	37.27651857	0.00	1,823,996,594,423	0
3/7/09	32	88.200	37.27651857	0.00	1,823,996,594,423	0
3/8/09	32	88.200	37.27651857	1.10	1,823,996,594,423	20,063,962,539
4/16/08	33	87.100	38.44140977	0.00	1,880,996,487,999	0
4/17/08	33	87.100	38.44140977	0.00	1,880,996,487,999	0
12/8/08	33	87.100	38.44140977	0.00	1,880,996,487,999	0
2/1/09	33	87.100	38.44140977	0.00	1,880,996,487,999	0
3/4/09	33	87.100	38.44140977	0.00	1,880,996,487,999	0
3/11/09	33	87.100	38.44140977	1.70	1,880,996,487,999	31,976,940,296
4/15/08	34	85.400	39.60630098	0.00	1,937,996,381,574	0
1/31/09	34	85.400	39.60630098	0.00	1,937,996,381,574	0
3/3/09	34	85.400	39.60630098	0.00	1,937,996,381,574	0
3/12/09	34	85.400	39.60630098	1.10	1,937,996,381,574	21,317,960,197
4/30/08	35	84.300	40.77119218	0.00	1,994,996,275,150	0
11/16/08	35	84.300	40.77119218	0.50	1,994,996,275,150	9,974,981,376
4/14/08	36	83.800	41.93608339	0.00	2,051,996,168,726	0
1/24/09	36	83.800	41.93608339	0.00	2,051,996,168,726	0
1/25/09	36	83.800	41.93608339	0.00	2,051,996,168,726	0
1/26/09	36	83.800	41.93608339	0.00	2,051,996,168,726	0
1/27/09	36	83.800	41.93608339	0.00	2,051,996,168,726	0
1/28/09	36	83.800	41.93608339	0.00	2,051,996,168,726	0
1/30/09	36	83.800	41.93608339	0.00	2,051,996,168,726	0
2/9/09	36	83.800	41.93608339	0.00	2,051,996,168,726	0
2/10/09	36	83.800	41.93608339	0.00	2,051,996,168,726	0
3/2/09	36	83.800	41.93608339	2.80	2,051,996,168,726	57,455,892,724
4/22/08	37	81.000	43.10097459	0.00	2,108,996,062,301	0
1/22/09	37	81.000	43.10097459	0.00	2,108,996,062,301	0
1/23/09	37	81.000	43.10097459	0.00	2,108,996,062,301	0
1/29/09	37	81.000	43.10097459	0.00	2,108,996,062,301	0
2/8/09	37	81.000	43.10097459	1.40	2,108,996,062,301	29,525,944,872
4/13/08	38	79.600	44.2658658	0.00	2,165,995,955,877	0
12/3/08	38	79.600	44.2658658	0.00	2,165,995,955,877	0
1/21/09	38	79.600	44.2658658	0.00	2,165,995,955,877	0
2/7/09	38	79.600	44.2658658	0.00	2,165,995,955,877	0
2/11/09	38	79.600	44.2658658	0.00	2,165,995,955,877	0
3/1/09	38	79.600	44.2658658	1.60	2,165,995,955,877	34,655,935,294
4/29/08	39	78.000	45.430757	0.30	2,222,995,849,453	6,668,987,548
4/12/08	40	77.700	46.59564821	0.00	2,279,995,743,028	0
1/20/09	40	77.700	46.59564821	0.00	2,279,995,743,028	0
2/28/09	40	77.700	46.59564821	0.90	2,279,995,743,028	20,519,961,687
12/4/08	41	76.800	47.76053941	0.00	2,336,995,636,604	0
12/7/08	41	76.800	47.76053941	0.00	2,336,995,636,604	0
1/17/09	41	76.800	47.76053941	0.00	2,336,995,636,604	0
1/18/09	41	76.800	47.76053941	0.00	2,336,995,636,604	0

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
1/19/09	41	76.800	47.76053941	0.00	2,336,995,636,604	0
2/6/09	41	76.800	47.76053941	0.00	2,336,995,636,604	0
2/26/09	41	76.800	47.76053941	0.00	2,336,995,636,604	0
2/27/09	41	76.800	47.76053941	2.20	2,336,995,636,604	51,413,904,005
4/11/08	42	74.600	48.92543062	0.00	2,393,995,530,180	0
4/18/08	42	74.600	48.92543062	0.00	2,393,995,530,180	0
2/25/09	42	74.600	48.92543062	0.00	2,393,995,530,180	0
4/11/09	42	74.600	48.92543062	0.00	2,393,995,530,180	0
4/12/09	42	74.600	48.92543062	1.30	2,393,995,530,180	31,121,941,892
4/21/08	43	73.300	50.09032182	0.00	2,450,995,423,756	0
1/16/09	43	73.300	50.09032182	0.00	2,450,995,423,756	0
4/10/09	43	73.300	50.09032182	0.90	2,450,995,423,756	22,058,958,814
2/2/09	44	72.400	51.25521303	0.00	2,507,995,317,331	0
2/24/09	44	72.400	51.25521303	0.50	2,507,995,317,331	12,539,976,587
4/10/08	45	71.900	52.42010423	0.00	2,564,995,210,907	0
4/28/08	45	71.900	52.42010423	0.00	2,564,995,210,907	0
1/15/09	45	71.900	52.42010423	0.00	2,564,995,210,907	0
2/12/09	45	71.900	52.42010423	0.00	2,564,995,210,907	0
4/9/09	45	71.900	52.42010423	1.40	2,564,995,210,907	35,909,932,953
4/27/08	46	70.500	53.58499544	0.00	2,621,995,104,483	0
2/23/09	46	70.500	53.58499544	0.60	2,621,995,104,483	15,731,970,627
12/8/07	47	69.900	54.74988664	0.00	2,678,994,998,058	0
12/9/07	47	69.900	54.74988664	0.00	2,678,994,998,058	0
4/8/09	47	69.900	54.74988664	0.80	2,678,994,998,058	21,431,959,984
12/7/07	48	69.100	55.91477785	0.00	2,735,994,891,634	0
12/12/07	48	69.100	55.91477785	0.00	2,735,994,891,634	0
1/14/09	48	69.100	55.91477785	0.80	2,735,994,891,634	21,887,959,133
12/11/07	49	68.300	57.07966905	0.00	2,792,994,785,210	0
12/13/07	49	68.300	57.07966905	0.00	2,792,994,785,210	0
4/9/08	49	68.300	57.07966905	0.00	2,792,994,785,210	0
4/19/08	49	68.300	57.07966905	0.00	2,792,994,785,210	0
12/5/08	49	68.300	57.07966905	0.00	2,792,994,785,210	0
2/5/09	49	68.300	57.07966905	0.00	2,792,994,785,210	0
4/16/09	49	68.300	57.07966905	2.00	2,792,994,785,210	55,859,895,704
2/22/09	50	66.300	58.24456026	0.00	2,849,994,678,786	0
3/24/09	50	66.300	58.24456026	0.50	2,849,994,678,786	14,249,973,394
12/6/07	51	65.800	59.40945146	0.00	2,906,994,572,361	0
12/10/07	51	65.800	59.40945146	0.00	2,906,994,572,361	0
4/4/08	51	65.800	59.40945146	0.00	2,906,994,572,361	0
1/13/09	51	65.800	59.40945146	0.00	2,906,994,572,361	0
4/7/09	51	65.800	59.40945146	0.00	2,906,994,572,361	0
4/27/09	51	65.800	59.40945146	1.70	2,906,994,572,361	49,418,907,730
12/14/07	52	64.100	60.57434267	0.00	2,963,994,465,937	0
1/4/08	52	64.100	60.57434267	0.00	2,963,994,465,937	0
1/5/08	52	64.100	60.57434267	0.00	2,963,994,465,937	0

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
3/30/08	52	64.100	60.57434267	0.00	2,963,994,465,937	0
3/31/08	52	64.100	60.57434267	1.30	2,963,994,465,937	38,531,928,057
1/6/08	53	62.800	61.73923387	0.00	3,020,994,359,513	0
4/3/08	53	62.800	61.73923387	0.00	3,020,994,359,513	0
4/20/08	53	62.800	61.73923387	0.00	3,020,994,359,513	0
4/26/08	53	62.800	61.73923387	0.00	3,020,994,359,513	0
2/13/09	53	62.800	61.73923387	1.40	3,020,994,359,513	42,293,921,033
1/7/08	54	61.400	62.90412508	0.00	3,077,994,253,088	0
1/8/08	54	61.400	62.90412508	0.00	3,077,994,253,088	0
3/26/08	54	61.400	62.90412508	0.00	3,077,994,253,088	0
3/27/08	54	61.400	62.90412508	0.00	3,077,994,253,088	0
3/28/08	54	61.400	62.90412508	0.00	3,077,994,253,088	0
3/29/08	54	61.400	62.90412508	0.00	3,077,994,253,088	0
3/23/09	54	61.400	62.90412508	2.00	3,077,994,253,088	61,559,885,062
12/5/07	55	59.400	64.06901628	0.00	3,134,994,146,664	0
2/21/09	55	59.400	64.06901628	0.50	3,134,994,146,664	15,674,970,733
12/3/07	56	58.900	65.23390749	0.00	3,191,994,040,240	0
12/4/07	56	58.900	65.23390749	0.00	3,191,994,040,240	0
1/3/08	56	58.900	65.23390749	0.00	3,191,994,040,240	0
1/15/08	56	58.900	65.23390749	0.00	3,191,994,040,240	0
4/17/09	56	58.900	65.23390749	0.00	3,191,994,040,240	0
4/26/09	56	58.900	65.23390749	1.70	3,191,994,040,240	54,263,898,684
3/25/08	57	57.200	66.39879869	0.00	3,248,993,933,816	0
1/12/09	57	57.200	66.39879869	0.00	3,248,993,933,816	0
3/25/09	57	57.200	66.39879869	0.00	3,248,993,933,816	0
4/13/09	57	57.200	66.39879869	1.10	3,248,993,933,816	35,738,933,272
12/2/07	58	56.100	67.5636899	0.00	3,305,993,827,391	0
1/9/08	58	56.100	67.5636899	0.00	3,305,993,827,391	0
4/8/08	58	56.100	67.5636899	0.00	3,305,993,827,391	0
12/23/08	58	56.100	67.5636899	1.10	3,305,993,827,391	36,365,932,101
1/12/08	59	55.000	68.7285811	0.00	3,362,993,720,967	0
4/6/09	59	55.000	68.7285811	0.50	3,362,993,720,967	16,814,968,605
12/19/07	60	54.500	69.89347231	0.00	3,419,993,614,543	0
4/1/08	60	54.500	69.89347231	0.00	3,419,993,614,543	0
3/22/09	60	54.500	69.89347231	0.90	3,419,993,614,543	30,779,942,531
1/10/08	62	53.600	72.22325472	0.00	3,533,993,401,694	0
3/24/08	62	53.600	72.22325472	0.00	3,533,993,401,694	0
4/2/08	62	53.600	72.22325472	0.80	3,533,993,401,694	28,271,947,214
1/2/08	63	52.800	73.38814593	0.00	3,590,993,295,270	0
1/13/08	63	52.800	73.38814593	0.00	3,590,993,295,270	0
1/14/08	63	52.800	73.38814593	0.00	3,590,993,295,270	0
4/5/08	63	52.800	73.38814593	0.00	3,590,993,295,270	0
12/6/08	63	52.800	73.38814593	0.00	3,590,993,295,270	0
2/20/09	63	52.800	73.38814593	0.00	3,590,993,295,270	0
4/25/09	63	52.800	73.38814593	1.90	3,590,993,295,270	68,228,872,610

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
12/1/07	64	50.900	74.55303713	0.00	3,647,993,188,846	0
1/11/08	64	50.900	74.55303713	0.00	3,647,993,188,846	0
1/3/09	64	50.900	74.55303713	0.00	3,647,993,188,846	0
1/11/09	64	50.900	74.55303713	1.10	3,647,993,188,846	40,127,925,077
11/15/08	65	49.800	75.71792834	0.30	3,704,993,082,421	11,114,979,247
3/23/08	68	49.500	79.21260195	0.30	3,875,992,763,148	11,627,978,289
1/4/09	69	49.200	80.37749316	0.30	3,932,992,656,724	11,798,977,970
3/21/09	70	48.900	81.54238436	0.00	3,989,992,550,300	0
4/15/09	70	48.900	81.54238436	0.50	3,989,992,550,300	19,949,962,751
11/30/08	71	48.400	82.70727557	0.00	4,046,992,443,876	0
1/2/09	71	48.400	82.70727557	0.00	4,046,992,443,876	0
4/5/09	71	48.400	82.70727557	0.80	4,046,992,443,876	32,375,939,551
2/3/09	72	47.600	83.87216677	0.30	4,103,992,337,451	12,311,977,012
12/15/07	73	47.300	85.03705798	0.30	4,160,992,231,027	12,482,976,693
11/30/07	74	47.000	86.20194918	0.00	4,217,992,124,603	0
12/22/08	74	47.000	86.20194918	0.00	4,217,992,124,603	0
1/10/09	74	47.000	86.20194918	0.00	4,217,992,124,603	0
4/24/09	74	47.000	86.20194918	1.10	4,217,992,124,603	46,397,913,371
1/1/08	75	45.900	87.36684039	0.00	4,274,992,018,178	0
2/4/09	75	45.900	87.36684039	0.50	4,274,992,018,178	21,374,960,091
2/19/09	76	45.400	88.53173159	0.30	4,331,991,911,754	12,995,975,735
3/22/08	77	45.100	89.6966228	0.00	4,388,991,805,330	0
12/2/08	77	45.100	89.6966228	0.60	4,388,991,805,330	26,333,950,832
12/18/07	78	44.500	90.861514	0.30	4,445,991,698,906	13,337,975,097
2/11/08	79	44.200	92.02640521	0.20	4,502,991,592,481	9,005,983,185
3/18/08	82	44.000	95.52107882	0.00	4,673,991,273,208	0
4/2/09	82	44.000	95.52107882	0.60	4,673,991,273,208	28,043,947,639
4/7/08	84	43.400	97.85086123	0.00	4,787,991,060,360	0
1/1/09	84	43.400	97.85086123	0.00	4,787,991,060,360	0
4/4/09	84	43.400	97.85086123	0.80	4,787,991,060,360	38,303,928,483
12/26/07	85	42.600	99.01575244	0.00	4,844,990,953,936	0
3/20/09	85	42.600	99.01575244	0.00	4,844,990,953,936	0
4/3/09	85	42.600	99.01575244	0.80	4,844,990,953,936	38,759,927,631
12/15/08	86	41.800	100.1806436	0.30	4,901,990,847,511	14,705,972,543
4/28/09	87	41.500	101.3455348	0.30	4,958,990,741,087	14,876,972,223
3/2/08	88	41.200	102.5104261	0.00	5,015,990,634,663	0
3/19/08	88	41.200	102.5104261	0.50	5,015,990,634,663	25,079,953,173
12/24/08	89	40.700	103.6753173	0.30	5,072,990,528,238	15,218,971,585
2/12/08	90	40.400	104.8402085	0.30	5,129,990,421,814	15,389,971,265
2/10/08	91	40.100	106.0050997	0.00	5,186,990,315,390	0
3/17/08	91	40.100	106.0050997	0.00	5,186,990,315,390	0
3/21/08	91	40.100	106.0050997	0.00	5,186,990,315,390	0
2/18/09	91	40.100	106.0050997	0.00	5,186,990,315,390	0
4/1/09	91	40.100	106.0050997	1.40	5,186,990,315,390	72,617,864,415
3/1/08	92	38.700	107.1699909	0.30	5,243,990,208,966	15,731,970,627

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
3/3/08	93	38.400	108.3348821	0.00	5,300,990,102,541	0
4/14/09	93	38.400	108.3348821	0.50	5,300,990,102,541	26,504,950,513
3/20/08	94	37.900	109.4997733	0.00	5,357,989,996,117	0
1/9/09	94	37.900	109.4997733	0.60	5,357,989,996,117	32,147,939,977
11/29/07	95	37.300	110.6646645	0.00	5,414,989,889,693	0
12/31/07	95	37.300	110.6646645	0.00	5,414,989,889,693	0
4/23/09	95	37.300	110.6646645	0.80	5,414,989,889,693	43,319,919,118
2/29/08	96	36.500	111.8295557	0.30	5,471,989,783,268	16,415,969,350
11/24/07	98	36.200	114.1593381	0.20	5,585,989,570,420	11,171,979,141
11/22/07	99	36.000	115.3242293	0.00	5,642,989,463,996	0
4/25/08	99	36.000	115.3242293	0.60	5,642,989,463,996	33,857,936,784
2/9/08	102	35.400	118.8189029	0.30	5,813,989,144,723	17,441,967,434
12/21/08	105	35.100	122.3135765	0.00	5,984,988,825,450	0
4/30/09	105	35.100	122.3135765	0.50	5,984,988,825,450	29,924,944,127
12/9/08	107	34.600	124.643359	0.30	6,098,988,612,601	18,296,965,838
2/28/08	108	34.300	125.8082502	0.00	6,155,988,506,177	0
3/16/08	108	34.300	125.8082502	0.50	6,155,988,506,177	30,779,942,531
12/25/07	109	33.800	126.9731414	0.00	6,212,988,399,753	0
4/6/08	109	33.800	126.9731414	0.60	6,212,988,399,753	37,277,930,399
12/31/08	110	33.200	128.1380326	0.30	6,269,988,293,328	18,809,964,880
11/23/07	111	32.900	129.3029238	0.00	6,326,988,186,904	0
12/17/07	111	32.900	129.3029238	0.00	6,326,988,186,904	0
12/27/07	111	32.900	129.3029238	0.80	6,326,988,186,904	50,615,905,495
1/22/08	113	32.100	131.6327062	0.30	6,440,987,974,055	19,322,963,922
11/12/08	114	31.800	132.7975974	0.00	6,497,987,867,631	0
3/19/09	114	31.800	132.7975974	0.50	6,497,987,867,631	32,489,939,338
12/16/08	120	31.300	139.7869446	0.00	6,839,987,229,085	0
3/31/09	120	31.300	139.7869446	0.60	6,839,987,229,085	41,039,923,375
1/23/08	123	30.700	143.2816182	0.30	7,010,986,909,813	21,032,960,729
4/29/09	125	30.400	145.6114006	0.20	7,124,986,696,964	14,249,973,394
2/27/08	126	30.200	146.7762919	0.30	7,181,986,590,540	21,545,959,772
2/8/08	129	29.900	150.2709655	0.00	7,352,986,271,267	0
3/15/08	129	29.900	150.2709655	0.60	7,352,986,271,267	44,117,917,628
1/8/09	134	29.300	156.0954215	0.20	7,637,985,739,145	15,275,971,478
2/15/08	137	29.100	159.5900951	0.30	7,808,985,419,873	23,426,956,260
12/16/07	138	28.800	160.7549863	0.30	7,865,985,313,448	23,597,955,940
11/18/07	139	28.500	161.9198775	0.00	7,922,985,207,024	0
12/14/08	139	28.500	161.9198775	0.50	7,922,985,207,024	39,614,926,035
2/17/09	142	28.000	165.4145511	0.30	8,093,984,887,751	24,281,954,663
12/30/07	144	27.700	167.7443335	0.30	8,207,984,674,903	24,623,954,025
12/29/07	146	27.400	170.074116	0.00	8,321,984,462,054	0
12/27/08	146	27.400	170.074116	0.60	8,321,984,462,054	49,931,906,772
2/26/08	147	26.800	171.2390072	0.20	8,378,984,355,630	16,757,968,711
11/25/07	149	26.600	173.5687896	0.00	8,492,984,142,781	0
12/28/07	149	26.600	173.5687896	0.00	8,492,984,142,781	0

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
2/5/08	149	26.600	173.5687896	0.90	8,492,984,142,781	76,436,857,285
11/21/07	151	25.700	175.898572	0.20	8,606,983,929,933	17,213,967,860
3/6/08	153	25.500	178.2283544	0.30	8,720,983,717,084	26,162,951,151
3/10/08	154	25.200	179.3932456	0.30	8,777,983,610,660	26,333,950,832
1/5/09	157	24.900	182.8879192	0.30	8,948,983,291,387	26,846,949,874
12/24/07	161	24.600	187.547484	0.00	9,176,982,865,690	0
2/4/08	161	24.600	187.547484	0.50	9,176,982,865,690	45,884,914,328
11/14/08	163	24.100	189.8772664	0.30	9,290,982,652,841	27,872,947,959
3/14/08	164	23.800	191.0421576	0.30	9,347,982,546,417	28,043,947,639
1/29/08	168	23.500	195.7017225	0.00	9,575,982,120,720	0
12/18/08	168	23.500	195.7017225	0.50	9,575,982,120,720	47,879,910,604
1/16/08	175	23.000	203.8559609	0.30	9,974,981,375,750	29,924,944,127
12/20/08	176	22.700	205.0208521	0.30	10,031,981,269,325	30,095,943,808
12/17/08	186	22.400	216.6697642	0.30	10,601,980,205,083	31,805,940,615
3/9/08	187	22.100	217.8346554	0.20	10,658,980,098,658	21,317,960,197
11/13/08	194	21.900	225.9888938	0.30	11,057,979,353,688	33,173,938,061
3/13/09	195	21.600	227.153785	0.30	11,114,979,247,264	33,344,937,742
1/7/09	196	21.300	228.3186762	0.30	11,171,979,140,840	33,515,937,423
1/19/08	198	21.000	230.6484586	0.00	11,285,978,927,991	0
4/23/08	198	21.000	230.6484586	0.50	11,285,978,927,991	56,429,894,640
2/25/08	199	20.500	231.8133498	0.30	11,342,978,821,567	34,028,936,465
1/21/08	200	20.200	232.978241	0.30	11,399,978,715,143	34,199,936,145
12/30/08	207	19.900	241.1324795	0.20	11,798,977,970,172	23,597,955,940
1/6/09	211	19.700	245.7920443	0.30	12,026,977,544,475	36,080,932,633
12/19/08	215	19.400	250.4516091	0.30	12,254,977,118,778	36,764,931,356
12/1/08	219	19.100	255.1111739	0.30	12,482,976,693,081	37,448,930,079
4/22/09	227	18.800	264.4303036	0.20	12,938,975,841,687	25,877,951,683
2/7/08	228	18.600	265.5951948	0.30	12,995,975,735,262	38,987,927,206
11/28/07	231	18.300	269.0898684	0.30	13,166,975,415,990	39,500,926,248
12/26/08	232	18.000	270.2547596	0.30	13,223,975,309,565	39,671,925,929
12/25/08	234	17.700	272.584542	0.20	13,337,975,096,717	26,675,950,193
3/18/09	235	17.500	273.7494332	0.30	13,394,974,990,292	40,184,924,971
12/20/07	237	17.200	276.0792156	0.30	13,508,974,777,444	40,526,924,332
12/23/07	244	16.900	284.2334541	0.30	13,907,974,032,474	41,723,922,097
2/3/08	247	16.600	287.7281277	0.30	14,078,973,713,201	42,236,921,140
1/18/08	249	16.300	290.0579101	0.00	14,192,973,500,352	0
2/14/08	249	16.300	290.0579101	0.50	14,192,973,500,352	70,964,867,502
3/7/08	250	15.800	291.2228013	0.30	14,249,973,393,928	42,749,920,182
1/30/08	258	15.500	300.5419309	0.30	14,705,972,542,534	44,117,917,628
2/6/08	259	15.200	301.7068221	0.20	14,762,972,436,110	29,525,944,872
2/13/08	260	15.000	302.8717133	0.30	14,819,972,329,685	44,459,916,989
4/24/08	271	14.700	315.6855166	0.30	15,446,971,159,018	46,340,913,477
3/4/08	282	14.400	328.4993199	0.30	16,073,969,988,351	48,221,909,965
3/5/08	288	14.100	335.4886671	0.20	16,415,969,349,805	32,831,938,700
3/8/08	292	13.900	340.1482319	0.30	16,643,968,924,108	49,931,906,772

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
1/28/08	300	13.600	349.4673615	0.30	17,099,968,072,714	51,299,904,218
1/20/08	313	13.300	364.6109472	0.30	17,840,966,689,198	53,522,900,068
2/21/08	316	13.000	368.1056208	0.20	18,011,966,369,925	36,023,932,740
1/31/08	326	12.800	379.7545329	0.30	18,581,965,305,682	55,745,895,917
11/20/07	336	12.500	391.4034449	0.30	19,151,964,241,439	57,455,892,724
1/24/08	350	12.200	407.7119218	0.30	19,949,962,751,499	59,849,888,254
12/22/07	357	11.900	415.8661602	0.20	20,348,962,006,529	40,697,924,013
2/16/09	366	11.700	426.3501811	0.30	20,861,961,048,711	62,585,883,146
11/19/07	374	11.400	435.6693107	0.30	21,317,960,197,316	63,953,880,592
2/20/08	386	11.100	449.6480052	0.30	22,001,958,920,225	66,005,876,761
12/28/08	405	10.800	471.7809381	0.30	23,084,956,898,164	69,254,870,694
12/29/08	406	10.500	472.9458293	0.20	23,141,956,791,739	46,283,913,583
1/17/08	414	10.300	482.2649589	0.30	23,597,955,940,345	70,793,867,821
3/30/09	417	10.000	485.7596326	0.30	23,768,955,621,072	71,306,866,863
12/21/07	431	9.700	502.0681094	0.30	24,566,954,131,132	73,700,862,393
1/25/08	444	9.400	517.2116951	0.20	25,307,952,747,616	50,615,905,495
3/13/08	451	9.200	525.3659335	0.30	25,706,952,002,646	77,120,856,008
2/14/09	456	8.900	531.1903896	0.30	25,991,951,470,525	77,975,854,412
11/26/07	486	8.600	566.1371257	0.30	27,701,948,277,796	83,105,844,833
11/27/07	490	8.300	570.7966905	0.20	27,929,947,852,099	55,859,895,704
1/26/08	491	8.100	571.9615817	0.30	27,986,947,745,675	83,960,843,237
12/13/08	496	7.800	577.7860378	0.30	28,271,947,213,553	84,815,841,641
3/26/09	504	7.500	587.1051674	0.30	28,727,946,362,159	86,183,839,086
1/27/08	527	7.200	613.8976651	0.20	30,038,943,914,400	60,077,887,829
2/22/08	535	7.000	623.2167948	0.30	30,494,943,063,006	91,484,829,189
3/14/09	610	6.700	710.5836352	0.30	34,769,935,081,185	104,309,805,244
2/24/08	616	6.400	717.5729824	0.30	35,111,934,442,639	105,335,803,328
3/17/09	675	6.100	786.3015635	0.20	38,474,928,163,606	76,949,856,327
2/2/08	678	5.900	789.7962371	0.30	38,645,927,844,333	115,937,783,533
2/23/08	691	5.600	804.9398228	0.30	39,386,926,460,817	118,160,779,382
3/11/08	709	5.300	825.9078645	0.30	40,412,924,545,180	121,238,773,636
4/18/09	718	5.000	836.3918853	0.30	40,925,923,587,361	122,777,770,762
3/29/09	741	4.700	863.184383	0.20	42,236,921,139,603	84,473,842,279
2/15/09	757	4.500	881.8226423	0.30	43,148,919,436,814	129,446,758,310
3/15/09	814	4.200	948.221441	0.30	46,397,913,370,630	139,193,740,112
2/1/08	819	3.900	954.045897	0.30	46,682,912,838,508	140,048,738,516
3/16/09	852	3.600	992.4873068	0.20	48,563,909,326,507	97,127,818,653
3/12/08	869	3.400	1012.290457	0.30	49,532,907,517,294	148,598,722,552
12/10/08	914	3.100	1064.710562	0.30	52,097,902,728,201	156,293,708,185
3/28/09	1040	2.800	1211.486853	0.30	59,279,889,318,741	177,839,667,956
12/12/08	1060	2.500	1234.784677	0.00	60,419,887,190,255	0
3/27/09	1060	2.500	1234.784677	0.50	60,419,887,190,255	302,099,435,951
4/21/09	1080	2.000	1258.082502	0.30	61,559,885,061,769	184,679,655,185
2/16/08	1150	1.700	1339.624886	0.30	65,549,877,612,069	196,649,632,836
12/11/08	1190	1.400	1386.220534	0.20	67,829,873,355,098	135,659,746,710

Date	Observed flow (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin (cfs)	Width for area under curves (%)	Allowable load to meet standard (MPN/day)	Area under TMDL curve (MPN/day)
2/19/08	1320	1.200	1537.656391	0.30	75,239,859,519,940	225,719,578,560
4/20/09	2210	0.900	2574.409563	0.30	125,969,764,802,324	377,909,294,407
4/19/09	2250	0.600	2621.005212	0.30	128,249,760,545,353	384,749,281,636
2/18/08	3380	0.300	3937.332273	0.30	192,659,640,285,908	577,978,920,858
2/17/08	4990	0.000	5812.807114	0.00	284,429,468,942,804	0