Indian Bayou
(Subsegment 030805), Louisiana,
Final TMDL for Fecal Coliform

Prepared for:

Louisiana Department of Environmental Quality, Water Quality Assessment Division,
Total Maximum Daily Load Program

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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 Indian Bayou, which is in the Calcasieu River Basin in southwestern Louisiana. Indian Bayou flows for 15 miles from the headwaters to the West Fork Calcasieu River.

The fecal coliform TMDL for Indian Bayou 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 Indian Bayou are 90 percent during the winter and 89 percent in the summer (Table ES-1).

Table ES-1. Summary of fecal coliform bacteria TMDL for Indian Bayou

Season	TMDL (MPN/day)	WLA (MPN/day)	LA (MPN/day)	Explicit MOS (MPN/day)	Percent reduction
Winter	3.60E+12	2.33E+11	2.64E+12	7.19E+11	90%
Summer	1.86E+11	1.75E+10	1.31E+11	3.71E+10	89%

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 Indian Bayou, which is in the Calcasieu River Basin in southwestern Louisiana (Figure 1-1). Indian Bayou flows for 15 miles from the headwaters to the West Fork Calcasieu River.

Indian Bayou was identified as not supporting its designated use of fish and wildlife propagation on the state's 2000 and 2002section 303(d) list of impaired waterbodies and the state's 2004 *Louisiana Water Quality Inventory: Integrated Report* (*Integrated Report*) because of dissolved oxygen and organic enrichment from hydromodification (flow alterations from water diversions), agriculture (irrigated and non-irrigated crop production), and natural sources (water quality standards use attainability analyses needed) (LDEQ 2001, 2003a, 2005). The state's 2006 and draft 2008 *Integrated Reports* continue to list dissolved oxygen but also show subsegment 030805 as not supporting its designated use of primary contact recreation because of fecal coliform bacteria from on-site treatment systems (septic systems and similar decentralized systems) and unpermitted discharges (domestic wastes) (LDEQ 2007a, 2008). The draft 2008 *Integrated Report* also shows Indian Bayou as not supporting its designated use of secondary contact recreation because of fecal coliform bacteria from on-site treatment systems (septic systems and similar decentralized systems) and unpermitted discharges (domestic wastes) (LDEQ 2008). Fecal coliform data from 2008 support the current use impairment listings for primary contact recreation and secondary contact recreation for Indian Bayou.

The fecal coliform TMDL for Indian Bayou 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.

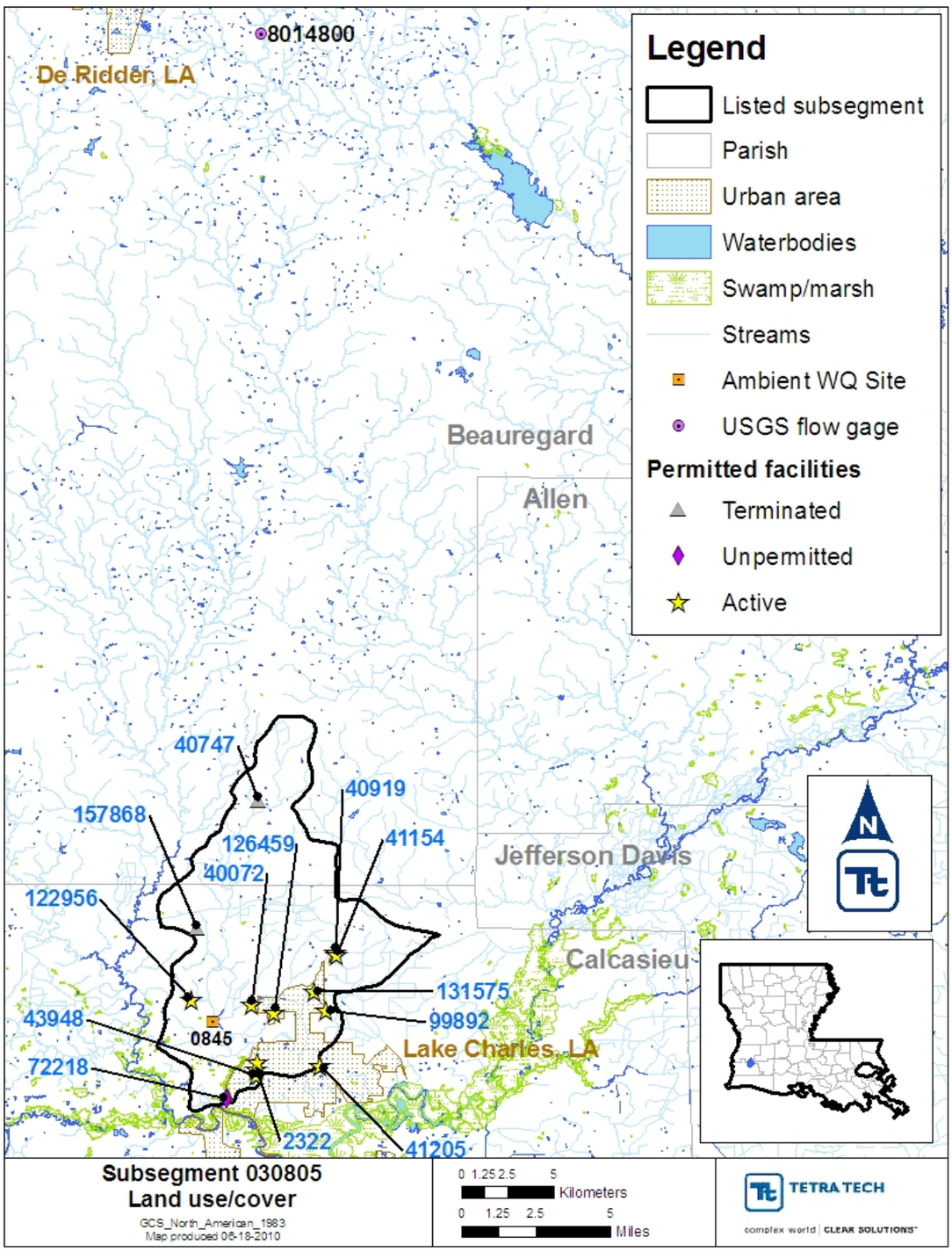

Figure 1-1. Indian Bayou (subsegment 030805) location and monitoring.

2. Study Area Description

2.1 Calcasieu River Basin— Indian Bayou

This fecal coliform TMDL has been developed for Indian Bayou, which is in the Calcasieu River Basin in southwestern Louisiana (Figure 1-1). Indian Bayou flows for 15 miles from the headwaters to the West Fork Calcasieu River. The Calcasieu River Basin is in southwest Louisiana and is positioned in a north-south direction between the Mermentau and Sabine rivers. The drainage area of the Calcasieu Basin comprises 3,910 square miles. The headwaters of the Calcasieu River are in the hills west of Alexandria, Louisiana. The Calcasieu River flows south for 160 miles to the Gulf of Mexico. The mouth of the river is 30 miles east of the Texas-Louisiana state line. The landscape in this basin varies from pine-forested hills in the upper end to brackish and salt marshes in the lower reaches around Calcasieu Lake; the basin also includes the city of Lake Charles (LDEQ 2003b).

Indian Bayou watershed includes 32,574 acres of Beauregard and Calcasieu parishes in the central portion of the Calcasieu River Basin. Indian Bayou from its headwaters to its confluence with the West Fork Calcasieu River constitutes the main stem of the watershed; Hickory Branch Canal, Little Indian Bayou, and several other unnamed tributaries contribute intermittent flow. The average annual precipitation in the segment is 62 inches, based on a 30-year record from the nearest Louisiana Climatic Station in Lake Charles (LDEQ 2003b.)

Indian Bayou lies in the Western Gulf Coastal Plain Ecoregion (WGCPE) of southwest Louisiana. The WGCPE is rich in plant species and communities, which include glades, barrens, bogs, outcrops, swamps, prairies, savannas, and pine and hardwood forests. An impermeable clay layer beneath shallow soil is common in the area, and it helped to maintain the treeless plains that historically covered the region. The clay layer prevents percolation of water through the soil, allowing water to stand during the wet season and support the extensive rice fields in the region. Trees are prevalent along stream margins where breaks in the clay layer allow them to grow (LDEQ 2003b).

The draft 2008 *Integrated Report* shows the primary contact recreation and secondary contact recreation designated uses as not being supported and fecal coliform listed as the reason for the impairment of this subsegment. The sources are listed as on-site treatment systems (septic systems and similar decentralized systems) and unpermitted discharges (domestic wastes) (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 more precise rendering of spatial boundaries between the 16 classes than those obtained using NLCD 1992 (USEPA 2007).

Table 2-1. Subsegment 030805 land use (NLCD 2001)

Land use	Percent
Open water	0.19%
Developed	18.41%
Barren land	0.09%
Forest	20.95%
Grass/shrub	14.27%
Pasture/hay	20.51%
Cultivated crops	13.37%
Woody wetlands	12.08%
Emergent herbaceous wetlands	0.14%

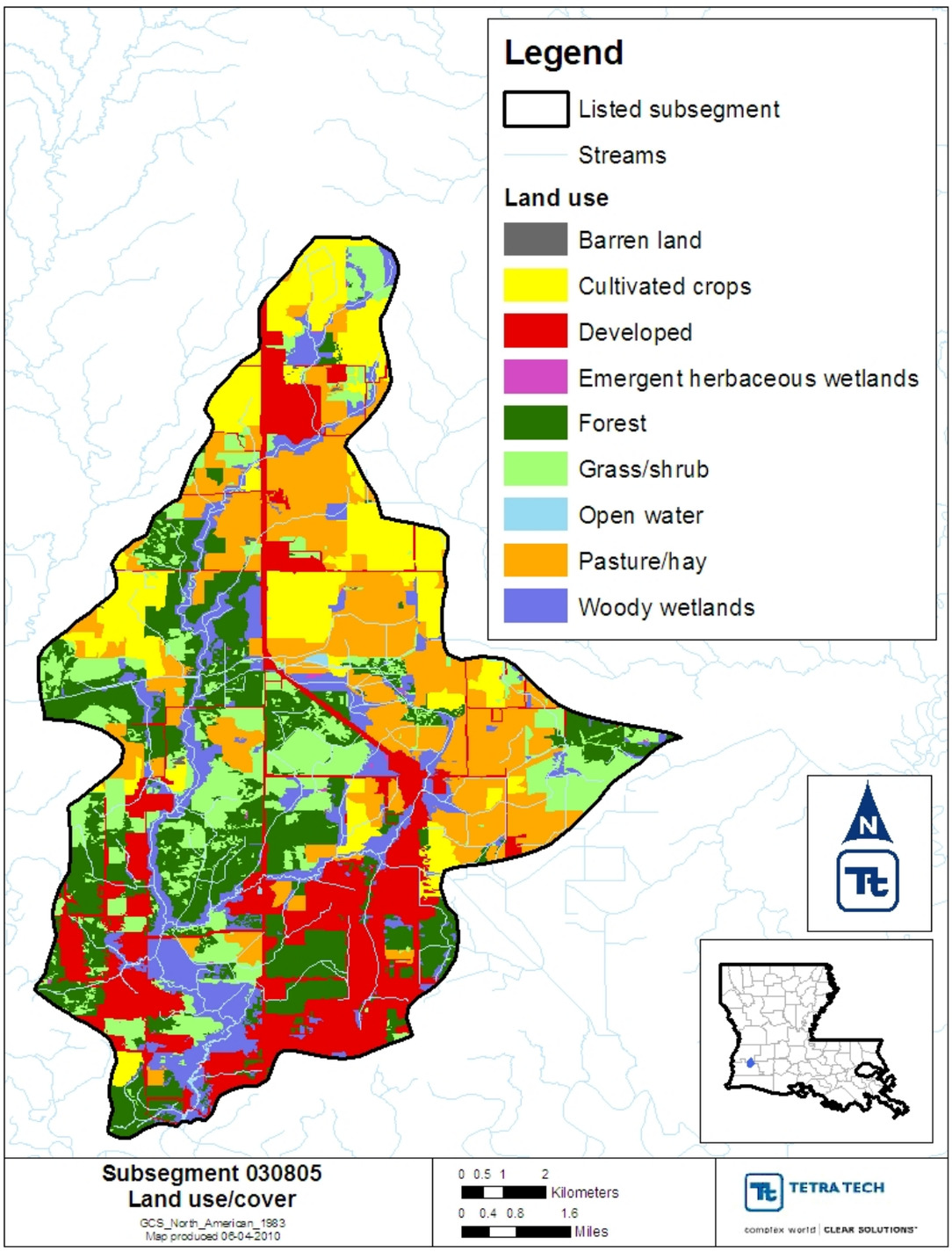

Figure 2-1. Land use in Indian Bayou (subsegment 030805).

2.2 Water Quality Data

One water quality station in Indian Bayou has fecal coliform data. Station 845 (Indian Bayou at Moss Bluff, Louisiana) had 11 fecal coliform observations collected in 2007 and 2008. Two fecal coliform observations collected at station 845 exceeded the water quality criterion for primary contact recreation; the exceedances occurred in May and July. Two fecal coliform observations collected at station 845 exceeded the water quality criterion for secondary contact recreation; the exceedances occurred in February and March. Of the water quality samples collected after 2005, 18.2 percent exceeded the water quality criterion for primary contact recreation and secondary contact recreation on Indian Bayou at Moss Bluff, Louisiana. Appendix A contains the raw water quality data.

The fecal coliform data were plotted over time for subsegment 030805 (Figure 2-2). No distinct seasonal trends or patterns can be seen in the water quality data.

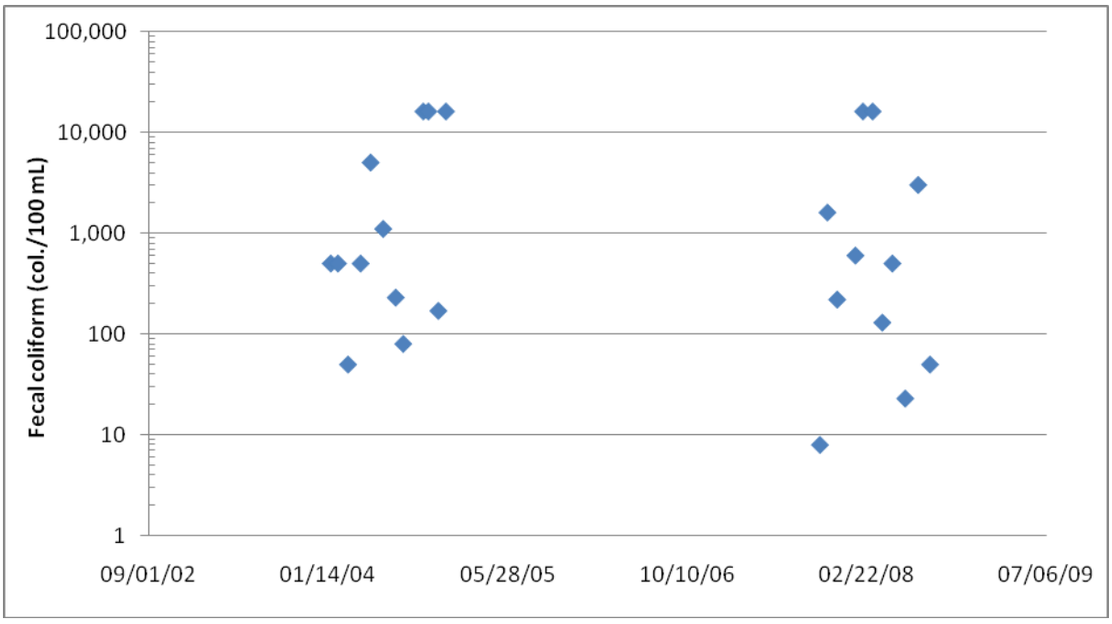

Figure 2-2. Fecal coliform data at station 845.

2.3 Water Quality Standards and Criteria

The designated uses for subsegment 030805 are primary contact recreation, secondary contact recreation, propagation of fish and wildlife, and agriculture. 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 are 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's) 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 non-recreational 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

Subsegment 030805 has no active U.S. Geological Survey (USGS) flow-monitoring gages or other known flow gages. Flow for Indian Bayou was calculated on the basis of the USGS station at Bundick Creek near DeRidder, Louisiana (08014800). Information from the USGS gage is summarized in Table 2-2. Flow at this gage 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)
08014800	Bundick Creek near DeRidder, LA	120.0	03/01/1956	10/20/2009	10	158.14	7,980

2.5 Identification of Sources

Louisiana's draft 2008 *Integrated Report* states that the suspected nonpoint sources of the fecal coliform bacteria impairment in Indian Bayou, subsegment 030805, are on-site treatment systems (septic systems and similar decentralized systems) and unpermitted discharges (domestic wastes) (LDEQ 2008).

Overflows in sanitary sewer lines or major upsets at wastewater treatment plants can be related to poor maintenance in collection system interceptor lines (infiltration and inflow or line clogging), equipment failures at lift stations, or inadequate pretreatment programs (LDEQ 2005). Municipal point sources include pollution introduced from end-of-pipe discharges from publicly owned treatment works.

Information on point source dischargers in the subsegment was obtained from LDEQ files. According to the LDEQ discharger database, 14 active permitted facilities discharge to Indian Bayou (Table 2-3). In addition, there are two facilities with terminated permits.

Table 2-3. Summary of LPDES permits in subsegment 030805

AI #	Permit #	Outfall	Facility name	Exp. date	Facility type	Outfall type	Receiving waterbody
99892	LAG380067	001	Calcasieu Parish Waterworks Treatment District #1 - Plant B	12/17/09	Electric, Gas, and Sanitary Services	treated sanitary wastewater	local drainage to Little Indian Bayou to Calcasieu River
2322	LAG530059	001	Beauregard Electric Coop	11/08/12	General Agency Interest	treated sanitary wastewater	unnamed ditch to Indian Bayou to West Fork Calcasieu River to Calcasieu River
42033	LAG530278	001	Kelly Park	11/08/12	General Agency Interest	treated sanitary wastewater	local drainage to Indian Bayou to West Fork Calcasieu River to Calcasieu River
43948	LAG530609	001	Westside Townhomes	11/08/12	General Agency Interest	treated sanitary wastewater	
126459	LAG531966	001	Ward 1 Fire Protection District 1 Station 5	11/08/12	Municipal Agency	treated sanitary wastewater	roadside ditch, unnamed coulee, to Little Indian Bayou
40919	LAG540208	001	Gillis Elementary School	06/05/13	Educational Services	treated sanitary wastewater	unnamed ditch into Indian Bayou
41205	LAG540260	001/002	Pin Oak Mobile Home Park of Moss Bluff Louisiana LLC - Pin Oak Mobile Home Park	06/05/13	Hotels, Camps, and Other Lodging Places	treated sanitary wastewater	West Fork Calcasieu River
122956	LAG541303	001	Pine Brook Estates	07/01/13	Electric, Gas, and Sanitary Services	treated sanitary wastewater	parish drainage ditch, to Indian Bayou, to Calcasieu River
131575	LAG541502	001	LA Bluff Mobile Home Park	07/01/13	Real Estate	treated sanitary wastewater	unnamed creek, to Goldsmith canal, to Little Indian Bayou to Indian Bayou to Calcasieu River
41154	LAG560003	001	Country Oaks Mobile Home Park	06/01/14	General Agency Interest	treated sanitary wastewater	Indian Bayou to Calcasieu River
40072	LAG780005	001	Chaney Trucking & Equipment Rental - Dirt Pit & Woodwaste Disposal	10/01/12	Electric, Gas, and Sanitary Services	stormwater from construction	Little Indian Bayou
108479			Lake Charles				Calcasieu River, Calcasieu River Ship Channel, Lake Charles, Prien Lake, Contraband Bayou, Bayou Verdine, West Fork Calcasieu River, Bayou d'Inde, English Bayou
108485	LAR041019		Calcasieu Parish Police Jury	12/05/12	MS4	MS4	
72218	LAU004298		Parkside Marina LLC	n/a[a]	Hotels, Camps, and Other Lodging Places	sanitary wastewater	Indian Bayou
157868	LAR10F105		Lawrence Fabacher Property	Terminated	Nonclassifiable Establishments		
40747	LAG530064		Beauregard Fire Protection District #2 Meadow Village Station #4	Terminated	General Agency Interest		

[a] n/a = not applicable. This facility was not permitted as of the TMDL publish date. Research indicates this facility does discharge sanitary wastewater to waters of the State of Louisiana. Therefore a permit is required and an allocation for fecal coliform is being provided as a part of this TMDL.

Phase I stormwater systems are a possible point source contributor in the Calcasieu River Basin. Stormwater discharges are generated by runoff from urban land and impervious areas such as paved streets, parking lots, and rooftops during precipitation events. These discharges often contain high

concentrations of pollutants that can eventually enter nearby waterbodies. Most stormwater discharges are considered point sources and require coverage by a Louisiana Pollutant Discharge Elimination System (LPDES) permit.

Under the LPDES stormwater program, operators of large, medium, and regulated small municipal separate storm sewer systems (MS4s) must obtain authorization to discharge pollutants. The Stormwater Phase I Rule (55 *Federal Register* 47990, November 16, 1990) requires all operators of medium and large MS4s to obtain an LPDES permit and develop a stormwater management program. Medium and large MS4s are defined by the size of the population within the MS4 area, not including the population served by combined sewer systems. A medium MS4 has a population between 100,000 and 249,999. A large MS4 has a population of 250,000 or more.

Calcasieu Parish and the city of Lake Charles are regulated as a MS4 as permit number LAR041019 (AI# 108479 and 108485). The permit covers Lake Charles and the Lake Charles Urban Area, including Westlake, Sulphur, and Calcasieu Parish. The MS4 discharges to Calcasieu River, Calcasieu River Ship Channel, Lake Charles, Prien Lake, Contraband Bayou, Bayou Verdine, West Fork Calcasieu River, Bayou d'Inde, and English Bayou. The urban area associated with the MS4, within the subsegment, is 4.02 square miles.

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 TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established and thereby provide 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 the 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 the impaired subsegments in Indian Bayou subsegment 030805 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 the 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 030805. Detailed flow information for subsegment 030805 was not available. To determine flow, data from a nearby USGS gage (08014800), with a drainage are 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 030805 has an area of 51 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.

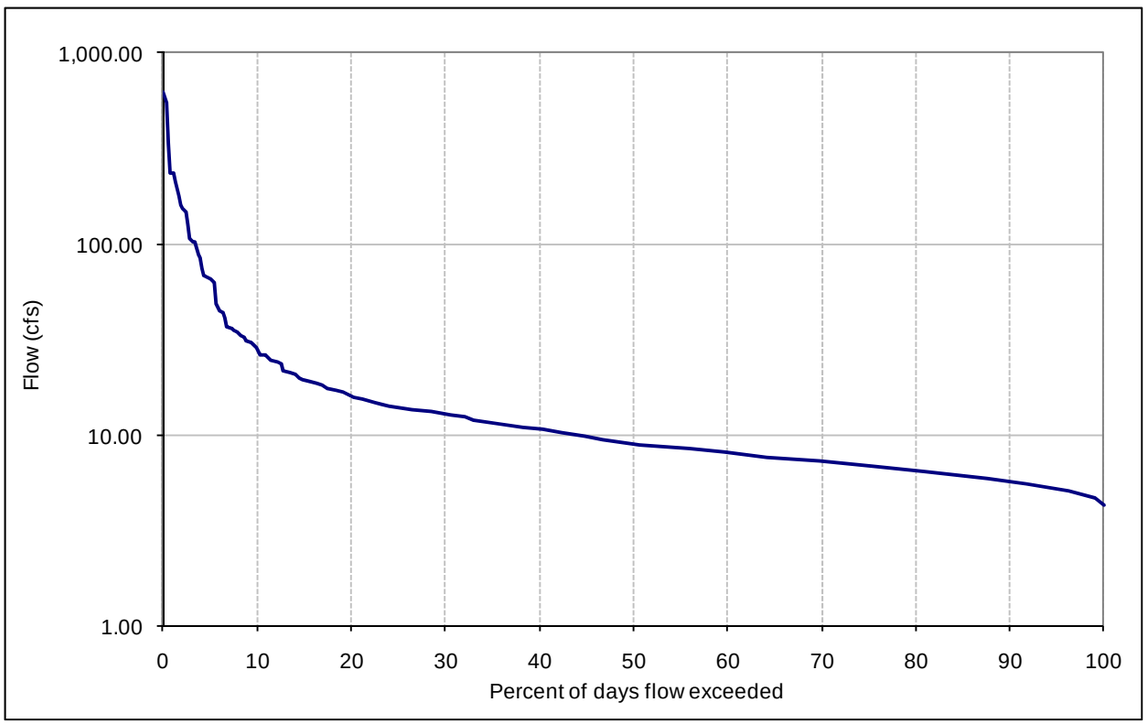

Figure 3-1. Summer flow duration curve for gage 08014800.

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 load duration curve is beneficial when analyzing monitoring data with their corresponding flow information plotted as a load. That 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 approach 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 exceeded 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 TMDL and allocations for subsegment 030805. Only observed data from 2005 and after were used in this TMDL. The reductions for fecal coliform bacteria at the monitoring station on Indian Bayou are 90 percent during the winter and 89 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 Indian Bayou

Season	TMDL (MPN/day)	WLA (MPN/day)	LA (MPN/day)	Explicit MOS (MPN/day)	Percent reduction
Winter	3.60E+12	2.33E+11	2.64E+12	7.19E+11	90%
Summer	1.86E+11	1.75E+10	1.31E+11	3.71E+10	89%

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 030805 include sanitary wastewater and 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.

The equation for WLA calculation is:

Flow (gallon/day) × concentration (MPN/100 mL) × 3,785.412 mL/gallon = load (MPN/day).

Table 3-2. WLA summary for subsegment 030805

AI #	Permit #	Outfall	Facility name	Outfall type	Flow type	Flow (gpd)	FCB limit type[1]	Limit (MPN/100 mL)	Load (MPN/d)
99892	LAG380067	001	Calcasieu Parish Waterworks Treatment District #1 - Plant B	treated sanitary wastewater	DMR average	365,000	weekly ave.	400	5.53E+09
							monthly ave.	none	
2322	LAG530059	001	Beauregard Electric Coop	treated sanitary wastewater	DMR average	1,080	weekly ave.	400	1.64E+07
							monthly ave.	200	8.18E+06
42033	LAG530278	001	Kelly Park	treated sanitary wastewater	DMR average	1,018	weekly ave.	400	1.54E+07
							monthly ave.	200	7.71E+06
43948	LAG530609	001	Westside Townhomes	treated sanitary wastewater	30-day max	2,700	weekly ave.	400	4.09E+07
							monthly ave.	200	2.04E+07
126459	LAG531966	001	Ward 1 Fire Protection District 1 Station 5	treated sanitary wastewater	expected	500	weekly ave.	400	7.57E+06
							monthly ave.	200	3.79E+06
40919	LAG540208	001	Gillis Elementary School	treated sanitary wastewater	30-day max	16,228	weekly ave.	400	2.46E+08
							monthly ave.	200	1.23E+08
41205	LAG540260	001/002	Pin Oak Mobile Home Park of Moss Bluff Louisiana LLC - Pin Oak Mobile Home Park	treated sanitary wastewater	DMR average	8,020	weekly ave.	400	1.21E+08
							monthly ave.	200	6.07E+07
122956	LAG541303	001	Pine Brook Estates	treated sanitary wastewater	expected	6,060	weekly ave.	400	9.18E+07
							monthly ave.	200	4.59E+07
131575	LAG541502	001	LA Bluff Mobile Home Park	treated sanitary wastewater	expected	21,000	weekly ave.	400	3.18E+08
							monthly ave.	200	1.59E+08
41154	LAG560003	001	Country Oaks Mobile Home Park	treated sanitary wastewater	expected	40,500	weekly ave.	400	6.13E+08
							monthly ave.	200	3.07E+08
40072	LAG780005	001	Chaney Trucking & Equipment Rental - Dirt Pit & Woodwaste Disposal	stormwater from construction	DMR average	150	weekly ave.	400	2.27E+06
							monthly ave.	none	
108479	LAR041019		Lake Charles	MS4	Not avail.		none		See Table 3-3
108485			Calcasieu Parish Police Jury						
72218	LAU004298		Parkside Marina LLC		expected	3,500	weekly ave.	400	5.30E+07
							monthly ave.	200	2.65E+07

[1] Individual WLAs are calculated using the most stringent limit. Other limits and loads are presented for the reader's information only.

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.

EPA's stormwater permitting regulations require municipalities to obtain permit coverage for all stormwater discharges from MS4s. For the MS4 in the basin, a gross MS4 load was computed by multiplying the ratio of the MS4 urban area in the subsegment to the subsegment area and the TMDL minus the MOS and the WLAs from Table 3-2. The computed MS4 load (Table 3-3) was included as a WLA component of the TMDL because although MS4s are permitted dischargers, they function similarly to nonpoint sources through storm-driven processes. Note that these values in Table 3-3 are estimates that can be refined in the future as more information about the MS4s and land use-specific loadings information becomes available. These loadings are not intended to be used to establish permit limits. Note also that the MS4 loads presented reflect only that portion of the MS4 in the subsegment because part of the MS4 area extends outside the subsegment.

Table 3-3. Fecal coliform bacteria WLAs for the MS4

AI #	LPDES number	Urban area	MS4 urban area (square miles)	Season	Load (MPN/d)
108479/108485	LAR041019	Lake Charles/ Calcasieu Parish Police Jury	4.02	Winter	2.27E+11
				Summer	1.12E+10

Notes: MPN = most probable number.

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 (including the MS4 loading) and MOS from the total TMDL. The final LA was calculated after the MS4 was determined. LAs were not allocated to separate nonpoint sources because of a 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 shown 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 located 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. Indian Bayou was monitored with the Calcasieu River Basin in 1999, 2004, 2005, 2008, and 2009. Fecal coliform data appear to have been collected in 1999, 2004, 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.

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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
Indian Bayou at Moss Bluff, Louisiana	845	1/26/99	170	
Indian Bayou at Moss Bluff, Louisiana	845	2/23/99	170	
Indian Bayou at Moss Bluff, Louisiana	845	3/23/99	240	
Indian Bayou at Moss Bluff, Louisiana	845	4/28/99	80	
Indian Bayou at Moss Bluff, Louisiana	845	5/25/99	300	
Indian Bayou at Moss Bluff, Louisiana	845	6/22/99	900	PCR
Indian Bayou at Moss Bluff, Louisiana	845	7/27/99	80	
Indian Bayou at Moss Bluff, Louisiana	845	8/24/99	60	
Indian Bayou at Moss Bluff, Louisiana	845	9/28/99	80	
Indian Bayou at Moss Bluff, Louisiana	845	10/26/99	170	
Indian Bayou at Moss Bluff, Louisiana	845	11/23/99	300	
Indian Bayou at Moss Bluff, Louisiana	845	12/1/99	130	
Indian Bayou at Moss Bluff, Louisiana	845	1/21/04	500	
Indian Bayou at Moss Bluff, Louisiana	845	2/10/04	500	
Indian Bayou at Moss Bluff, Louisiana	845	3/9/04	50	
Indian Bayou at Moss Bluff, Louisiana	845	4/13/04	500	
Indian Bayou at Moss Bluff, Louisiana	845	5/11/04	5,000	PCR
Indian Bayou at Moss Bluff, Louisiana	845	6/15/04	1,100	PCR
Indian Bayou at Moss Bluff, Louisiana	845	7/20/04	230	
Indian Bayou at Moss Bluff, Louisiana	845	8/10/04	80	
Indian Bayou at Moss Bluff, Louisiana	845	10/5/04	16,000	PCR
Indian Bayou at Moss Bluff, Louisiana	845	10/19/04	16,000	PCR
Indian Bayou at Moss Bluff, Louisiana	845	11/16/04	170	
Indian Bayou at Moss Bluff, Louisiana	845	12/7/04	16,000	SCR
Indian Bayou at Moss Bluff, Louisiana	845	10/16/07	8	
Indian Bayou at Moss Bluff, Louisiana	845	11/6/07	1,600	
Indian Bayou at Moss Bluff, Louisiana	845	12/3/07	220	
Indian Bayou at Moss Bluff, Louisiana	845	1/23/08	600	
Indian Bayou at Moss Bluff, Louisiana	845	2/13/08	16,000	SCR
Indian Bayou at Moss Bluff, Louisiana	845	3/11/08	16,000	SCR
Indian Bayou at Moss Bluff, Louisiana	845	4/7/08	130	
Indian Bayou at Moss Bluff, Louisiana	845	5/5/08	500	PCR
Indian Bayou at Moss Bluff, Louisiana	845	6/10/08	23	
Indian Bayou at Moss Bluff, Louisiana	845	7/16/08	3,000	PCR
Indian Bayou at Moss Bluff, Louisiana	845	8/18/08	50	

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

Table A-2. Fecal coliform summary statistics for station 845

Statistic	Value[a]
Minimum (MPN/100 mL)	8
Maximum (MPN/100 mL)	16,000
Average (MPN/100 mL)	3,466.5
Count	11
Percentage of data that violate the PCR criterion	18.2
Percentage of data that violate the SCR criterion	18.2

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

Appendix B. Load Duration Curve Plots

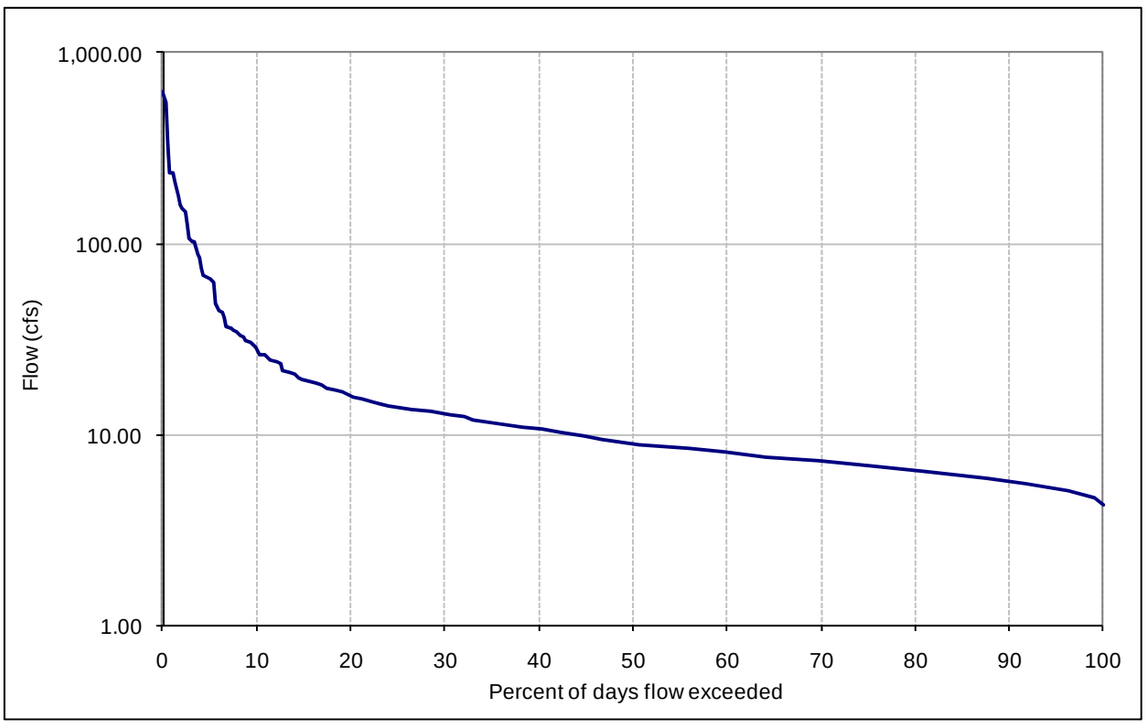

Figure B-1. Summer flow duration curve for gage 08014800.

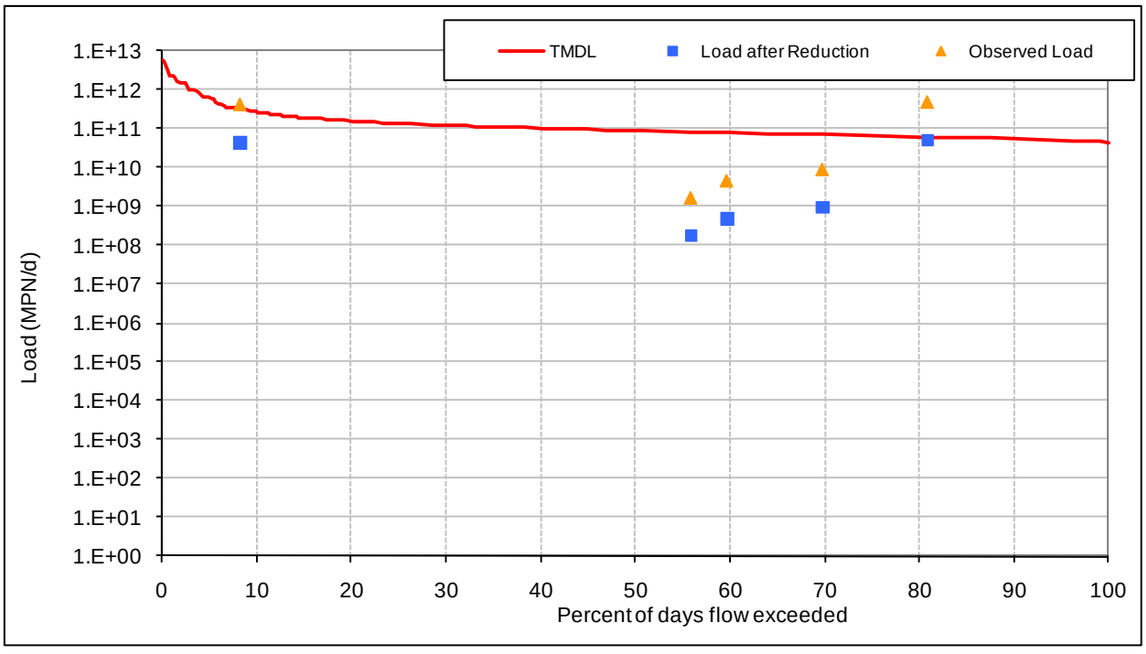

Figure B-2. Summer load duration curve.

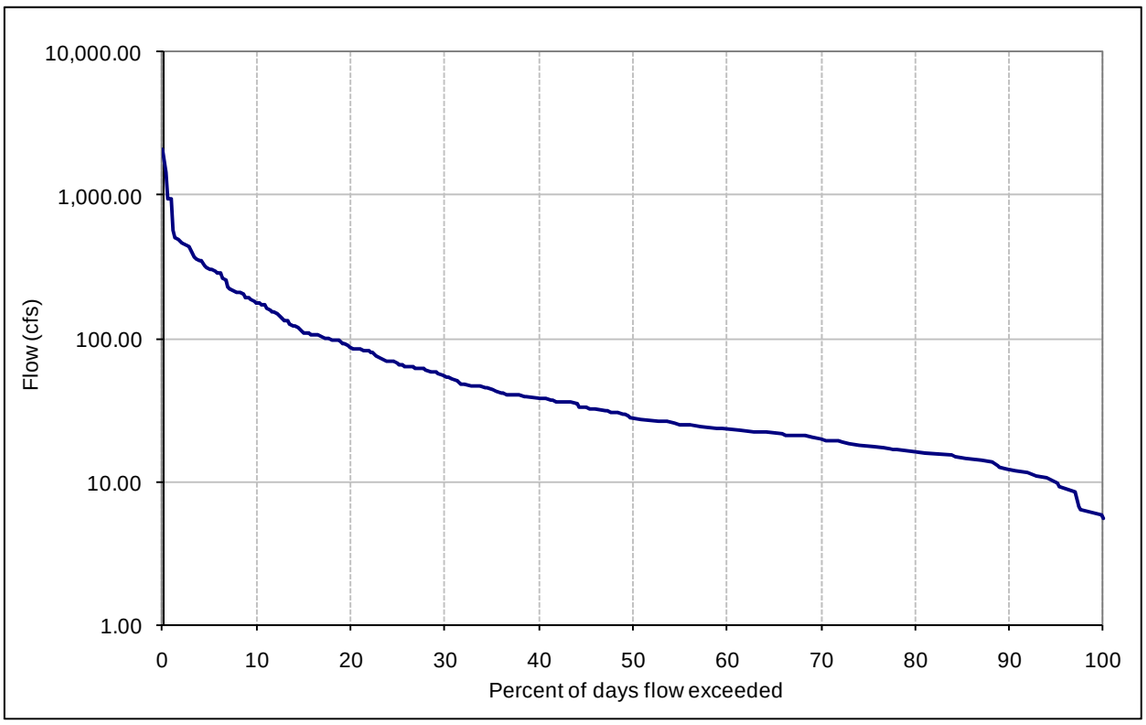

Figure B-3. Winter flow duration curve for gage 08014800.

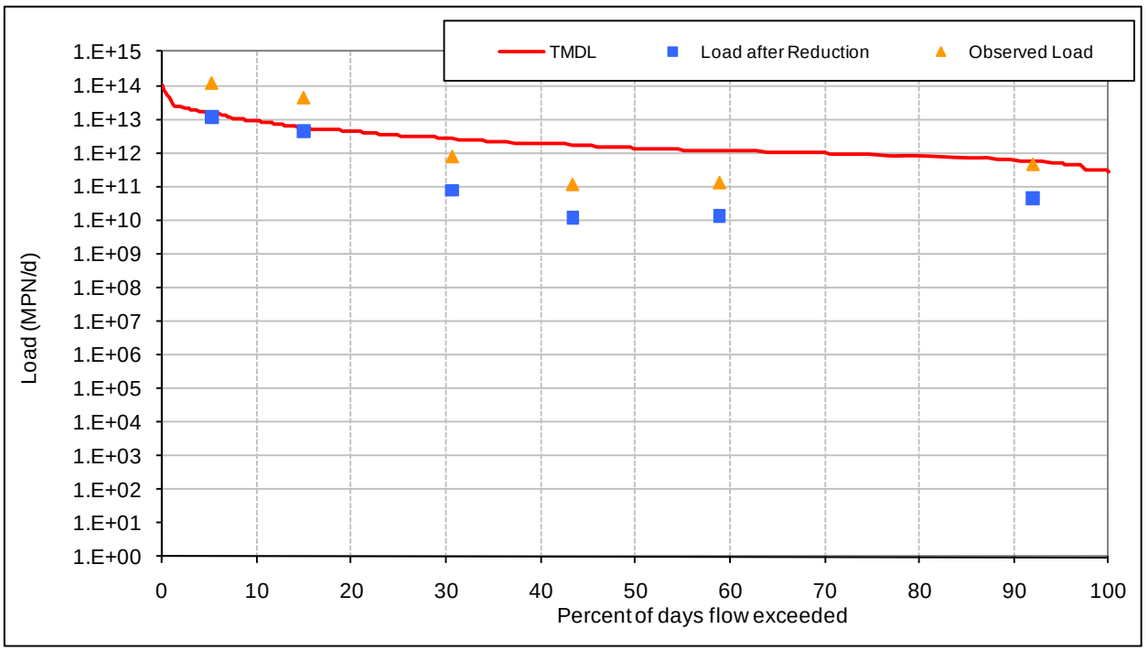

Figure B-4. Winter load duration curve.

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?
7/16/2008	3,000	6.36500372	80.9	4.672E+11	4.983E+10	4.983E+10	Yes
5/5/2008	500	33.09801935	8.3	4.049E+11	4.319E+10	2.591E+11	Yes
8/18/2008	50	7.213670883	69.8	8.824E+09	9.413E+08	5.648E+10	Yes
6/10/2008	23	8.062338046	59.7	4.537E+09	4.839E+08	6.312E+10	Yes
10/16/2007	8	8.486671627	55.9	1.661E+09	1.772E+08	6.644E+10	Yes

Table C-2. Load duration curve summer statistics

Total No. of samples =	5	
MOS =	20%	
WQ standard for =	400	MPN/100 mL
Percent Reduction Required =	89.3	
Allowable percentage of exceedences =	*0%*	
No. of exceedances after reductions =	0	
Sum of flow on sampling day	63	cfs
Sum of current loads	8.871E+11	MPN/d
Flow weighted avg conc	*573*	MPN/100 mL
Average flow	20	cfs
Existing total load	2.839E+11	MPN/d
Existing point source load	6.291E+09	MPN/d
Existing remaining load	2.776E+11	MPN/d
Total allowable loading	1.856E+11	MPN/d
Explicit MOS (20%)	3.713E+10	MPN/d
WLA	6.291E+09	MPN/d
LA	1.422E+11	MPN/d
USGS drainage area (mi^2) =	120.0	
SS drainage area (mi^2) =	50.92	

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)
						185,627,927,398
8/15/09	10.00	100.00	4.2433358	0.00	41,526,571,530	0
8/16/09	10.00	100.00	4.2433358	0.00	41,526,571,530	0
8/17/09	10.00	100.00	4.2433358	0.00	41,526,571,530	0
8/25/09	10.00	100.00	4.2433358	1.00	41,526,571,530	415,265,715
7/14/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
7/15/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
8/13/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
8/14/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
8/18/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
8/24/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
9/3/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
9/4/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
9/5/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
9/8/09	11.00	99.00	4.6676694	0.00	45,679,228,683	0
9/9/09	11.00	99.00	4.6676694	2.80	45,679,228,683	1,279,018,403
7/30/08	12.00	96.20	5.0920030	0.00	49,831,885,836	0
7/31/08	12.00	96.20	5.0920030	0.00	49,831,885,836	0
8/1/08	12.00	96.20	5.0920030	0.00	49,831,885,836	0
8/2/08	12.00	96.20	5.0920030	0.00	49,831,885,836	0
7/3/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
7/4/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
7/5/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
7/6/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
7/13/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
8/12/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
8/23/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
8/26/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
8/27/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
8/28/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
8/29/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
9/2/09	12.00	96.20	5.0920030	0.00	49,831,885,836	0
9/7/09	12.00	96.20	5.0920030	4.40	49,831,885,836	2,192,602,977
7/20/08	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/21/08	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/22/08	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/23/08	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/28/08	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/29/08	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/2/09	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/12/09	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/17/09	13.00	91.80	5.5163366	0.00	53,984,542,989	0
7/18/09	13.00	91.80	5.5163366	0.00	53,984,542,989	0
8/8/09	13.00	91.80	5.5163366	0.00	53,984,542,989	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	13.00	91.80	5.5163366	0.00	53,984,542,989	0
8/11/09	13.00	91.80	5.5163366	0.00	53,984,542,989	0
8/19/09	13.00	91.80	5.5163366	0.00	53,984,542,989	0
8/21/09	13.00	91.80	5.5163366	0.00	53,984,542,989	0
9/11/09	13.00	91.80	5.5163366	4.20	53,984,542,989	2,267,350,806
7/17/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/18/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/19/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/24/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/27/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
10/27/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
10/28/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
10/29/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
10/30/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
10/31/08	14.00	87.60	5.9406701	0.00	58,137,200,142	0
6/27/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
6/28/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/1/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/7/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/10/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/11/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/27/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
7/28/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
8/7/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
8/10/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
8/20/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
8/22/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
9/1/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
9/10/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
9/12/09	14.00	87.60	5.9406701	0.00	58,137,200,142	0
10/1/09	14.00	87.60	5.9406701	6.70	58,137,200,142	3,895,192,410
7/13/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
7/14/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
7/15/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
7/16/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
7/26/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
8/11/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
8/12/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
10/24/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
10/25/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
10/26/08	15.00	80.90	6.3650037	0.00	62,289,857,295	0
6/22/09	15.00	80.90	6.3650037	0.00	62,289,857,295	0
6/23/09	15.00	80.90	6.3650037	0.00	62,289,857,295	0
6/24/09	15.00	80.90	6.3650037	0.00	62,289,857,295	0
6/25/09	15.00	80.90	6.3650037	0.00	62,289,857,295	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	15.00	80.90	6.3650037	0.00	62,289,857,295	0
7/8/09	15.00	80.90	6.3650037	0.00	62,289,857,295	0
7/9/09	15.00	80.90	6.3650037	0.00	62,289,857,295	0
7/21/09	15.00	80.90	6.3650037	0.00	62,289,857,295	0
7/26/09	15.00	80.90	6.3650037	0.00	62,289,857,295	0
8/6/09	15.00	80.90	6.3650037	0.00	62,289,857,295	0
9/30/09	15.00	80.90	6.3650037	5.40	62,289,857,295	3,363,652,294
7/9/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
7/10/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
8/10/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
8/30/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
8/31/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/1/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/2/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/3/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/4/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/5/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/6/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/7/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/13/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/14/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/22/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
10/23/08	16.00	75.50	6.7893373	0.00	66,442,514,448	0
6/19/09	16.00	75.50	6.7893373	0.00	66,442,514,448	0
6/20/09	16.00	75.50	6.7893373	0.00	66,442,514,448	0
6/21/09	16.00	75.50	6.7893373	0.00	66,442,514,448	0
7/20/09	16.00	75.50	6.7893373	0.00	66,442,514,448	0
7/25/09	16.00	75.50	6.7893373	0.00	66,442,514,448	0
8/5/09	16.00	75.50	6.7893373	5.70	66,442,514,448	3,787,223,324
7/8/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
7/12/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
8/9/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
8/18/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
8/28/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
8/29/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
9/1/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
9/28/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
9/29/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
9/30/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
10/8/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
10/9/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
10/12/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
10/15/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
10/21/08	17.00	69.80	7.2136709	0.00	70,595,171,601	0
6/17/09	17.00	69.80	7.2136709	0.00	70,595,171,601	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	17.00	69.80	7.2136709	0.00	70,595,171,601	0
7/22/09	17.00	69.80	7.2136709	0.00	70,595,171,601	0
7/24/09	17.00	69.80	7.2136709	0.00	70,595,171,601	0
8/31/09	17.00	69.80	7.2136709	0.00	70,595,171,601	0
9/22/09	17.00	69.80	7.2136709	0.00	70,595,171,601	0
9/29/09	17.00	69.80	7.2136709	5.70	70,595,171,601	4,023,924,781
6/20/08	18.00	64.10	7.6380045	0.00	74,747,828,755	0
6/21/08	18.00	64.10	7.6380045	0.00	74,747,828,755	0
7/7/08	18.00	64.10	7.6380045	0.00	74,747,828,755	0
7/25/08	18.00	64.10	7.6380045	0.00	74,747,828,755	0
9/26/08	18.00	64.10	7.6380045	0.00	74,747,828,755	0
9/27/08	18.00	64.10	7.6380045	0.00	74,747,828,755	0
10/11/08	18.00	64.10	7.6380045	0.00	74,747,828,755	0
10/20/08	18.00	64.10	7.6380045	0.00	74,747,828,755	0
6/15/09	18.00	64.10	7.6380045	0.00	74,747,828,755	0
6/16/09	18.00	64.10	7.6380045	0.00	74,747,828,755	0
6/29/09	18.00	64.10	7.6380045	0.00	74,747,828,755	0
6/30/09	18.00	64.10	7.6380045	0.00	74,747,828,755	0
7/23/09	18.00	64.10	7.6380045	0.00	74,747,828,755	0
7/29/09	18.00	64.10	7.6380045	0.00	74,747,828,755	0
9/21/09	18.00	64.10	7.6380045	0.00	74,747,828,755	0
9/28/09	18.00	64.10	7.6380045	0.00	74,747,828,755	0
10/2/09	18.00	64.10	7.6380045	4.40	74,747,828,755	3,288,904,465
6/10/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
6/15/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
6/19/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
7/3/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
7/4/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
8/13/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
8/19/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
8/20/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
8/27/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
9/12/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
9/24/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
9/25/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
10/19/08	19.00	59.70	8.0623380	0.00	78,900,485,908	0
6/14/09	19.00	59.70	8.0623380	0.00	78,900,485,908	0
8/4/09	19.00	59.70	8.0623380	3.80	78,900,485,908	2,998,218,464
10/14/07	20.00	55.90	8.4866716	0.00	83,053,143,061	0
10/15/07	20.00	55.90	8.4866716	0.00	83,053,143,061	0
10/16/07	20.00	55.90	8.4866716	0.00	83,053,143,061	0
6/6/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
6/7/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
6/8/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
6/9/08	20.00	55.90	8.4866716	0.00	83,053,143,061	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	20.00	55.90	8.4866716	0.00	83,053,143,061	0
6/14/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
6/22/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
6/24/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
8/8/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
8/17/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
8/26/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
9/11/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
9/23/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
10/10/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
10/18/08	20.00	55.90	8.4866716	0.00	83,053,143,061	0
6/13/09	20.00	55.90	8.4866716	0.00	83,053,143,061	0
9/27/09	20.00	55.90	8.4866716	5.20	83,053,143,061	4,318,763,439
10/12/07	21.00	50.70	8.9110052	0.00	87,205,800,214	0
10/13/07	21.00	50.70	8.9110052	0.00	87,205,800,214	0
6/4/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
6/5/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
6/12/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
6/13/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
6/16/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
6/17/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
6/29/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
9/10/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
9/22/08	21.00	50.70	8.9110052	0.00	87,205,800,214	0
6/12/09	21.00	50.70	8.9110052	0.00	87,205,800,214	0
9/6/09	21.00	50.70	8.9110052	0.00	87,205,800,214	0
9/23/09	21.00	50.70	8.9110052	0.00	87,205,800,214	0
9/26/09	21.00	50.70	8.9110052	3.90	87,205,800,214	3,401,026,208
10/11/07	22.00	46.80	9.3353388	0.00	91,358,457,367	0
6/3/08	22.00	46.80	9.3353388	0.00	91,358,457,367	0
7/1/08	22.00	46.80	9.3353388	0.00	91,358,457,367	0
9/21/08	22.00	46.80	9.3353388	0.00	91,358,457,367	0
10/17/08	22.00	46.80	9.3353388	0.00	91,358,457,367	0
6/11/09	22.00	46.80	9.3353388	0.00	91,358,457,367	0
7/30/09	22.00	46.80	9.3353388	0.00	91,358,457,367	0
9/20/09	22.00	46.80	9.3353388	2.00	91,358,457,367	1,827,169,147
10/4/07	23.00	44.80	9.7596724	0.00	95,511,114,520	0
10/5/07	23.00	44.80	9.7596724	0.00	95,511,114,520	0
10/7/07	23.00	44.80	9.7596724	0.00	95,511,114,520	0
10/10/07	23.00	44.80	9.7596724	0.00	95,511,114,520	0
6/18/08	23.00	44.80	9.7596724	0.00	95,511,114,520	0
9/9/08	23.00	44.80	9.7596724	0.00	95,511,114,520	0
9/20/08	23.00	44.80	9.7596724	0.00	95,511,114,520	0
6/10/09	23.00	44.80	9.7596724	0.00	95,511,114,520	0
7/19/09	23.00	44.80	9.7596724	2.40	95,511,114,520	2,292,266,748

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	24.00	42.40	10.1840060	0.00	99,663,771,673	0
10/8/07	24.00	42.40	10.1840060	0.00	99,663,771,673	0
10/9/07	24.00	42.40	10.1840060	0.00	99,663,771,673	0
6/2/08	24.00	42.40	10.1840060	0.00	99,663,771,673	0
6/28/08	24.00	42.40	10.1840060	0.00	99,663,771,673	0
7/11/08	24.00	42.40	10.1840060	0.00	99,663,771,673	0
8/25/08	24.00	42.40	10.1840060	0.00	99,663,771,673	0
7/16/09	24.00	42.40	10.1840060	2.00	99,663,771,673	1,993,275,433
10/2/07	25.00	40.40	10.6083395	0.00	103,816,428,826	0
10/6/07	25.00	40.40	10.6083395	0.00	103,816,428,826	0
5/13/08	25.00	40.40	10.6083395	0.00	103,816,428,826	0
6/27/08	25.00	40.40	10.6083395	0.00	103,816,428,826	0
7/2/08	25.00	40.40	10.6083395	0.00	103,816,428,826	0
8/15/08	25.00	40.40	10.6083395	0.00	103,816,428,826	0
6/9/09	25.00	40.40	10.6083395	0.00	103,816,428,826	0
10/3/09	25.00	40.40	10.6083395	2.10	103,816,428,826	2,180,145,005
5/12/08	26.00	38.30	11.0326731	0.00	107,969,085,979	0
5/28/08	26.00	38.30	11.0326731	0.00	107,969,085,979	0
6/1/08	26.00	38.30	11.0326731	0.00	107,969,085,979	0
6/26/08	26.00	38.30	11.0326731	0.00	107,969,085,979	0
8/7/08	26.00	38.30	11.0326731	0.00	107,969,085,979	0
9/19/08	26.00	38.30	11.0326731	0.00	107,969,085,979	0
6/3/09	26.00	38.30	11.0326731	0.00	107,969,085,979	0
8/3/09	26.00	38.30	11.0326731	0.00	107,969,085,979	0
9/13/09	26.00	38.30	11.0326731	0.00	107,969,085,979	0
9/25/09	26.00	38.30	11.0326731	2.60	107,969,085,979	2,807,196,235
10/1/07	27.00	35.70	11.4570067	0.00	112,121,743,132	0
5/11/08	27.00	35.70	11.4570067	0.00	112,121,743,132	0
5/27/08	27.00	35.70	11.4570067	0.00	112,121,743,132	0
6/23/08	27.00	35.70	11.4570067	0.00	112,121,743,132	0
6/25/08	27.00	35.70	11.4570067	0.00	112,121,743,132	0
6/30/08	27.00	35.70	11.4570067	0.00	112,121,743,132	0
9/8/08	27.00	35.70	11.4570067	0.00	112,121,743,132	0
6/2/09	27.00	35.70	11.4570067	0.00	112,121,743,132	0
6/8/09	27.00	35.70	11.4570067	0.00	112,121,743,132	0
10/8/09	27.00	35.70	11.4570067	2.60	112,121,743,132	2,915,165,321
10/31/07	28.00	33.10	11.8813403	0.00	116,274,400,285	0
6/1/09	28.00	33.10	11.8813403	0.00	116,274,400,285	0
8/30/09	28.00	33.10	11.8813403	0.00	116,274,400,285	0
9/18/09	28.00	33.10	11.8813403	1.00	116,274,400,285	1,162,744,003
10/30/07	29.00	32.10	12.3056739	0.00	120,427,057,438	0
5/10/08	29.00	32.10	12.3056739	0.00	120,427,057,438	0
7/5/08	29.00	32.10	12.3056739	0.00	120,427,057,438	0
10/16/08	29.00	32.10	12.3056739	0.00	120,427,057,438	0
5/31/09	29.00	32.10	12.3056739	0.00	120,427,057,438	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	29.00	32.10	12.3056739	1.60	120,427,057,438	1,926,832,919
5/14/08	30.00	30.50	12.7300074	0.00	124,579,714,591	0
5/22/08	30.00	30.50	12.7300074	0.00	124,579,714,591	0
5/23/08	30.00	30.50	12.7300074	0.00	124,579,714,591	0
5/26/08	30.00	30.50	12.7300074	0.00	124,579,714,591	0
5/31/08	30.00	30.50	12.7300074	0.00	124,579,714,591	0
7/6/08	30.00	30.50	12.7300074	0.00	124,579,714,591	0
6/7/09	30.00	30.50	12.7300074	0.00	124,579,714,591	0
9/19/09	30.00	30.50	12.7300074	2.00	124,579,714,591	2,491,594,292
10/29/07	31.00	28.50	13.1543410	0.00	128,732,371,744	0
5/2/08	31.00	28.50	13.1543410	0.00	128,732,371,744	0
5/9/08	31.00	28.50	13.1543410	0.00	128,732,371,744	0
8/14/08	31.00	28.50	13.1543410	0.00	128,732,371,744	0
8/16/08	31.00	28.50	13.1543410	0.00	128,732,371,744	0
6/5/09	31.00	28.50	13.1543410	0.00	128,732,371,744	0
9/16/09	31.00	28.50	13.1543410	0.00	128,732,371,744	0
9/24/09	31.00	28.50	13.1543410	2.10	128,732,371,744	2,703,379,807
5/1/08	32.00	26.40	13.5786746	0.00	132,885,028,897	0
5/21/08	32.00	26.40	13.5786746	0.00	132,885,028,897	0
9/13/08	32.00	26.40	13.5786746	0.00	132,885,028,897	0
9/18/08	32.00	26.40	13.5786746	0.00	132,885,028,897	0
5/30/09	32.00	26.40	13.5786746	0.00	132,885,028,897	0
6/4/09	32.00	26.40	13.5786746	0.00	132,885,028,897	0
6/6/09	32.00	26.40	13.5786746	0.00	132,885,028,897	0
10/5/09	32.00	26.40	13.5786746	0.00	132,885,028,897	0
10/20/09	32.00	26.40	13.5786746	2.30	132,885,028,897	3,056,355,665
10/28/07	33.00	24.10	14.0030082	0.00	137,037,686,050	0
5/8/08	33.00	24.10	14.0030082	0.00	137,037,686,050	0
10/4/09	33.00	24.10	14.0030082	0.80	137,037,686,050	1,096,301,488
5/24/08	34.00	23.30	14.4273418	0.00	141,190,343,203	0
5/30/08	34.00	23.30	14.4273418	0.00	141,190,343,203	0
9/7/08	34.00	23.30	14.4273418	0.80	141,190,343,203	1,129,522,746
5/3/08	35.00	22.50	14.8516753	0.00	145,343,000,356	0
8/24/08	35.00	22.50	14.8516753	0.00	145,343,000,356	0
5/29/09	35.00	22.50	14.8516753	0.00	145,343,000,356	0
9/15/09	35.00	22.50	14.8516753	0.00	145,343,000,356	0
10/6/09	35.00	22.50	14.8516753	1.30	145,343,000,356	1,889,459,005
5/7/08	36.00	21.20	15.2760089	0.00	149,495,657,509	0
5/25/08	36.00	21.20	15.2760089	0.00	149,495,657,509	0
8/6/08	36.00	21.20	15.2760089	0.00	149,495,657,509	0
10/10/09	36.00	21.20	15.2760089	1.00	149,495,657,509	1,494,956,575
10/27/07	37.00	20.20	15.7003425	0.00	153,648,314,662	0
5/20/08	37.00	20.20	15.7003425	0.00	153,648,314,662	0
9/17/09	37.00	20.20	15.7003425	0.00	153,648,314,662	0
10/7/09	37.00	20.20	15.7003425	1.00	153,648,314,662	1,536,483,147

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	39.00	19.20	16.5490097	0.00	161,953,628,968	0
5/28/09	39.00	19.20	16.5490097	0.00	161,953,628,968	0
10/11/09	39.00	19.20	16.5490097	0.80	161,953,628,968	1,295,629,032
8/5/08	40.00	18.40	16.9733433	0.00	166,106,286,121	0
5/22/09	40.00	18.40	16.9733433	0.00	166,106,286,121	0
7/31/09	40.00	18.40	16.9733433	0.00	166,106,286,121	0
10/19/09	40.00	18.40	16.9733433	1.00	166,106,286,121	1,661,062,861
10/21/07	41.00	17.40	17.3976768	0.00	170,258,943,274	0
5/26/09	41.00	17.40	17.3976768	0.60	170,258,943,274	1,021,553,660
8/21/08	43.00	16.80	18.2463440	0.00	178,564,257,580	0
9/14/09	43.00	16.80	18.2463440	0.50	178,564,257,580	892,821,288
5/6/08	44.00	16.30	18.6706776	0.00	182,716,914,733	0
9/17/08	44.00	16.30	18.6706776	0.00	182,716,914,733	0
5/21/09	44.00	16.30	18.6706776	0.70	182,716,914,733	1,279,018,403
5/19/08	45.00	15.60	19.0950112	0.00	186,869,571,886	0
5/25/09	45.00	15.60	19.0950112	0.00	186,869,571,886	0
5/27/09	45.00	15.60	19.0950112	0.80	186,869,571,886	1,494,956,575
10/26/07	46.00	14.80	19.5193447	0.30	191,022,229,039	573,066,687
8/2/09	47.00	14.50	19.9436783	0.20	195,174,886,192	390,349,772
8/4/08	48.00	14.30	20.3680119	0.30	199,327,543,345	597,982,630
10/22/07	49.00	14.00	20.7923455	0.00	203,480,200,498	0
5/24/09	49.00	14.00	20.7923455	0.50	203,480,200,498	1,017,401,002
5/29/08	50.00	13.50	21.2166791	0.00	207,632,857,651	0
5/20/09	50.00	13.50	21.2166791	0.00	207,632,857,651	0
8/1/09	50.00	13.50	21.2166791	0.80	207,632,857,651	1,661,062,861
9/6/08	51.00	12.70	21.6410126	0.20	211,785,514,804	423,571,030
8/3/08	55.00	12.50	23.3383470	0.30	228,396,143,417	685,188,430
5/2/09	56.00	12.20	23.7626806	0.00	232,548,800,570	0
5/16/09	56.00	12.20	23.7626806	0.00	232,548,800,570	0
10/12/09	56.00	12.20	23.7626806	0.80	232,548,800,570	1,860,390,405
10/18/09	58.00	11.40	24.6113477	0.20	240,854,114,876	481,708,230
5/11/09	59.00	11.20	25.0356813	0.30	245,006,772,029	735,020,316
5/10/09	61.00	10.90	25.8843485	0.00	253,312,086,335	0
5/17/09	61.00	10.90	25.8843485	0.50	253,312,086,335	1,266,560,432
5/19/09	62.00	10.40	26.3086820	0.30	257,464,743,488	772,394,230
5/18/08	64.00	10.10	27.1573492	0.20	265,770,057,794	531,540,116
5/15/09	67.00	9.90	28.4303500	0.30	278,228,029,253	834,684,088
9/2/08	70.00	9.60	29.7033507	0.20	290,686,000,712	581,372,001
5/1/09	71.00	9.40	30.1276843	0.00	294,838,657,865	0
5/9/09	71.00	9.40	30.1276843	0.60	294,838,657,865	1,769,031,947
10/25/07	73.00	8.80	30.9763514	0.20	303,143,972,171	606,287,944
5/18/09	76.00	8.60	32.2493522	0.30	315,601,943,630	946,805,831
10/20/07	78.00	8.30	33.0980193	0.00	323,907,257,936	0
5/5/08	78.00	8.30	33.0980193	0.50	323,907,257,936	1,619,536,290
8/23/08	81.00	7.80	34.3710201	0.30	336,365,229,395	1,009,095,688

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	83.00	7.50	35.2196873	0.20	344,670,543,701	689,341,087
9/16/08	84.00	7.30	35.6440208	0.00	348,823,200,854	0
5/8/09	84.00	7.30	35.6440208	0.50	348,823,200,854	1,744,116,004
5/4/08	86.00	6.80	36.4926880	0.30	357,128,515,160	1,071,385,545
5/14/09	96.00	6.50	40.7360238	0.20	398,655,086,691	797,310,173
9/14/08	103.00	6.30	43.7063589	0.30	427,723,686,762	1,283,171,060
8/22/08	106.00	6.00	44.9793596	0.30	440,181,658,221	1,320,544,975
5/7/09	115.00	5.70	48.7983619	0.20	477,555,572,598	955,111,145
10/17/07	146.00	5.50	61.9527029	0.30	606,287,944,342	1,818,863,833
10/23/07	150.00	5.20	63.6500372	0.20	622,898,572,954	1,245,797,146
5/17/08	155.00	5.00	65.7717051	0.30	643,661,858,719	1,930,985,576
9/15/08	158.00	4.70	67.0447059	0.30	656,119,830,179	1,968,359,491
10/24/07	160.00	4.40	67.8933730	0.20	664,425,144,485	1,328,850,289
9/5/08	175.00	4.20	74.2583767	0.30	726,715,001,780	2,180,145,005
5/15/08	199.00	3.90	84.4423827	0.20	826,378,773,453	1,652,757,547
10/19/07	208.00	3.70	88.2613849	0.30	863,752,687,830	2,591,258,063
10/16/09	240.00	3.40	101.8400595	0.20	996,637,716,727	1,993,275,433
10/13/09	243.00	3.20	103.1130603	0.30	1,009,095,688,186	3,027,287,065
5/13/09	250.00	2.90	106.0833953	0.30	1,038,164,288,257	3,114,492,865
9/3/08	300.00	2.60	127.3000744	0.20	1,245,797,145,909	2,491,594,292
9/4/08	348.00	2.40	147.6680863	0.30	1,445,124,689,254	4,335,374,068
5/16/08	358.00	2.10	151.9114221	0.20	1,486,651,260,784	2,973,302,522
5/3/09	377.00	1.90	159.9737602	0.30	1,565,551,746,692	4,696,655,240
10/18/07	421.00	1.60	178.6444378	0.30	1,748,268,661,425	5,244,805,984
5/12/09	499.00	1.30	211.7424571	0.20	2,072,175,919,361	4,144,351,839
5/6/09	547.00	1.10	232.1104690	0.30	2,271,503,462,707	6,814,510,388
10/14/09	549.00	0.80	232.9591362	0.20	2,279,808,777,013	4,559,617,554
10/15/09	790.00	0.60	335.2235293	0.30	3,280,599,150,893	9,841,797,453
5/5/09	1,290.00	0.30	547.3903200	0.30	5,356,927,727,407	16,070,783,182
5/4/09	1,460.00	-	619.5270288	0.00	6,062,879,443,422	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?
2/13/2008	16,000	110.3267312	15	4.319E+13	4.319E+12	4.319E+12	Yes
3/11/2008	16,000	300.8525092	5.3	1.178E+14	1.178E+13	1.178E+13	Yes
11/6/2007	1,600	11.4570067	92	4.485E+11	4.485E+10	4.485E+11	Yes
1/23/2008	600	52.19303051	30.7	7.662E+11	7.662E+10	2.043E+12	Yes
12/3/2007	220	23.76268056	58.9	1.279E+11	1.279E+10	9.302E+11	Yes
4/7/2008	130	35.64402083	43.4	1.134E+11	1.134E+10	1.395E+12	Yes

Table C-5. Load duration curve winter statistics

Total No. of samples =	6	
MOS =	20%	
WQ standard for =	2,000	MPN/100 mL
Percent Reduction Required =	90.0	
Allowable percentage of exceedences =	*0%*	
No. of exceedances after reductions =	0	
Sum of flow on sampling day	534	cfs
Sum of current loads	1.624E+14	MPN/d
Flow weighted avg conc	*12,426*	MPN/100 mL
Average flow	78	cfs
Existing total load	2.386E+13	MPN/d
Existing point source load	6.291E+09	MPN/d
Existing remaining load	2.385E+13	MPN/d
Total allowable loading	3.597E+12	MPN/d
Explicit MOS (20%)	7.194E+11	MPN/d
WLA	6.291E+09	MPN/d
LA	2.871E+12	MPN/d
USGS drainage area (mi^2) =	120.0	
SS drainage area (mi^2) =	50.92	

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)
						3,596,761,703,239
11/6/08	13.00	100.00	5.516337	0.20	269,922,714,947	539,845,430
11/1/08	14.00	99.80	5.940670	0.00	290,686,000,712	0
11/2/08	14.00	99.80	5.940670	0.00	290,686,000,712	0
11/3/08	14.00	99.80	5.940670	0.00	290,686,000,712	0
11/4/08	14.00	99.80	5.940670	0.00	290,686,000,712	0
11/5/08	14.00	99.80	5.940670	0.00	290,686,000,712	0
11/7/08	14.00	99.80	5.940670	0.00	290,686,000,712	0
11/8/08	14.00	99.80	5.940670	0.00	290,686,000,712	0
11/9/08	14.00	99.80	5.940670	2.20	290,686,000,712	6,395,092,016
11/10/08	15.00	97.60	6.365004	0.30	311,449,286,477	934,347,859
11/11/08	16.00	97.30	6.789337	0.30	332,212,572,242	996,637,717
11/21/08	20.00	97.00	8.486672	0.00	415,265,715,303	0
11/22/08	20.00	97.00	8.486672	0.00	415,265,715,303	0
11/23/08	20.00	97.00	8.486672	0.00	415,265,715,303	0
11/24/08	20.00	97.00	8.486672	1.10	415,265,715,303	4,567,922,868
11/20/08	21.00	95.90	8.911005	0.00	436,029,001,068	0
11/25/08	21.00	95.90	8.911005	0.50	436,029,001,068	2,180,145,005
11/19/08	22.00	95.40	9.335339	0.30	456,792,286,833	1,370,376,860
11/18/08	23.00	95.10	9.759672	0.30	477,555,572,598	1,432,666,718
11/8/07	24.00	94.80	10.184006	0.00	498,318,858,363	0
11/9/07	24.00	94.80	10.184006	0.00	498,318,858,363	0
11/26/08	24.00	94.80	10.184006	0.80	498,318,858,363	3,986,550,867
11/7/07	25.00	94.00	10.608340	0.00	519,082,144,129	0
11/10/07	25.00	94.00	10.608340	0.00	519,082,144,129	0
11/11/07	25.00	94.00	10.608340	0.00	519,082,144,129	0
11/28/08	25.00	94.00	10.608340	1.10	519,082,144,129	5,709,903,585
11/4/07	26.00	92.90	11.032673	0.00	539,845,429,894	0
11/12/07	26.00	92.90	11.032673	0.00	539,845,429,894	0
11/17/07	26.00	92.90	11.032673	0.90	539,845,429,894	4,858,608,869
11/1/07	27.00	92.00	11.457007	0.00	560,608,715,659	0
11/3/07	27.00	92.00	11.457007	0.00	560,608,715,659	0
11/6/07	27.00	92.00	11.457007	0.00	560,608,715,659	0
11/16/07	27.00	92.00	11.457007	0.00	560,608,715,659	0
11/17/08	27.00	92.00	11.457007	1.30	560,608,715,659	7,287,913,304
11/2/07	28.00	90.70	11.881340	0.00	581,372,001,424	0
11/5/07	28.00	90.70	11.881340	0.00	581,372,001,424	0
11/15/07	28.00	90.70	11.881340	0.00	581,372,001,424	0
11/29/08	28.00	90.70	11.881340	1.10	581,372,001,424	6,395,092,016
11/13/07	29.00	89.60	12.305674	0.00	602,135,287,189	0
11/14/07	29.00	89.60	12.305674	0.60	602,135,287,189	3,612,811,723
3/10/09	30.00	89.00	12.730007	0.30	622,898,572,954	1,868,695,719
11/27/08	31.00	88.70	13.154341	0.00	643,661,858,719	0
3/9/09	31.00	88.70	13.154341	0.50	643,661,858,719	3,218,309,294

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	32.00	88.20	13.578675	0.00	664,425,144,485	0
3/6/09	32.00	88.20	13.578675	0.00	664,425,144,485	0
3/7/09	32.00	88.20	13.578675	0.00	664,425,144,485	0
3/8/09	32.00	88.20	13.578675	1.10	664,425,144,485	7,308,676,589
4/16/08	33.00	87.10	14.003008	0.00	685,188,430,250	0
4/17/08	33.00	87.10	14.003008	0.00	685,188,430,250	0
12/8/08	33.00	87.10	14.003008	0.00	685,188,430,250	0
2/1/09	33.00	87.10	14.003008	0.00	685,188,430,250	0
3/4/09	33.00	87.10	14.003008	0.00	685,188,430,250	0
3/11/09	33.00	87.10	14.003008	1.70	685,188,430,250	11,648,203,314
4/15/08	34.00	85.40	14.427342	0.00	705,951,716,015	0
1/31/09	34.00	85.40	14.427342	0.00	705,951,716,015	0
3/3/09	34.00	85.40	14.427342	0.00	705,951,716,015	0
3/12/09	34.00	85.40	14.427342	1.10	705,951,716,015	7,765,468,876
4/30/08	35.00	84.30	14.851675	0.00	726,715,001,780	0
11/16/08	35.00	84.30	14.851675	0.50	726,715,001,780	3,633,575,009
4/14/08	36.00	83.80	15.276009	0.00	747,478,287,545	0
1/24/09	36.00	83.80	15.276009	0.00	747,478,287,545	0
1/25/09	36.00	83.80	15.276009	0.00	747,478,287,545	0
1/26/09	36.00	83.80	15.276009	0.00	747,478,287,545	0
1/27/09	36.00	83.80	15.276009	0.00	747,478,287,545	0
1/28/09	36.00	83.80	15.276009	0.00	747,478,287,545	0
1/30/09	36.00	83.80	15.276009	0.00	747,478,287,545	0
2/9/09	36.00	83.80	15.276009	0.00	747,478,287,545	0
2/10/09	36.00	83.80	15.276009	0.00	747,478,287,545	0
3/2/09	36.00	83.80	15.276009	2.80	747,478,287,545	20,929,392,051
4/22/08	37.00	81.00	15.700343	0.00	768,241,573,310	0
1/22/09	37.00	81.00	15.700343	0.00	768,241,573,310	0
1/23/09	37.00	81.00	15.700343	0.00	768,241,573,310	0
1/29/09	37.00	81.00	15.700343	0.00	768,241,573,310	0
2/8/09	37.00	81.00	15.700343	1.40	768,241,573,310	10,755,382,026
4/13/08	38.00	79.60	16.124676	0.00	789,004,859,075	0
12/3/08	38.00	79.60	16.124676	0.00	789,004,859,075	0
1/21/09	38.00	79.60	16.124676	0.00	789,004,859,075	0
2/7/09	38.00	79.60	16.124676	0.00	789,004,859,075	0
2/11/09	38.00	79.60	16.124676	0.00	789,004,859,075	0
3/1/09	38.00	79.60	16.124676	1.60	789,004,859,075	12,624,077,745
4/29/08	39.00	78.00	16.549010	0.30	809,768,144,841	2,429,304,435
4/12/08	40.00	77.70	16.973343	0.00	830,531,430,606	0
1/20/09	40.00	77.70	16.973343	0.00	830,531,430,606	0
2/28/09	40.00	77.70	16.973343	0.90	830,531,430,606	7,474,782,875
12/4/08	41.00	76.80	17.397677	0.00	851,294,716,371	0
12/7/08	41.00	76.80	17.397677	0.00	851,294,716,371	0
1/17/09	41.00	76.80	17.397677	0.00	851,294,716,371	0
1/18/09	41.00	76.80	17.397677	0.00	851,294,716,371	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	41.00	76.80	17.397677	0.00	851,294,716,371	0
2/6/09	41.00	76.80	17.397677	0.00	851,294,716,371	0
2/26/09	41.00	76.80	17.397677	0.00	851,294,716,371	0
2/27/09	41.00	76.80	17.397677	2.20	851,294,716,371	18,728,483,760
4/11/08	42.00	74.60	17.822010	0.00	872,058,002,136	0
4/18/08	42.00	74.60	17.822010	0.00	872,058,002,136	0
2/25/09	42.00	74.60	17.822010	0.00	872,058,002,136	0
4/11/09	42.00	74.60	17.822010	0.00	872,058,002,136	0
4/12/09	42.00	74.60	17.822010	1.30	872,058,002,136	11,336,754,028
4/21/08	43.00	73.30	18.246344	0.00	892,821,287,901	0
1/16/09	43.00	73.30	18.246344	0.00	892,821,287,901	0
4/10/09	43.00	73.30	18.246344	0.90	892,821,287,901	8,035,391,591
2/2/09	44.00	72.40	18.670678	0.00	913,584,573,666	0
2/24/09	44.00	72.40	18.670678	0.50	913,584,573,666	4,567,922,868
4/10/08	45.00	71.90	19.095011	0.00	934,347,859,431	0
4/28/08	45.00	71.90	19.095011	0.00	934,347,859,431	0
1/15/09	45.00	71.90	19.095011	0.00	934,347,859,431	0
2/12/09	45.00	71.90	19.095011	0.00	934,347,859,431	0
4/9/09	45.00	71.90	19.095011	1.40	934,347,859,431	13,080,870,032
4/27/08	46.00	70.50	19.519345	0.00	955,111,145,197	0
2/23/09	46.00	70.50	19.519345	0.60	955,111,145,197	5,730,666,871
12/8/07	47.00	69.90	19.943678	0.00	975,874,430,962	0
12/9/07	47.00	69.90	19.943678	0.00	975,874,430,962	0
4/8/09	47.00	69.90	19.943678	0.80	975,874,430,962	7,806,995,448
12/7/07	48.00	69.10	20.368012	0.00	996,637,716,727	0
12/12/07	48.00	69.10	20.368012	0.00	996,637,716,727	0
1/14/09	48.00	69.10	20.368012	0.80	996,637,716,727	7,973,101,734
12/11/07	49.00	68.30	20.792345	0.00	1,017,401,002,492	0
12/13/07	49.00	68.30	20.792345	0.00	1,017,401,002,492	0
4/9/08	49.00	68.30	20.792345	0.00	1,017,401,002,492	0
4/19/08	49.00	68.30	20.792345	0.00	1,017,401,002,492	0
12/5/08	49.00	68.30	20.792345	0.00	1,017,401,002,492	0
2/5/09	49.00	68.30	20.792345	0.00	1,017,401,002,492	0
4/16/09	49.00	68.30	20.792345	2.00	1,017,401,002,492	20,348,020,050
2/22/09	50.00	66.30	21.216679	0.00	1,038,164,288,257	0
3/24/09	50.00	66.30	21.216679	0.50	1,038,164,288,257	5,190,821,441
12/6/07	51.00	65.80	21.641013	0.00	1,058,927,574,022	0
12/10/07	51.00	65.80	21.641013	0.00	1,058,927,574,022	0
4/4/08	51.00	65.80	21.641013	0.00	1,058,927,574,022	0
1/13/09	51.00	65.80	21.641013	0.00	1,058,927,574,022	0
4/7/09	51.00	65.80	21.641013	0.00	1,058,927,574,022	0
4/27/09	51.00	65.80	21.641013	1.70	1,058,927,574,022	18,001,768,758
12/14/07	52.00	64.10	22.065346	0.00	1,079,690,859,788	0
1/4/08	52.00	64.10	22.065346	0.00	1,079,690,859,788	0
1/5/08	52.00	64.10	22.065346	0.00	1,079,690,859,788	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	52.00	64.10	22.065346	0.00	1,079,690,859,788	0
3/31/08	52.00	64.10	22.065346	1.30	1,079,690,859,788	14,035,981,177
1/6/08	53.00	62.80	22.489680	0.00	1,100,454,145,553	0
4/3/08	53.00	62.80	22.489680	0.00	1,100,454,145,553	0
4/20/08	53.00	62.80	22.489680	0.00	1,100,454,145,553	0
4/26/08	53.00	62.80	22.489680	0.00	1,100,454,145,553	0
2/13/09	53.00	62.80	22.489680	1.40	1,100,454,145,553	15,406,358,038
1/7/08	54.00	61.40	22.914013	0.00	1,121,217,431,318	0
1/8/08	54.00	61.40	22.914013	0.00	1,121,217,431,318	0
3/26/08	54.00	61.40	22.914013	0.00	1,121,217,431,318	0
3/27/08	54.00	61.40	22.914013	0.00	1,121,217,431,318	0
3/28/08	54.00	61.40	22.914013	0.00	1,121,217,431,318	0
3/29/08	54.00	61.40	22.914013	0.00	1,121,217,431,318	0
3/23/09	54.00	61.40	22.914013	2.00	1,121,217,431,318	22,424,348,626
12/5/07	55.00	59.40	23.338347	0.00	1,141,980,717,083	0
2/21/09	55.00	59.40	23.338347	0.50	1,141,980,717,083	5,709,903,585
12/3/07	56.00	58.90	23.762681	0.00	1,162,744,002,848	0
12/4/07	56.00	58.90	23.762681	0.00	1,162,744,002,848	0
1/3/08	56.00	58.90	23.762681	0.00	1,162,744,002,848	0
1/15/08	56.00	58.90	23.762681	0.00	1,162,744,002,848	0
4/17/09	56.00	58.90	23.762681	0.00	1,162,744,002,848	0
4/26/09	56.00	58.90	23.762681	1.70	1,162,744,002,848	19,766,648,048
3/25/08	57.00	57.20	24.187014	0.00	1,183,507,288,613	0
1/12/09	57.00	57.20	24.187014	0.00	1,183,507,288,613	0
3/25/09	57.00	57.20	24.187014	0.00	1,183,507,288,613	0
4/13/09	57.00	57.20	24.187014	1.10	1,183,507,288,613	13,018,580,175
12/2/07	58.00	56.10	24.611348	0.00	1,204,270,574,378	0
1/9/08	58.00	56.10	24.611348	0.00	1,204,270,574,378	0
4/8/08	58.00	56.10	24.611348	0.00	1,204,270,574,378	0
12/23/08	58.00	56.10	24.611348	1.10	1,204,270,574,378	13,246,976,318
1/12/08	59.00	55.00	25.035681	0.00	1,225,033,860,144	0
4/6/09	59.00	55.00	25.035681	0.50	1,225,033,860,144	6,125,169,301
12/19/07	60.00	54.50	25.460015	0.00	1,245,797,145,909	0
4/1/08	60.00	54.50	25.460015	0.00	1,245,797,145,909	0
3/22/09	60.00	54.50	25.460015	0.90	1,245,797,145,909	11,212,174,313
1/10/08	62.00	53.60	26.308682	0.00	1,287,323,717,439	0
3/24/08	62.00	53.60	26.308682	0.00	1,287,323,717,439	0
4/2/08	62.00	53.60	26.308682	0.80	1,287,323,717,439	10,298,589,740
1/2/08	63.00	52.80	26.733016	0.00	1,308,087,003,204	0
1/13/08	63.00	52.80	26.733016	0.00	1,308,087,003,204	0
1/14/08	63.00	52.80	26.733016	0.00	1,308,087,003,204	0
4/5/08	63.00	52.80	26.733016	0.00	1,308,087,003,204	0
12/6/08	63.00	52.80	26.733016	0.00	1,308,087,003,204	0
2/20/09	63.00	52.80	26.733016	0.00	1,308,087,003,204	0
4/25/09	63.00	52.80	26.733016	1.90	1,308,087,003,204	24,853,653,061

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	64.00	50.90	27.157349	0.00	1,328,850,288,969	0
1/11/08	64.00	50.90	27.157349	0.00	1,328,850,288,969	0
1/3/09	64.00	50.90	27.157349	0.00	1,328,850,288,969	0
1/11/09	64.00	50.90	27.157349	1.10	1,328,850,288,969	14,617,353,179
11/15/08	65.00	49.80	27.581683	0.30	1,349,613,574,734	4,048,840,724
3/23/08	68.00	49.50	28.854684	0.30	1,411,903,432,030	4,235,710,296
1/4/09	69.00	49.20	29.279017	0.30	1,432,666,717,795	4,298,000,153
3/21/09	70.00	48.90	29.703351	0.00	1,453,430,003,560	0
4/15/09	70.00	48.90	29.703351	0.50	1,453,430,003,560	7,267,150,018
11/30/08	71.00	48.40	30.127684	0.00	1,474,193,289,325	0
1/2/09	71.00	48.40	30.127684	0.00	1,474,193,289,325	0
4/5/09	71.00	48.40	30.127684	0.80	1,474,193,289,325	11,793,546,315
2/3/09	72.00	47.60	30.552018	0.30	1,494,956,575,090	4,484,869,725
12/15/07	73.00	47.30	30.976351	0.30	1,515,719,860,856	4,547,159,583
11/30/07	74.00	47.00	31.400685	0.00	1,536,483,146,621	0
12/22/08	74.00	47.00	31.400685	0.00	1,536,483,146,621	0
1/10/09	74.00	47.00	31.400685	0.00	1,536,483,146,621	0
4/24/09	74.00	47.00	31.400685	1.10	1,536,483,146,621	16,901,314,613
1/1/08	75.00	45.90	31.825019	0.00	1,557,246,432,386	0
2/4/09	75.00	45.90	31.825019	0.50	1,557,246,432,386	7,786,232,162
2/19/09	76.00	45.40	32.249352	0.30	1,578,009,718,151	4,734,029,154
3/22/08	77.00	45.10	32.673686	0.00	1,598,773,003,916	0
12/2/08	77.00	45.10	32.673686	0.60	1,598,773,003,916	9,592,638,023
12/18/07	78.00	44.50	33.098019	0.30	1,619,536,289,681	4,858,608,869
2/11/08	79.00	44.20	33.522353	0.20	1,640,299,575,446	3,280,599,151
3/18/08	82.00	44.00	34.795354	0.00	1,702,589,432,742	0
4/2/09	82.00	44.00	34.795354	0.60	1,702,589,432,742	10,215,536,596
4/7/08	84.00	43.40	35.644021	0.00	1,744,116,004,272	0
1/1/09	84.00	43.40	35.644021	0.00	1,744,116,004,272	0
4/4/09	84.00	43.40	35.644021	0.80	1,744,116,004,272	13,952,928,034
12/26/07	85.00	42.60	36.068354	0.00	1,764,879,290,037	0
3/20/09	85.00	42.60	36.068354	0.00	1,764,879,290,037	0
4/3/09	85.00	42.60	36.068354	0.80	1,764,879,290,037	14,119,034,320
12/15/08	86.00	41.80	36.492688	0.30	1,785,642,575,802	5,356,927,727
4/28/09	87.00	41.50	36.917022	0.30	1,806,405,861,568	5,419,217,585
3/2/08	88.00	41.20	37.341355	0.00	1,827,169,147,333	0
3/19/08	88.00	41.20	37.341355	0.50	1,827,169,147,333	9,135,845,737
12/24/08	89.00	40.70	37.765689	0.30	1,847,932,433,098	5,543,797,299
2/12/08	90.00	40.40	38.190022	0.30	1,868,695,718,863	5,606,087,157
2/10/08	91.00	40.10	38.614356	0.00	1,889,459,004,628	0
3/17/08	91.00	40.10	38.614356	0.00	1,889,459,004,628	0
3/21/08	91.00	40.10	38.614356	0.00	1,889,459,004,628	0
2/18/09	91.00	40.10	38.614356	0.00	1,889,459,004,628	0
4/1/09	91.00	40.10	38.614356	1.40	1,889,459,004,628	26,452,426,065
3/1/08	92.00	38.70	39.038689	0.30	1,910,222,290,393	5,730,666,871

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	93.00	38.40	39.463023	0.00	1,930,985,576,158	0
4/14/09	93.00	38.40	39.463023	0.50	1,930,985,576,158	9,654,927,881
3/20/08	94.00	37.90	39.887357	0.00	1,951,748,861,924	0
1/9/09	94.00	37.90	39.887357	0.60	1,951,748,861,924	11,710,493,172
11/29/07	95.00	37.30	40.311690	0.00	1,972,512,147,689	0
12/31/07	95.00	37.30	40.311690	0.00	1,972,512,147,689	0
4/23/09	95.00	37.30	40.311690	0.80	1,972,512,147,689	15,780,097,182
2/29/08	96.00	36.50	40.736024	0.30	1,993,275,433,454	5,979,826,300
11/24/07	98.00	36.20	41.584691	0.20	2,034,802,004,984	4,069,604,010
11/22/07	99.00	36.00	42.009025	0.00	2,055,565,290,749	0
4/25/08	99.00	36.00	42.009025	0.60	2,055,565,290,749	12,333,391,744
2/9/08	102.00	35.40	43.282025	0.30	2,117,855,148,045	6,353,565,444
12/21/08	105.00	35.10	44.555026	0.00	2,180,145,005,340	0
4/30/09	105.00	35.10	44.555026	0.50	2,180,145,005,340	10,900,725,027
12/9/08	107.00	34.60	45.403693	0.30	2,221,671,576,870	6,665,014,731
2/28/08	108.00	34.30	45.828027	0.00	2,242,434,862,636	0
3/16/08	108.00	34.30	45.828027	0.50	2,242,434,862,636	11,212,174,313
12/25/07	109.00	33.80	46.252360	0.00	2,263,198,148,401	0
4/6/08	109.00	33.80	46.252360	0.60	2,263,198,148,401	13,579,188,890
12/31/08	110.00	33.20	46.676694	0.30	2,283,961,434,166	6,851,884,302
11/23/07	111.00	32.90	47.101028	0.00	2,304,724,719,931	0
12/17/07	111.00	32.90	47.101028	0.00	2,304,724,719,931	0
12/27/07	111.00	32.90	47.101028	0.80	2,304,724,719,931	18,437,797,759
1/22/08	113.00	32.10	47.949695	0.30	2,346,251,291,461	7,038,753,874
11/12/08	114.00	31.80	48.374028	0.00	2,367,014,577,226	0
3/19/09	114.00	31.80	48.374028	0.50	2,367,014,577,226	11,835,072,886
12/16/08	120.00	31.30	50.920030	0.00	2,491,594,291,817	0
3/31/09	120.00	31.30	50.920030	0.60	2,491,594,291,817	14,949,565,751
1/23/08	123.00	30.70	52.193031	0.30	2,553,884,149,113	7,661,652,447
4/29/09	125.00	30.40	53.041698	0.20	2,595,410,720,643	5,190,821,441
2/27/08	126.00	30.20	53.466031	0.30	2,616,174,006,408	7,848,522,019
2/8/08	129.00	29.90	54.739032	0.00	2,678,463,863,704	0
3/15/08	129.00	29.90	54.739032	0.60	2,678,463,863,704	16,070,783,182
1/8/09	134.00	29.30	56.860700	0.20	2,782,280,292,529	5,564,560,585
2/15/08	137.00	29.10	58.133701	0.30	2,844,570,149,825	8,533,710,449
12/16/07	138.00	28.80	58.558034	0.30	2,865,333,435,590	8,596,000,307
11/18/07	139.00	28.50	58.982368	0.00	2,886,096,721,355	0
12/14/08	139.00	28.50	58.982368	0.50	2,886,096,721,355	14,430,483,607
2/17/09	142.00	28.00	60.255369	0.30	2,948,386,578,650	8,845,159,736
12/30/07	144.00	27.70	61.104036	0.30	2,989,913,150,181	8,969,739,451
12/29/07	146.00	27.40	61.952703	0.00	3,031,439,721,711	0
12/27/08	146.00	27.40	61.952703	0.60	3,031,439,721,711	18,188,638,330
2/26/08	147.00	26.80	62.377036	0.20	3,052,203,007,476	6,104,406,015
11/25/07	149.00	26.60	63.225704	0.00	3,093,729,579,007	0
12/28/07	149.00	26.60	63.225704	0.00	3,093,729,579,007	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	149.00	26.60	63.225704	0.90	3,093,729,579,007	27,843,566,211
11/21/07	151.00	25.70	64.074371	0.20	3,135,256,150,537	6,270,512,301
3/6/08	153.00	25.50	64.923038	0.30	3,176,782,722,067	9,530,348,166
3/10/08	154.00	25.20	65.347372	0.30	3,197,546,007,832	9,592,638,023
1/5/09	157.00	24.90	66.620372	0.30	3,259,835,865,128	9,779,507,595
12/24/07	161.00	24.60	68.317707	0.00	3,342,889,008,188	0
2/4/08	161.00	24.60	68.317707	0.50	3,342,889,008,188	16,714,445,041
11/14/08	163.00	24.10	69.166374	0.30	3,384,415,579,719	10,153,246,739
3/14/08	164.00	23.80	69.590707	0.30	3,405,178,865,484	10,215,536,596
1/29/08	168.00	23.50	71.288042	0.00	3,488,232,008,544	0
12/18/08	168.00	23.50	71.288042	0.50	3,488,232,008,544	17,441,160,043
1/16/08	175.00	23.00	74.258377	0.30	3,633,575,008,900	10,900,725,027
12/20/08	176.00	22.70	74.682710	0.30	3,654,338,294,665	10,963,014,884
12/17/08	186.00	22.40	78.926046	0.30	3,861,971,152,317	11,585,913,457
3/9/08	187.00	22.10	79.350380	0.20	3,882,734,438,082	7,765,468,876
11/13/08	194.00	21.90	82.320715	0.30	4,028,077,438,438	12,084,232,315
3/13/09	195.00	21.60	82.745048	0.30	4,048,840,724,203	12,146,522,173
1/7/09	196.00	21.30	83.169382	0.30	4,069,604,009,968	12,208,812,030
1/19/08	198.00	21.00	84.018049	0.00	4,111,130,581,499	0
4/23/08	198.00	21.00	84.018049	0.50	4,111,130,581,499	20,555,652,907
2/25/08	199.00	20.50	84.442383	0.30	4,131,893,867,264	12,395,681,602
1/21/08	200.00	20.20	84.866716	0.30	4,152,657,153,029	12,457,971,459
12/30/08	207.00	19.90	87.837051	0.20	4,298,000,153,385	8,596,000,307
1/6/09	211.00	19.70	89.534386	0.30	4,381,053,296,445	13,143,159,889
12/19/08	215.00	19.40	91.231720	0.30	4,464,106,439,506	13,392,319,319
12/1/08	219.00	19.10	92.929054	0.30	4,547,159,582,567	13,641,478,748
4/22/09	227.00	18.80	96.323723	0.20	4,713,265,868,688	9,426,531,737
2/7/08	228.00	18.60	96.748057	0.30	4,734,029,154,453	14,202,087,463
11/28/07	231.00	18.30	98.021057	0.30	4,796,319,011,748	14,388,957,035
12/26/08	232.00	18.00	98.445391	0.30	4,817,082,297,513	14,451,246,893
12/25/08	234.00	17.70	99.294058	0.20	4,858,608,869,044	9,717,217,738
3/18/09	235.00	17.50	99.718392	0.30	4,879,372,154,809	14,638,116,464
12/20/07	237.00	17.20	100.567059	0.30	4,920,898,726,339	14,762,696,179
12/23/07	244.00	16.90	103.537394	0.30	5,066,241,726,695	15,198,725,180
2/3/08	247.00	16.60	104.810395	0.30	5,128,531,583,991	15,385,594,752
1/18/08	249.00	16.30	105.659062	0.00	5,170,058,155,521	0
2/14/08	249.00	16.30	105.659062	0.50	5,170,058,155,521	25,850,290,778
3/7/08	250.00	15.80	106.083395	0.30	5,190,821,441,286	15,572,464,324
1/30/08	258.00	15.50	109.478064	0.30	5,356,927,727,407	16,070,783,182
2/6/08	259.00	15.20	109.902398	0.20	5,377,691,013,172	10,755,382,026
2/13/08	260.00	15.00	110.326731	0.30	5,398,454,298,938	16,195,362,897
4/24/08	271.00	14.70	114.994401	0.30	5,626,850,442,354	16,880,551,327
3/4/08	282.00	14.40	119.662070	0.30	5,855,246,585,771	17,565,739,757
3/5/08	288.00	14.10	122.208071	0.20	5,979,826,300,362	11,959,652,601
3/8/08	292.00	13.90	123.905406	0.30	6,062,879,443,422	18,188,638,330

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	300.00	13.60	127.300074	0.30	6,228,985,729,543	18,686,957,189
1/20/08	313.00	13.30	132.816411	0.30	6,498,908,444,490	19,496,725,333
2/21/08	316.00	13.00	134.089412	0.20	6,561,198,301,786	13,122,396,604
1/31/08	326.00	12.80	138.332748	0.30	6,768,831,159,437	20,306,493,478
11/20/07	336.00	12.50	142.576083	0.30	6,976,464,017,088	20,929,392,051
1/24/08	350.00	12.20	148.516753	0.30	7,267,150,017,801	21,801,450,053
12/22/07	357.00	11.90	151.487089	0.20	7,412,493,018,157	14,824,986,036
2/16/09	366.00	11.70	155.306091	0.30	7,599,362,590,043	22,798,087,770
11/19/07	374.00	11.40	158.700759	0.30	7,765,468,876,164	23,296,406,628
2/20/08	386.00	11.10	163.792762	0.30	8,014,628,305,346	24,043,884,916
12/28/08	405.00	10.80	171.855100	0.30	8,409,130,734,883	25,227,392,205
12/29/08	406.00	10.50	172.279434	0.20	8,429,894,020,649	16,859,788,041
1/17/08	414.00	10.30	175.674103	0.30	8,596,000,306,770	25,788,000,920
3/30/09	417.00	10.00	176.947103	0.30	8,658,290,164,065	25,974,870,492
12/21/07	431.00	9.70	182.887774	0.30	8,948,976,164,777	26,846,928,494
1/25/08	444.00	9.40	188.404110	0.20	9,218,898,879,724	18,437,797,759
3/13/08	451.00	9.20	191.374445	0.30	9,364,241,880,080	28,092,725,640
2/14/09	456.00	8.90	193.496113	0.30	9,468,058,308,906	28,404,174,927
11/26/07	486.00	8.60	206.226121	0.30	10,090,956,881,860	30,272,870,646
11/27/07	490.00	8.30	207.923455	0.20	10,174,010,024,921	20,348,020,050
1/26/08	491.00	8.10	208.347788	0.30	10,194,773,310,686	30,584,319,932
12/13/08	496.00	7.80	210.469456	0.30	10,298,589,739,512	30,895,769,219
3/26/09	504.00	7.50	213.864125	0.30	10,464,696,025,633	31,394,088,077
1/27/08	527.00	7.20	223.623797	0.20	10,942,251,598,231	21,884,503,196
2/22/08	535.00	7.00	227.018466	0.30	11,108,357,884,352	33,325,073,653
3/14/09	610.00	6.70	258.843485	0.30	12,665,604,316,738	37,996,812,950
2/24/08	616.00	6.40	261.389486	0.30	12,790,184,031,329	38,370,552,094
3/17/09	675.00	6.10	286.425167	0.20	14,015,217,891,472	28,030,435,783
2/2/08	678.00	5.90	287.698168	0.30	14,077,507,748,768	42,232,523,246
2/23/08	691.00	5.60	293.214505	0.30	14,347,430,463,715	43,042,291,391
3/11/08	709.00	5.30	300.852509	0.30	14,721,169,607,487	44,163,508,822
4/18/09	718.00	5.00	304.671511	0.30	14,908,039,179,374	44,724,117,538
3/29/09	741.00	4.70	314.431184	0.20	15,385,594,751,972	30,771,189,504
2/15/09	757.00	4.50	321.220521	0.30	15,717,807,324,214	47,153,421,973
3/15/09	814.00	4.20	345.407535	0.30	16,901,314,612,828	50,703,943,838
2/1/08	819.00	3.90	347.529203	0.30	17,005,131,041,653	51,015,393,125
3/16/09	852.00	3.60	361.532211	0.20	17,690,319,471,903	35,380,638,944
3/12/08	869.00	3.40	368.745882	0.30	18,043,295,329,910	54,129,885,990
12/10/08	914.00	3.10	387.840893	0.30	18,977,643,189,342	56,932,929,568
3/28/09	1,040.00	2.80	441.306925	0.30	21,593,817,195,750	64,781,451,587
12/12/08	1,060.00	2.50	449.793596	0.00	22,009,082,911,053	0
3/27/09	1,060.00	2.50	449.793596	0.50	22,009,082,911,053	110,045,414,555
4/21/09	1,080.00	2.00	458.280268	0.30	22,424,348,626,356	67,273,045,879
2/16/08	1,150.00	1.70	487.983619	0.30	23,877,778,629,916	71,633,335,890
12/11/08	1,190.00	1.40	504.956962	0.20	24,708,310,060,522	49,416,620,121

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	1,320.00	1.20	560.120327	0.30	27,407,537,209,991	82,222,611,630
4/20/09	2,210.00	0.90	937.777215	0.30	45,886,861,540,969	137,660,584,623
4/19/09	2,250.00	0.60	954.750558	0.30	46,717,392,971,575	140,152,178,915
2/18/08	3,380.00	0.30	1,434.247505	0.30	70,179,905,886,188	210,539,717,659
2/17/08	4,990.00	0.00	2,117.424571	0.00	103,608,795,968,070	0