

Marsh Bayou (Subsegment 030603), Louisiana,
Draft TMDL for Fecal Coliform

Prepared for:

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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:

$$TMDL = \sum WLA_s + \sum LA_s + MOS.$$

This fecal coliform TMDL has been developed for Marsh Bayou, which is in the Calcasieu River Basin in southwestern Louisiana. Marsh Bayou is 11 miles long, from the headwaters to the Calcasieu River. The Calcasieu River begins in the hills west of Alexandria, Louisiana, and flows south for 160 miles to the Gulf of Mexico. The mouth of the river is 30 miles east of the Texas-Louisiana state border. The basin encompasses the hill region of the state, the terrace region, and a section of the coastal marsh. The upper end of the basin consists of pine-forested hills, while the lower end of the basin consists of brackish and salt marshes. Originally, much of the area was covered by tall prairie grasses, among which were scattered clumps of trees.

The fecal coliform TMDL for Marsh 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 seasonal water quality criteria.

The reductions for fecal coliform bacteria at the monitoring station on Marsh Bayou are 82 percent during the winter months and 98 percent in the summer (Table ES-1).

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

Season	TMDL (MPN/day)	WLA (MPN/day)	LA (MPN/day)	Explicit MOS (MPN/day)	Percent reduction
Winter	2.73E+12	9.99E+06	2.18E+12	5.46E+11	82%
Summer	1.41E+11	9.99E+06	1.13E+11	2.82E+10	98%

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 Marsh Bayou, which is in the Calcasieu River Basin in southwestern Louisiana (Figure 1-1). Marsh Bayou is 11 miles long, from the headwaters to the Calcasieu River.

Marsh Bayou was included on the state's 2000 303(d) list as not supporting its designated use of fish and wildlife propagation because of organic enrichment and low dissolved oxygen suspected to be from natural sources (LDEQ 2001). The state's 2002 and 2004 303(d) list and *Integrated Report* show subsegment 030603 continuing to not support the fish and wildlife propagation designated use because of low dissolved oxygen. The suspected sources of the dissolved oxygen impairment are irrigated crop production, natural conditions, and non-irrigated crop production (LDEQ 2003a, 2005). The state's 2006 and draft 2008 *Integrated Reports* continue to list dissolved oxygen as a cause of impairment of for Marsh Bayou (LDEQ 2007a, 2008). The 2006 and draft 2008 *Integrated Reports* also add fecal coliform as a cause of impairment of the primary contact recreation designated use (LDEQ 2007a, 2008). The suspected sources of impairment from fecal coliform are on-site treatment systems (septic systems and similar decentralized systems) and unpermitted discharges (domestic wastes) (LDEQ 2007a, 2008). Fecal coliform data from 2005 and 2009 support the current use impairment listing for primary contact recreation for Marsh Bayou and show violations of the secondary contact recreation criterion.

The fecal coliform TMDL for Marsh 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.

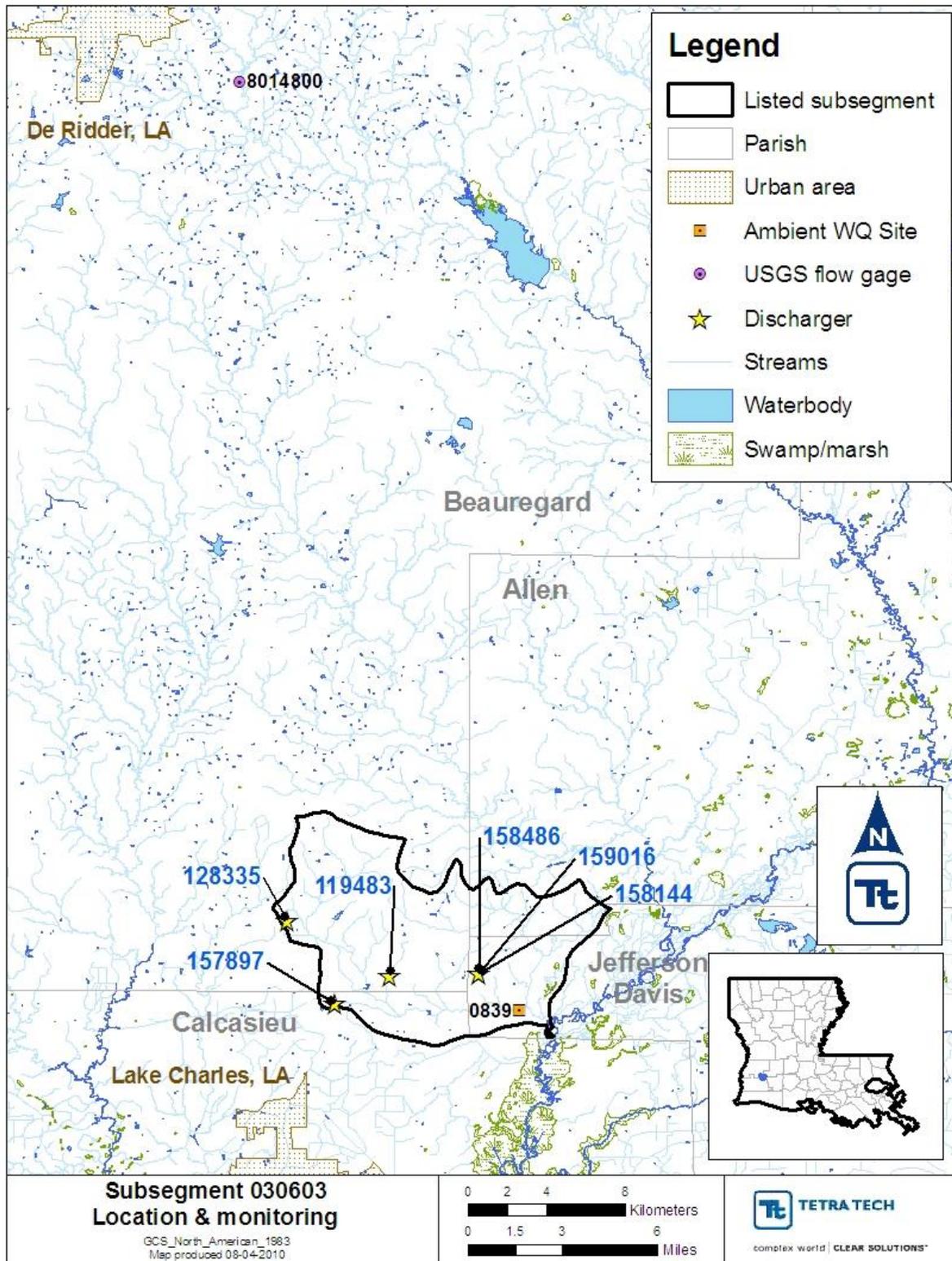


Figure 1-1. Marsh Bayou (subsegment 030603) location and monitoring.

2. Study Area Description

2.1 Calcasieu River Basin – Marsh Bayou

This fecal coliform TMDL has been developed for Marsh Bayou, which is in the Calcasieu River Basin in southwestern Louisiana. Marsh Bayou is 11 miles long, from the headwaters to the Calcasieu River. The Calcasieu River begins in the hills west of Alexandria, Louisiana, and flows south for 160 miles to the Gulf of Mexico. The mouth of the river is 30 miles east of the Texas-Louisiana state border. The basin encompasses the hill region of the state, the terrace region, and a section of the coastal marsh. The upper end of the basin consists of pine-forested hills, while the lower end of the basin consists of brackish and salt marshes. This nearly north-south-oriented drainage basin includes portions of nine parishes—Cameron, Vermillion, Calcasieu, Jefferson Davis, Beauregard, Allen, Vernon, Rapides, and Natchitoches—and is made up of 39 subsegments (LDEQ 2003b).

The Marsh Bayou watershed is a unique land area containing geographic and biotic features present in two different eco-regions. The watershed is also located in close proximity to two major cities, Lake Charles and Houston, a major interstate system, a major shipping channel, and the gulf coast. The Marsh Bayou watershed is in four different parishes—Beauregard, Allen, Calcasieu, and Jefferson Davis. Marsh Bayou is the main channel in the watershed; surface runoff drains to it, and it carries that flow into the Calcasieu River. The main tributary draining into Marsh Bayou is called “Little Marsh Bayou”, and there are several unnamed tributaries as well. Little Marsh Bayou may be the only tributary with a perennial flow; the other tributaries flow only after significant rainfall events. Little Marsh Bayou drains the eastern portion of the watershed (LDEQ 2003b).

The Marsh Bayou watershed is in the south-central portion of the Calcasieu River Basin, an area just northeast of Lake Charles, east of DeQuincy, and south of Reaves. Marsh Bayou is a tributary to the Calcasieu River and enters on the right descending bank. The watershed drainage area is approximately 40 square miles, beginning east of Dequincy and flowing southwest for approximately 26 miles to its confluence with the Calcasieu River. The total acreage of the watershed is estimated at 24,671 acres (LDEQ 2003b).

The Marsh Bayou watershed has landscape features that are found in two of the three ecoregions that make up the Calcasieu River Basin—the *South Central Plains* and *Western Gulf Coastal Plain* eco-regions. The watershed is located at a point of transition between the two eco-regions. For example, in the northern portion of the watershed there are higher elevations (80 ft to 50 ft above mean sea level) with sharper land contours in the form of upland terraces blanketed by dense stands of mixed pine. Small shaded creeks and springs with small flows draining from north to south make up the hydrology of the headwaters of Marsh Bayou. The central portion of the watershed undergoes a transition from higher elevations with sharp contours to lands having gentler slopes and less pine. The hydrology in the central area becomes less diffuse and more defined. The Marsh Bayou descends southward along the western boundary of the watershed to the southern portion. In the southern portion of the watershed, Marsh Bayou makes a “lateral trek” from its western watershed boundary across to its eastern boundary at its confluence with the Calcasieu River. The land throughout this area is much flatter, having lower elevations (25 ft to 10 ft above mean sea level), and is covered by a wide and dense stand of bottomland hardwoods and other lowland species. The bottomland forest, cypress forest, and other streamside vegetation form a “riparian buffer zone” along most of the bayou on its way to the Calcasieu River. The riparian zone is functioning as the floodplain for the Marsh Bayou and its tributaries (LDEQ 2003b).

Historically, the Marsh Bayou watershed was primarily composed of “mixed pine forests,” with long-leaf and slash pine in the higher elevations and “bottomland hardwoods” in the riparian areas,

adjacent to the bayou. Currently the watershed consists of rural forestry, agricultural land (mostly soybeans and rice), and idle fields. Higher elevations in the northern part of the watershed fade to a broad terrace region in the south and the soils are moderately to highly erosive. These historical changes in the landscape, from forest to pasture and agriculture caused hydrologic changes in the watershed (LDEQ 2003b).

Forested watersheds typically have lower rates of stormwater runoff than watersheds that have been cleared for agricultural production, resulting in higher peak flows after rainfall events. These changes in the hydrology within the watershed have resulted in several reaches of Marsh Bayou becoming aggraded and unstable. An increase in the rate and amount of stormwater runoff moving across the landscape also creates a higher potential for sediment erosion. Higher peak flows occur after rain events and have greater hydraulic energy, which can cause stream banks to become unstable and scoured. Streams filled with sediment tend to pool water rather than transport the water and sediment downstream. The aggraded reaches of Marsh Bayou function as a sink for organic debris and pollutants. These physical alterations to the bayou affect the water quality (LDEQ 2003b).

Current and future sediment and nonpoint source pollutant loads to the bayou have a tendency to become trapped in the channel and slowly degrade water quality. This degradative process is referred to as sediment oxygen demand (SOD), and it occurs within the benthic layers of the bayou. Therefore, the hydrology of Marsh Bayou is characterized by high peak flows after rain events, followed by periods of extremely low flow when the sediment and pollutants that have been transported to the bayou are slowly degraded, consuming much of the dissolved oxygen that is present in the water column (LDEQ 2003b).

The 2006 and draft 2008 *Integrated Reports* show the primary contact recreation designated use as not being supported and fecal coliform listed as the cause of impairment for this subsegment. The suspected sources of impairment from fecal coliform are on-site treatment systems (septic systems and similar decentralized systems) and unpermitted discharge (domestic wastes) (LDEQ 2007a and 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 030603 land use (NLCD 2001)

Land use	Percent
Open water	0.22%
Developed	4.73%
Barren land	0.14%
Forest	10.62%
Grass/shrub	22.44%
Pasture/hay	19.11%
Cultivated crops	14.79%
Woody wetlands	27.72%
Emergent herbaceous wetlands	0.23%

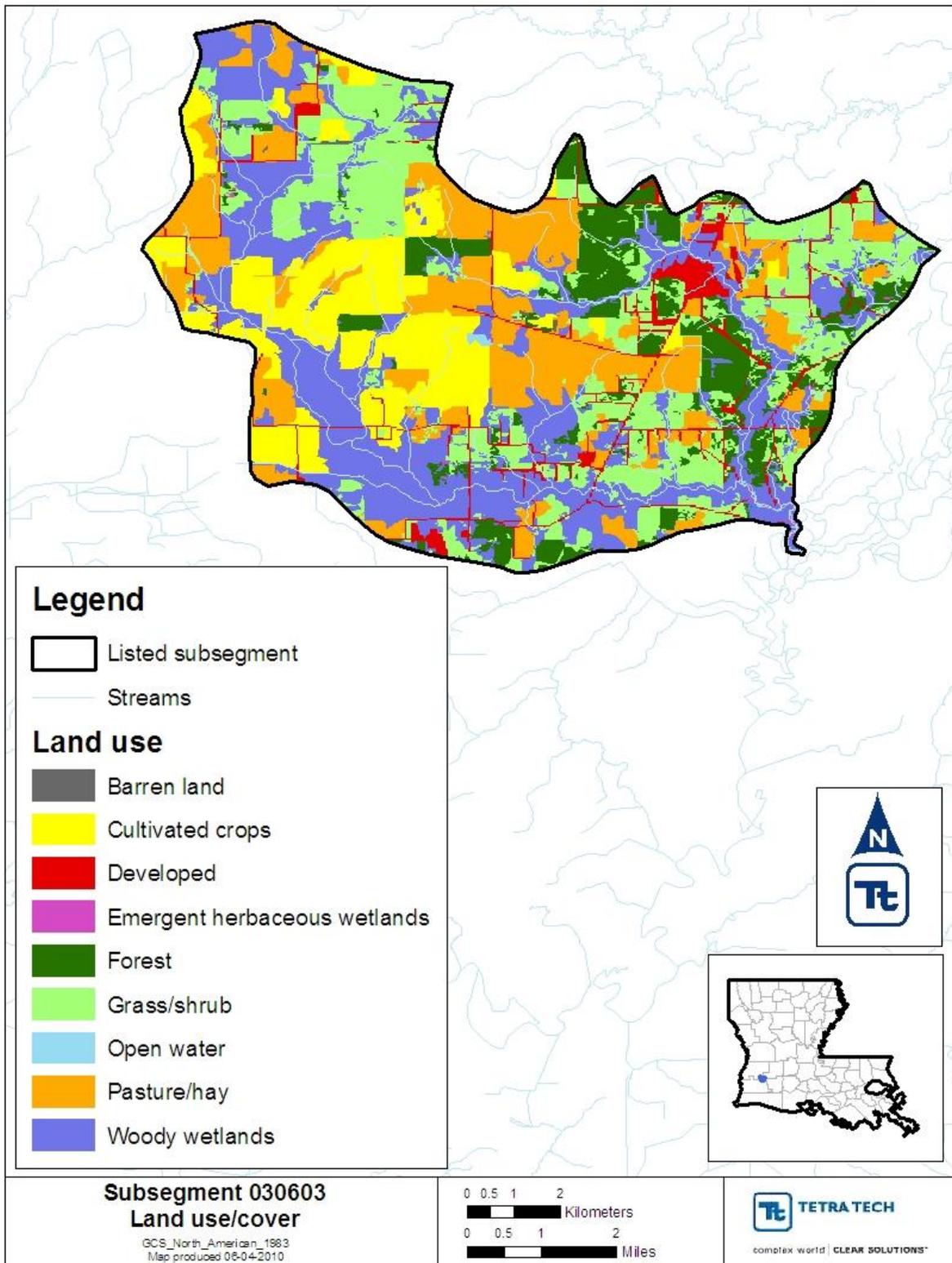


Figure 2-1. Land use in Marsh Bayou (subsegment 030603).

2.2 Water Quality Data

There is one water quality station in subsegment 030603 of Marsh Bayou with fecal coliform data. Station 839 (Marsh Bayou southeast of Topsy, Louisiana) had 25 fecal coliform observations collected in 2005, 2008, and 2009. Eight of the samples exceeded water quality criteria for fecal coliform. Samples taken on May 3, 2005, May 23, 2005, August 2, 2005, and June 23, 2009, exceeded the water quality criterion for primary contact recreation. Samples taken February 15, 2005, March 8, 2005, April 12, 2005, and April 28, 2009, exceeded the water quality criterion for secondary contact recreation. Data collected from 1999 also exceed the water quality criterion for primary contact recreation. However, only observed data from during 2005 and after were used in this TMDL. Of the water quality samples collected after 2004, 16 percent exceeded the water quality criterion for primary contact recreation and 16 percent exceeded the water quality criterion for secondary contact recreation on subsegment 030603. Appendix A contains the raw water quality data.

The fecal coliform data were plotted over time for subsegment 030603 (Figure 2-2). As previously noted, the exceedances occurred during February, March, April, May, June, and August. No distinct seasonal trends or patterns can be seen in the water quality data.

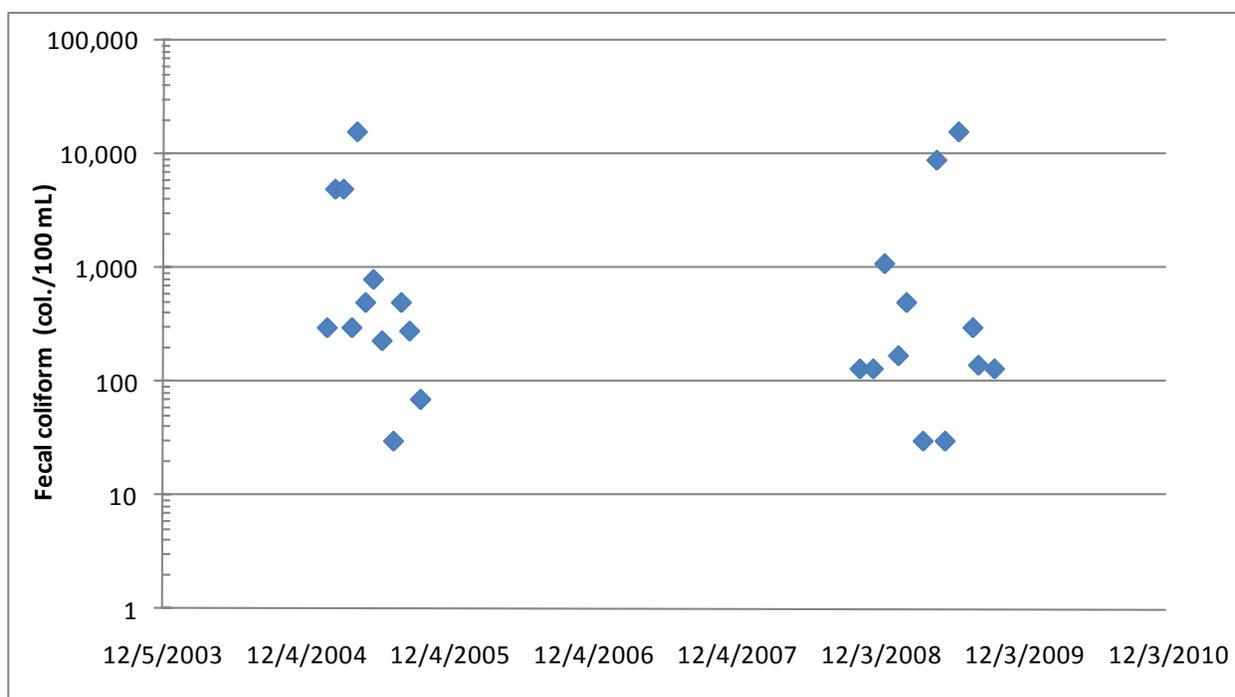


Figure 2-2. Fecal coliform data at station 839.

2.3 Water Quality Standards and Criteria

The designated uses for subsegment 030603 are primary contact recreation, secondary contact recreation, and propagation of fish and wildlife. Primary contact recreation includes any recreational or other water contact activity that involves prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable. Examples of that type of water use include swimming, water skiing, and diving (LDEQ 2007b). Secondary contact recreation includes any recreational or other water contact activity in which prolonged or regular full-body contact with the water is either incidental or accidental, and the probability of ingesting appreciable amounts of water is minimal. Examples of that type of water use include fishing, wading, and boating (LDEQ 2007b). The criteria for protection of aquatic life are based on acute and chronic

concentrations in fresh and marine waters and 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 nonrecreational period of November 1 through April 30, the criterion for secondary contact recreation applies. For secondary contact recreation, no more than 25 percent of the total samples collected on a monthly or near-monthly basis may exceed a fecal coliform density of 2,000/100 mL. The secondary contact recreation criterion applies year-round (LDEQ 2007b).

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

2.4 Flow

Subsegment 030603 has no active U.S. Geological Survey (USGS) flow-monitoring gages or other known flow gages. Flow for Marsh Bayou was calculated on the basis of the USGS station at Bundick Creek near DeRidder (USGS 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* identifies on-site treatment systems (septic systems and similar decentralized systems) and unpermitted discharges (domestic wastes) as the suspected nonpoint sources of the fecal coliform bacteria impairment in Marsh Bayou, subsegment 030603 (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 to 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, five active permitted facilities discharge to Marsh Bayou (Table 2-3).

Table 2-3. Summary of NPDES permits in subsegment 030603

AI #	Permit #	Outfall	Facility name	Exp. date	Facility type	Outfall type	Receiving waterbody
128335	LAG532248	001	Liberty Gas Storage LLC - Ragley Compressor Station	11/30/12	Electric, Gas, and Sanitary Services	treated sanitary wastewater	facility ditch to Marsh Bayou
159016	LAG532988	001	Fire District #7 Ward 9	11/30/12	Justice, Public Order, and Safety	treated sanitary wastewater	North Lane Road ditch to Topsy Road ditch to Marsh Bayou to Calcasieu River
158486	LAG533014	001	Fournet Boudreaux VFW Post 10665	11/30/12	General Agency Interest	treated sanitary wastewater	unnamed ditch to Marsh Bayou
158144	LAU005938	001	Topsy Fire Department District 7	n/a ^a	Nonclassifiable Establishments	sanitary wastewater	local drainage to Marsh Bayou
157897	LAR05P013		Gillis Lumber	4/30/11	Lumber and Wood Products, Except Furniture	MSGP - stormwater	Unnamed creek to Marsh Bayou to Calcasieu River
119483	LAR10C437		Briars Subdivision	10/01/14	Real Estate	stormwater CGP	Marsh Bayou

^a n/a = not applicable. This facility is does not require a sanitary discharge permit.

3. TMDL Load Calculations

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

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

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

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

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

3.1 Load Duration Curve Approach

The methodology used to determine the TMDL for subsegment 030603 is the load duration curve. This TMDL represents a continuum of desired loads over all flow conditions, rather than a fixed, single value, because loading capacity varies as a function of the flow present in the stream. The basic elements of this procedure are documented on the Kansas Department of Health and Environment Web site (KDHE 2003). That method was used to illustrate allowable loading for a wide range of flows. The steps for how the methodology was applied for the TMDL in this report are summarized as follows:

1. Develop a flow duration curve.
2. Convert the flow duration curve to load duration curves 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 030603. Detailed flow information for subsegment 030603 was not available. To determine flow, data from the active USGS gage on Bundick Creek near DeRidder, Louisiana (08014800), with a drainage area of 120 square miles, was chosen to represent flow, and only the flows from 2007 and later were used. Flow from that gage was area-weighted to represent the flow from the TMDL subsegment. The area of the subsegment is 39 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.

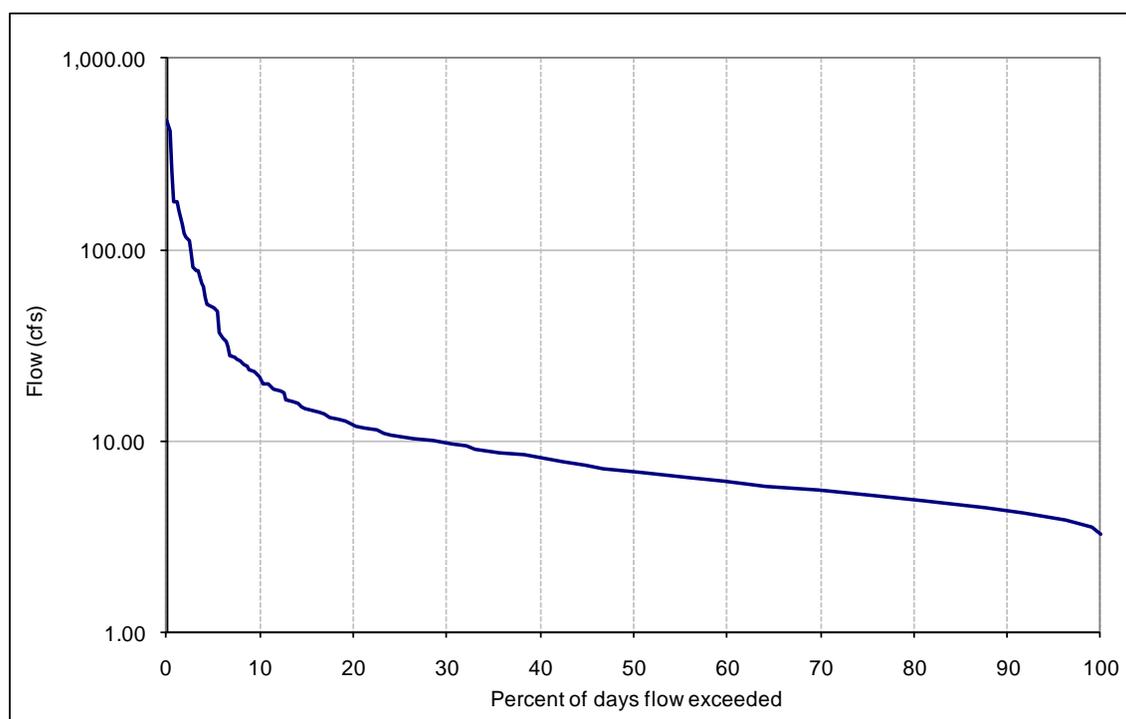


Figure 3-1. Summer flow duration curve for gage 08014800.

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 allows for analysis of load cases in the future for different flow regimes.

Observed Loads

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

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

3.2 TMDL

Table 3-1 presents the TMDLs and allocations for Marsh Bayou, subsegment 030603. Only observed data from 2005 and after were used in this TMDL. The reductions for fecal coliform bacteria at the monitoring station on Marsh Bayou are 82 percent during the winter and 98 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 Marsh Bayou

Season	TMDL (MPN/day)	WLA (MPN/day)	LA (MPN/day)	Explicit MOS (MPN/day)	Percent reduction
Winter	2.73E+12	9.99E+06	2.18E+12	5.46E+11	82%
Summer	1.41E+11	9.99E+06	1.13E+11	2.82E+10	98%

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 030603 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:

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

Table 3-2. WLA summary for subsegment 030603

AI #	Permit #	Outfall	Facility name	Outfall type	Flow type	Flow (gpd)	FCB limit type	Limit (MPN/100 mL)	Load (MPN/d)
128335	LAG532248	001	Liberty Gas Storage LLC - Ragley Compressor Station	treated sanitary wastewater	expected	100	monthly ave.	200	7.57E+05
159016	LAG532988	001	Fire District #7 Ward 9	treated sanitary wastewater	expected	140	weekly ave.	400	2.12E+06
158486	LAG533014	001	Fournet Boudreaux VFW Post 10665	treated sanitary wastewater	expected	470	weekly ave.	400	7.12E+06
157897	LAR05P013		Gillis Lumber	MSGP - stormwater	not avail.		none		0.00E+00
119483	LAR10C437		Briars Subdivision	stormwater CGP	not avail.		none		0.00E+00
158144	LAU005938	001	Topsy Fire Department District 7		not avail.		n/a		0.00E+00

Note: MPN = most probable number. n/a = not applicable (facility is not required to have a sanitary discharge permit)

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

3.4 Load Allocation (LA)

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

3.5 Margin of Safety (MOS)

The Clean Water Act requires that TMDLs take into consideration a margin of safety. The MOS is the portion of the pollutant loading reserved to account for any uncertainty in the data. There are two ways to incorporate the MOS. One way is to implicitly incorporate it by using conservative model assumptions to develop allocations. The other way is to explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations (USEPA 1991). For this TMDL an explicit MOS of 20 percent was used; it is 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 its 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. Subsegment 030603 of Marsh Bayou would have been monitored with the Calcasieu River Basin in 2004, 2005, 2008, and 2009. Fecal coliform data appear to have been collected in 2005, 2008, and 2009. 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 TMDLs have been implemented. When LDEQ evaluates monitoring results at the end of each year, it may add waterbodies to or remove them from the section 303(d) list of impaired waterbodies.

5. Public Participation

Federal regulations require LDEQ to notify the public and seek comments concerning the TMDLs it prepares. This TMDL was developed under contract to LDEQ, and LDEQ will hold a public review period seeking comments, information, and data from the public and any other interested party. The

notice for the public review period will be published in local and state newspapers and on LDEQ's electronic notification system. The TMDL report will be available on LDEQ's TMDL Web site at <http://www.deq.louisiana.gov/portal/default.aspx?tabid=1563>. The public review period will last for 30 days. LDEQ will review all comments received, and this TMDL might be revised to reflect comments if appropriate.

6. References

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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
Marsh Bayou southeast of Topsy, Louisiana	839	1/20/99	7	
Marsh Bayou southeast of Topsy, Louisiana	839	3/17/99	240	
Marsh Bayou southeast of Topsy, Louisiana	839	4/21/99	50	
Marsh Bayou southeast of Topsy, Louisiana	839	5/19/99	30	
Marsh Bayou southeast of Topsy, Louisiana	839	6/16/99	80	
Marsh Bayou southeast of Topsy, Louisiana	839	7/21/99	170	
Marsh Bayou southeast of Topsy, Louisiana	839	8/18/99	50	
Marsh Bayou southeast of Topsy, Louisiana	839	9/22/99	1,600	PCR
Marsh Bayou southeast of Topsy, Louisiana	839	10/20/99	170	
Marsh Bayou southeast of Topsy, Louisiana	839	11/17/99	1,300	
Marsh Bayou southeast of Topsy, Louisiana	839	12/22/99	500	
Marsh Bayou southeast of Topsy, Louisiana	839	1/25/05	300	
Marsh Bayou southeast of Topsy, Louisiana	839	2/15/05	5,000	SCR
Marsh Bayou southeast of Topsy, Louisiana	839	3/8/05	5,000	SCR
Marsh Bayou southeast of Topsy, Louisiana	839	3/29/05	300	
Marsh Bayou southeast of Topsy, Louisiana	839	4/12/05	16,000	SCR
Marsh Bayou southeast of Topsy, Louisiana	839	5/3/05	500	PCR
Marsh Bayou southeast of Topsy, Louisiana	839	5/23/05	800	PCR
Marsh Bayou southeast of Topsy, Louisiana	839	6/14/05	230	
Marsh Bayou southeast of Topsy, Louisiana	839	7/13/05	30	
Marsh Bayou southeast of Topsy, Louisiana	839	8/2/05	500	PCR
Marsh Bayou southeast of Topsy, Louisiana	839	8/23/05	280	
Marsh Bayou southeast of Topsy, Louisiana	839	9/20/05	70	
Marsh Bayou southeast of Topsy, Louisiana	839	9/20/05	70	
Marsh Bayou southeast of Topsy, Louisiana	839	10/14/08	130	
Marsh Bayou southeast of Topsy, Louisiana	839	11/17/08	130	
Marsh Bayou southeast of Topsy, Louisiana	839	12/16/08	1,100	
Marsh Bayou southeast of Topsy, Louisiana	839	1/20/09	170	
Marsh Bayou southeast of Topsy, Louisiana	839	2/10/09	500	
Marsh Bayou southeast of Topsy, Louisiana	839	3/24/09	30	
Marsh Bayou southeast of Topsy, Louisiana	839	4/28/09	9,000	SCR
Marsh Bayou southeast of Topsy, Louisiana	839	5/19/09	30	
Marsh Bayou southeast of Topsy, Louisiana	839	6/23/09	16,000	PCR
Marsh Bayou southeast of Topsy, Louisiana	839	7/29/09	300	
Marsh Bayou southeast of Topsy, Louisiana	839	8/12/09	140	
Marsh Bayou southeast of Topsy, Louisiana	839	9/22/09	130	

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

Table A-2. Fecal coliform summary statistics for station 839

Statistic	Value ^a
Minimum (MPN/100 mL)	30
Maximum (MPN/100 mL)	16,000
Average (MPN/100 mL)	2,269.6
Count	25
Percentage of data that violate the PCR criterion	16
Percentage of data that violate the SCR criterion	16

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

Appendix B. Load Duration Curve Plots

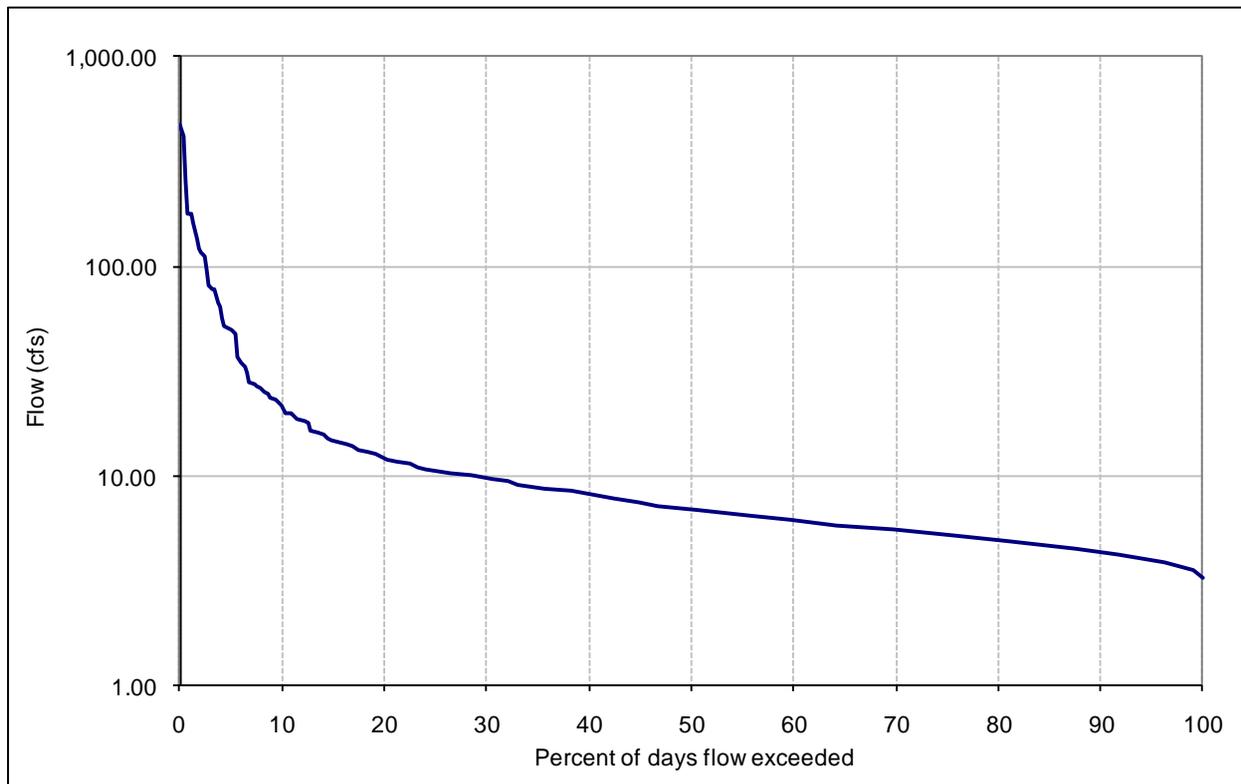


Figure B-1. Summer flow duration curve for gage 08014800.

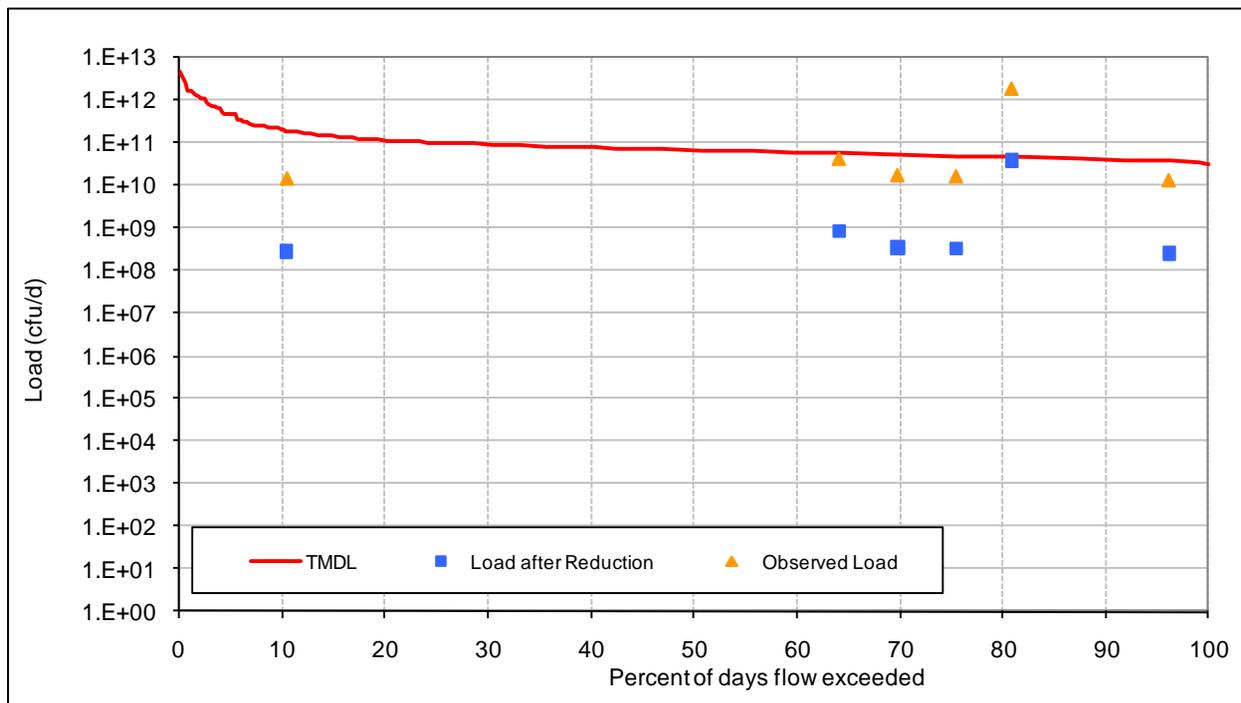


Figure B-2. Summer load duration curve.

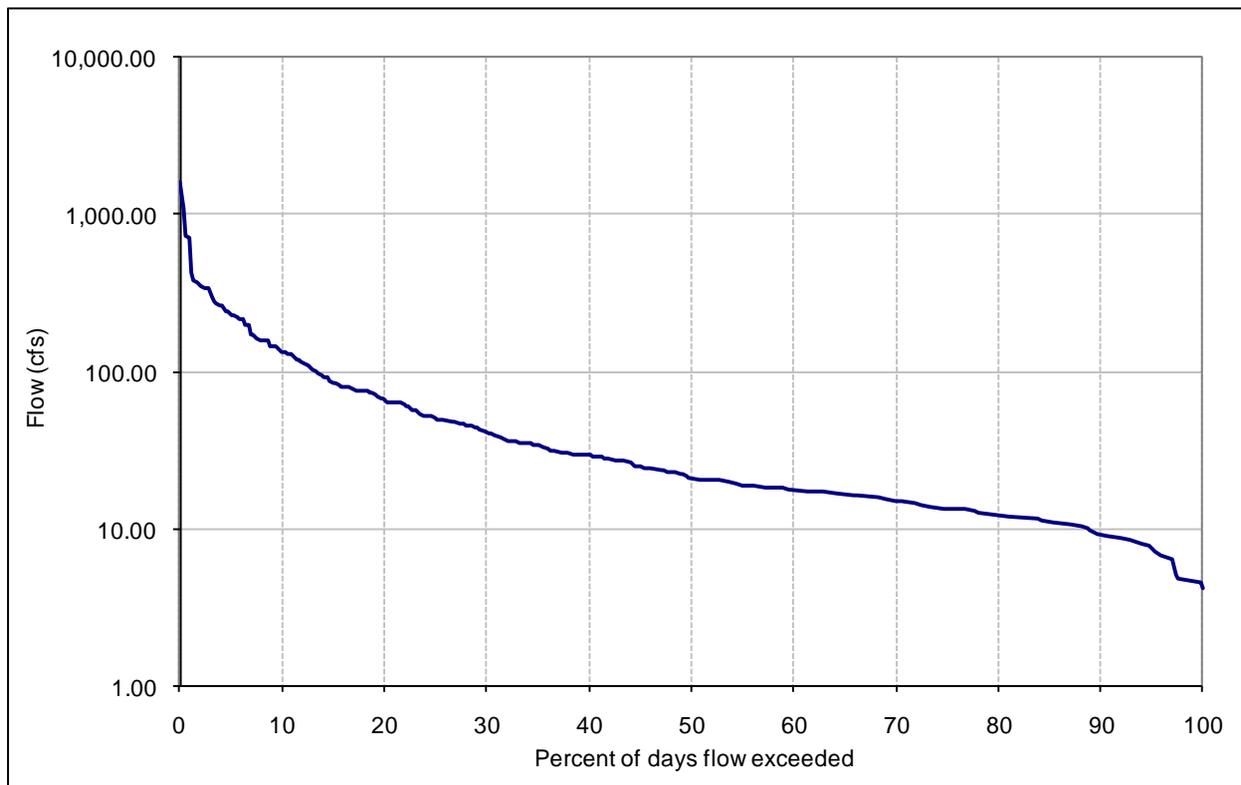


Figure B-3. Winter flow duration curve for gage 08014800.

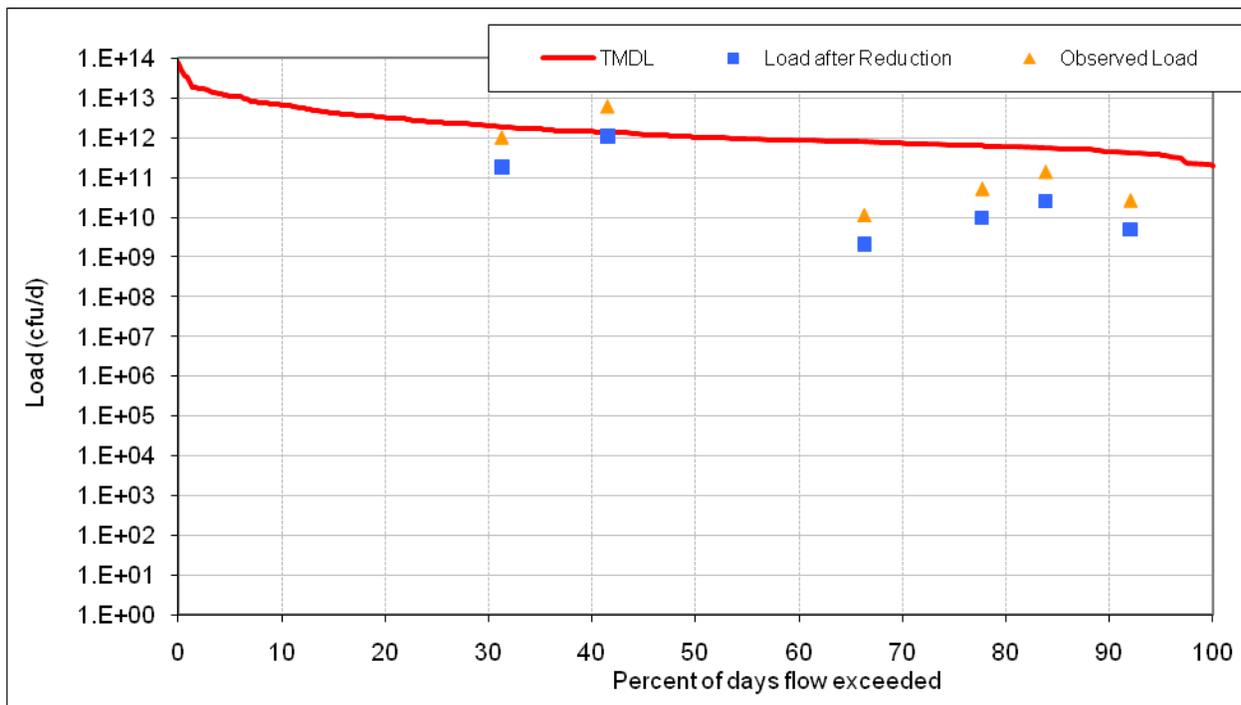


Figure B-4. Winter load duration curve.

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?
6/23/2009	16000	4.831983612	80.9	1.891E+12	3.783E+10	3.783E+10	Yes
7/29/2009	300	5.798380334	64.1	4.256E+10	8.512E+08	4.540E+10	Yes
8/12/2009	140	3.86558689	96.2	1.324E+10	2.648E+08	3.026E+10	Yes
10/14/2008	130	5.154115853	75.5	1.639E+10	3.279E+08	4.035E+10	Yes
9/22/2009	130	5.476248094	69.8	1.742E+10	3.483E+08	4.287E+10	Yes
5/19/2009	30	19.97219893	10.4	1.466E+10	2.932E+08	1.564E+11	Yes

Table C-2. Load duration curve summer statistics

Total No. of samples =	6	
MOS =	20%	
WQ standard for =	400	MPN/100 mL
Percent Reduction Required =	98.0	
Allowable percentage of exceedences =	0%	
No. of exceedences after reductions =	0	
Sum of flow on sampling day	45	cfs
Sum of current loads	1.996E+12	MPN/d
Flow weighted avg conc	1,809	MPN/100 mL
Average flow	15	cfs
Existing total load	6.799E+11	MPN/d
Existing point source load	9.993E+06	MPN/d
Existing remaining load	6.798E+11	MPN/d
Total allowable loading	1.409E+11	MPN/d
Explicit MOS (20%)	2.818E+10	MPN/d
WLA	9.993E+06	MPN/d
LA	1.127E+11	MPN/d
USGS drainage area (mi ²) =	120.0	
SS drainage area (mi ²) =	38.66	

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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)
						140,919,179,705
8/15/09	10.00	100.00	3.221322	0.00	31,524,838,305	0
8/16/09	10.00	100.00	3.221322	0.00	31,524,838,305	0
8/17/09	10.00	100.00	3.221322	0.00	31,524,838,305	0
8/25/09	10.00	100.00	3.221322	1.00	31,524,838,305	315,248,383
7/14/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
7/15/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
8/13/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
8/14/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
8/18/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
8/24/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
9/3/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
9/4/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
9/5/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
9/8/09	11.00	99.00	3.543455	0.00	34,677,322,135	0
9/9/09	11.00	99.00	3.543455	2.80	34,677,322,135	970,965,020
7/30/08	12.00	96.20	3.865587	0.00	37,829,805,965	0
7/31/08	12.00	96.20	3.865587	0.00	37,829,805,965	0
8/1/08	12.00	96.20	3.865587	0.00	37,829,805,965	0
8/2/08	12.00	96.20	3.865587	0.00	37,829,805,965	0
7/3/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
7/4/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
7/5/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
7/6/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
7/13/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
8/12/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
8/23/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
8/26/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
8/27/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
8/28/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
8/29/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
9/2/09	12.00	96.20	3.865587	0.00	37,829,805,965	0
9/7/09	12.00	96.20	3.865587	4.40	37,829,805,965	1,664,511,462
7/20/08	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/21/08	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/22/08	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/23/08	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/28/08	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/29/08	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/2/09	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/12/09	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/17/09	13.00	91.80	4.187719	0.00	40,982,289,796	0
7/18/09	13.00	91.80	4.187719	0.00	40,982,289,796	0
8/8/09	13.00	91.80	4.187719	0.00	40,982,289,796	0

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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	4.187719	0.00	40,982,289,796	0
8/11/09	13.00	91.80	4.187719	0.00	40,982,289,796	0
8/19/09	13.00	91.80	4.187719	0.00	40,982,289,796	0
8/21/09	13.00	91.80	4.187719	0.00	40,982,289,796	0
9/11/09	13.00	91.80	4.187719	4.20	40,982,289,796	1,721,256,171
7/17/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/18/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/19/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/24/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/27/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
10/27/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
10/28/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
10/29/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
10/30/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
10/31/08	14.00	87.60	4.509851	0.00	44,134,773,626	0
6/27/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
6/28/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/1/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/7/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/10/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/11/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/27/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
7/28/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
8/7/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
8/10/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
8/20/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
8/22/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
9/1/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
9/10/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
9/12/09	14.00	87.60	4.509851	0.00	44,134,773,626	0
10/1/09	14.00	87.60	4.509851	6.70	44,134,773,626	2,957,029,833
7/13/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
7/14/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
7/15/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
7/16/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
7/26/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
8/11/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
8/12/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
10/24/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
10/25/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
10/26/08	15.00	80.90	4.831984	0.00	47,287,257,457	0
6/22/09	15.00	80.90	4.831984	0.00	47,287,257,457	0
6/23/09	15.00	80.90	4.831984	0.00	47,287,257,457	0
6/24/09	15.00	80.90	4.831984	0.00	47,287,257,457	0
6/25/09	15.00	80.90	4.831984	0.00	47,287,257,457	0

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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	4.831984	0.00	47,287,257,457	0
7/8/09	15.00	80.90	4.831984	0.00	47,287,257,457	0
7/9/09	15.00	80.90	4.831984	0.00	47,287,257,457	0
7/21/09	15.00	80.90	4.831984	0.00	47,287,257,457	0
7/26/09	15.00	80.90	4.831984	0.00	47,287,257,457	0
8/6/09	15.00	80.90	4.831984	0.00	47,287,257,457	0
9/30/09	15.00	80.90	4.831984	5.40	47,287,257,457	2,553,511,903
7/9/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
7/10/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
8/10/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
8/30/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
8/31/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/1/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/2/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/3/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/4/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/5/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/6/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/7/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/13/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/14/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/22/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
10/23/08	16.00	75.50	5.154116	0.00	50,439,741,287	0
6/19/09	16.00	75.50	5.154116	0.00	50,439,741,287	0
6/20/09	16.00	75.50	5.154116	0.00	50,439,741,287	0
6/21/09	16.00	75.50	5.154116	0.00	50,439,741,287	0
7/20/09	16.00	75.50	5.154116	0.00	50,439,741,287	0
7/25/09	16.00	75.50	5.154116	0.00	50,439,741,287	0
8/5/09	16.00	75.50	5.154116	5.70	50,439,741,287	2,875,065,253
7/8/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
7/12/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
8/9/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
8/18/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
8/28/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
8/29/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
9/1/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
9/28/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
9/29/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
9/30/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
10/8/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
10/9/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
10/12/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
10/15/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
10/21/08	17.00	69.80	5.476248	0.00	53,592,225,118	0
6/17/09	17.00	69.80	5.476248	0.00	53,592,225,118	0

DRAFT—Marsh Bayou (Subsegment 030603) Fecal Coliform Bacteria TMDL
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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	5.476248	0.00	53,592,225,118	0
7/22/09	17.00	69.80	5.476248	0.00	53,592,225,118	0
7/24/09	17.00	69.80	5.476248	0.00	53,592,225,118	0
8/31/09	17.00	69.80	5.476248	0.00	53,592,225,118	0
9/22/09	17.00	69.80	5.476248	0.00	53,592,225,118	0
9/29/09	17.00	69.80	5.476248	5.70	53,592,225,118	3,054,756,832
6/20/08	18.00	64.10	5.798380	0.00	56,744,708,948	0
6/21/08	18.00	64.10	5.798380	0.00	56,744,708,948	0
7/7/08	18.00	64.10	5.798380	0.00	56,744,708,948	0
7/25/08	18.00	64.10	5.798380	0.00	56,744,708,948	0
9/26/08	18.00	64.10	5.798380	0.00	56,744,708,948	0
9/27/08	18.00	64.10	5.798380	0.00	56,744,708,948	0
10/11/08	18.00	64.10	5.798380	0.00	56,744,708,948	0
10/20/08	18.00	64.10	5.798380	0.00	56,744,708,948	0
6/15/09	18.00	64.10	5.798380	0.00	56,744,708,948	0
6/16/09	18.00	64.10	5.798380	0.00	56,744,708,948	0
6/29/09	18.00	64.10	5.798380	0.00	56,744,708,948	0
6/30/09	18.00	64.10	5.798380	0.00	56,744,708,948	0
7/23/09	18.00	64.10	5.798380	0.00	56,744,708,948	0
7/29/09	18.00	64.10	5.798380	0.00	56,744,708,948	0
9/21/09	18.00	64.10	5.798380	0.00	56,744,708,948	0
9/28/09	18.00	64.10	5.798380	0.00	56,744,708,948	0
10/2/09	18.00	64.10	5.798380	4.40	56,744,708,948	2,496,767,194
6/10/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
6/15/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
6/19/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
7/3/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
7/4/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
8/13/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
8/19/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
8/20/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
8/27/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
9/12/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
9/24/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
9/25/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
10/19/08	19.00	59.70	6.120513	0.00	59,897,192,779	0
6/14/09	19.00	59.70	6.120513	0.00	59,897,192,779	0
8/4/09	19.00	59.70	6.120513	3.80	59,897,192,779	2,276,093,326
10/14/07	20.00	55.90	6.442645	0.00	63,049,676,609	0
10/15/07	20.00	55.90	6.442645	0.00	63,049,676,609	0
10/16/07	20.00	55.90	6.442645	0.00	63,049,676,609	0
6/6/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
6/7/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
6/8/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
6/9/08	20.00	55.90	6.442645	0.00	63,049,676,609	0

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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	6.442645	0.00	63,049,676,609	0
6/14/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
6/22/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
6/24/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
8/8/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
8/17/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
8/26/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
9/11/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
9/23/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
10/10/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
10/18/08	20.00	55.90	6.442645	0.00	63,049,676,609	0
6/13/09	20.00	55.90	6.442645	0.00	63,049,676,609	0
9/27/09	20.00	55.90	6.442645	5.20	63,049,676,609	3,278,583,184
10/12/07	21.00	50.70	6.764777	0.00	66,202,160,440	0
10/13/07	21.00	50.70	6.764777	0.00	66,202,160,440	0
6/4/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
6/5/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
6/12/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
6/13/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
6/16/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
6/17/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
6/29/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
9/10/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
9/22/08	21.00	50.70	6.764777	0.00	66,202,160,440	0
6/12/09	21.00	50.70	6.764777	0.00	66,202,160,440	0
9/6/09	21.00	50.70	6.764777	0.00	66,202,160,440	0
9/23/09	21.00	50.70	6.764777	0.00	66,202,160,440	0
9/26/09	21.00	50.70	6.764777	3.90	66,202,160,440	2,581,884,257
10/11/07	22.00	46.80	7.086909	0.00	69,354,644,270	0
6/3/08	22.00	46.80	7.086909	0.00	69,354,644,270	0
7/1/08	22.00	46.80	7.086909	0.00	69,354,644,270	0
9/21/08	22.00	46.80	7.086909	0.00	69,354,644,270	0
10/17/08	22.00	46.80	7.086909	0.00	69,354,644,270	0
6/11/09	22.00	46.80	7.086909	0.00	69,354,644,270	0
7/30/09	22.00	46.80	7.086909	0.00	69,354,644,270	0
9/20/09	22.00	46.80	7.086909	2.00	69,354,644,270	1,387,092,885
10/4/07	23.00	44.80	7.409042	0.00	72,507,128,100	0
10/5/07	23.00	44.80	7.409042	0.00	72,507,128,100	0
10/7/07	23.00	44.80	7.409042	0.00	72,507,128,100	0
10/10/07	23.00	44.80	7.409042	0.00	72,507,128,100	0
6/18/08	23.00	44.80	7.409042	0.00	72,507,128,100	0
9/9/08	23.00	44.80	7.409042	0.00	72,507,128,100	0
9/20/08	23.00	44.80	7.409042	0.00	72,507,128,100	0
6/10/09	23.00	44.80	7.409042	0.00	72,507,128,100	0
7/19/09	23.00	44.80	7.409042	2.40	72,507,128,100	1,740,171,074

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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	7.731174	0.00	75,659,611,931	0
10/8/07	24.00	42.40	7.731174	0.00	75,659,611,931	0
10/9/07	24.00	42.40	7.731174	0.00	75,659,611,931	0
6/2/08	24.00	42.40	7.731174	0.00	75,659,611,931	0
6/28/08	24.00	42.40	7.731174	0.00	75,659,611,931	0
7/11/08	24.00	42.40	7.731174	0.00	75,659,611,931	0
8/25/08	24.00	42.40	7.731174	0.00	75,659,611,931	0
7/16/09	24.00	42.40	7.731174	2.00	75,659,611,931	1,513,192,239
10/2/07	25.00	40.40	8.053306	0.00	78,812,095,761	0
10/6/07	25.00	40.40	8.053306	0.00	78,812,095,761	0
5/13/08	25.00	40.40	8.053306	0.00	78,812,095,761	0
6/27/08	25.00	40.40	8.053306	0.00	78,812,095,761	0
7/2/08	25.00	40.40	8.053306	0.00	78,812,095,761	0
8/15/08	25.00	40.40	8.053306	0.00	78,812,095,761	0
6/9/09	25.00	40.40	8.053306	0.00	78,812,095,761	0
10/3/09	25.00	40.40	8.053306	2.10	78,812,095,761	1,655,054,011
5/12/08	26.00	38.30	8.375438	0.00	81,964,579,592	0
5/28/08	26.00	38.30	8.375438	0.00	81,964,579,592	0
6/1/08	26.00	38.30	8.375438	0.00	81,964,579,592	0
6/26/08	26.00	38.30	8.375438	0.00	81,964,579,592	0
8/7/08	26.00	38.30	8.375438	0.00	81,964,579,592	0
9/19/08	26.00	38.30	8.375438	0.00	81,964,579,592	0
6/3/09	26.00	38.30	8.375438	0.00	81,964,579,592	0
8/3/09	26.00	38.30	8.375438	0.00	81,964,579,592	0
9/13/09	26.00	38.30	8.375438	0.00	81,964,579,592	0
9/25/09	26.00	38.30	8.375438	2.60	81,964,579,592	2,131,079,069
10/1/07	27.00	35.70	8.697571	0.00	85,117,063,422	0
5/11/08	27.00	35.70	8.697571	0.00	85,117,063,422	0
5/27/08	27.00	35.70	8.697571	0.00	85,117,063,422	0
6/23/08	27.00	35.70	8.697571	0.00	85,117,063,422	0
6/25/08	27.00	35.70	8.697571	0.00	85,117,063,422	0
6/30/08	27.00	35.70	8.697571	0.00	85,117,063,422	0
9/8/08	27.00	35.70	8.697571	0.00	85,117,063,422	0
6/2/09	27.00	35.70	8.697571	0.00	85,117,063,422	0
6/8/09	27.00	35.70	8.697571	0.00	85,117,063,422	0
10/8/09	27.00	35.70	8.697571	2.60	85,117,063,422	2,213,043,649
10/31/07	28.00	33.10	9.019703	0.00	88,269,547,253	0
6/1/09	28.00	33.10	9.019703	0.00	88,269,547,253	0
8/30/09	28.00	33.10	9.019703	0.00	88,269,547,253	0
9/18/09	28.00	33.10	9.019703	1.00	88,269,547,253	882,695,473
10/30/07	29.00	32.10	9.341835	0.00	91,422,031,083	0
5/10/08	29.00	32.10	9.341835	0.00	91,422,031,083	0
7/5/08	29.00	32.10	9.341835	0.00	91,422,031,083	0
10/16/08	29.00	32.10	9.341835	0.00	91,422,031,083	0
5/31/09	29.00	32.10	9.341835	0.00	91,422,031,083	0

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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	9.341835	1.60	91,422,031,083	1,462,752,497
5/14/08	30.00	30.50	9.663967	0.00	94,574,514,914	0
5/22/08	30.00	30.50	9.663967	0.00	94,574,514,914	0
5/23/08	30.00	30.50	9.663967	0.00	94,574,514,914	0
5/26/08	30.00	30.50	9.663967	0.00	94,574,514,914	0
5/31/08	30.00	30.50	9.663967	0.00	94,574,514,914	0
7/6/08	30.00	30.50	9.663967	0.00	94,574,514,914	0
6/7/09	30.00	30.50	9.663967	0.00	94,574,514,914	0
9/19/09	30.00	30.50	9.663967	2.00	94,574,514,914	1,891,490,298
10/29/07	31.00	28.50	9.986099	0.00	97,726,998,744	0
5/2/08	31.00	28.50	9.986099	0.00	97,726,998,744	0
5/9/08	31.00	28.50	9.986099	0.00	97,726,998,744	0
8/14/08	31.00	28.50	9.986099	0.00	97,726,998,744	0
8/16/08	31.00	28.50	9.986099	0.00	97,726,998,744	0
6/5/09	31.00	28.50	9.986099	0.00	97,726,998,744	0
9/16/09	31.00	28.50	9.986099	0.00	97,726,998,744	0
9/24/09	31.00	28.50	9.986099	2.10	97,726,998,744	2,052,266,974
5/1/08	32.00	26.40	10.308232	0.00	100,879,482,575	0
5/21/08	32.00	26.40	10.308232	0.00	100,879,482,575	0
9/13/08	32.00	26.40	10.308232	0.00	100,879,482,575	0
9/18/08	32.00	26.40	10.308232	0.00	100,879,482,575	0
5/30/09	32.00	26.40	10.308232	0.00	100,879,482,575	0
6/4/09	32.00	26.40	10.308232	0.00	100,879,482,575	0
6/6/09	32.00	26.40	10.308232	0.00	100,879,482,575	0
10/5/09	32.00	26.40	10.308232	0.00	100,879,482,575	0
10/20/09	32.00	26.40	10.308232	2.30	100,879,482,575	2,320,228,099
10/28/07	33.00	24.10	10.630364	0.00	104,031,966,405	0
5/8/08	33.00	24.10	10.630364	0.00	104,031,966,405	0
10/4/09	33.00	24.10	10.630364	0.80	104,031,966,405	832,255,731
5/24/08	34.00	23.30	10.952496	0.00	107,184,450,235	0
5/30/08	34.00	23.30	10.952496	0.00	107,184,450,235	0
9/7/08	34.00	23.30	10.952496	0.80	107,184,450,235	857,475,602
5/3/08	35.00	22.50	11.274628	0.00	110,336,934,066	0
8/24/08	35.00	22.50	11.274628	0.00	110,336,934,066	0
5/29/09	35.00	22.50	11.274628	0.00	110,336,934,066	0
9/15/09	35.00	22.50	11.274628	0.00	110,336,934,066	0
10/6/09	35.00	22.50	11.274628	1.30	110,336,934,066	1,434,380,143
5/7/08	36.00	21.20	11.596761	0.00	113,489,417,896	0
5/25/08	36.00	21.20	11.596761	0.00	113,489,417,896	0
8/6/08	36.00	21.20	11.596761	0.00	113,489,417,896	0
10/10/09	36.00	21.20	11.596761	1.00	113,489,417,896	1,134,894,179
10/27/07	37.00	20.20	11.918893	0.00	116,641,901,727	0
5/20/08	37.00	20.20	11.918893	0.00	116,641,901,727	0
9/17/09	37.00	20.20	11.918893	0.00	116,641,901,727	0
10/7/09	37.00	20.20	11.918893	1.00	116,641,901,727	1,166,419,017

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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	12.563157	0.00	122,946,869,388	0
5/28/09	39.00	19.20	12.563157	0.00	122,946,869,388	0
10/11/09	39.00	19.20	12.563157	0.80	122,946,869,388	983,574,955
8/5/08	40.00	18.40	12.885290	0.00	126,099,353,218	0
5/22/09	40.00	18.40	12.885290	0.00	126,099,353,218	0
7/31/09	40.00	18.40	12.885290	0.00	126,099,353,218	0
10/19/09	40.00	18.40	12.885290	1.00	126,099,353,218	1,260,993,532
10/21/07	41.00	17.40	13.207422	0.00	129,251,837,049	0
5/26/09	41.00	17.40	13.207422	0.60	129,251,837,049	775,511,022
8/21/08	43.00	16.80	13.851686	0.00	135,556,804,710	0
9/14/09	43.00	16.80	13.851686	0.50	135,556,804,710	677,784,024
5/6/08	44.00	16.30	14.173819	0.00	138,709,288,540	0
9/17/08	44.00	16.30	14.173819	0.00	138,709,288,540	0
5/21/09	44.00	16.30	14.173819	0.70	138,709,288,540	970,965,020
5/19/08	45.00	15.60	14.495951	0.00	141,861,772,370	0
5/25/09	45.00	15.60	14.495951	0.00	141,861,772,370	0
5/27/09	45.00	15.60	14.495951	0.80	141,861,772,370	1,134,894,179
10/26/07	46.00	14.80	14.818083	0.30	145,014,256,201	435,042,769
8/2/09	47.00	14.50	15.140215	0.20	148,166,740,031	296,333,480
8/4/08	48.00	14.30	15.462348	0.30	151,319,223,862	453,957,672
10/22/07	49.00	14.00	15.784480	0.00	154,471,707,692	0
5/24/09	49.00	14.00	15.784480	0.50	154,471,707,692	772,358,538
5/29/08	50.00	13.50	16.106612	0.00	157,624,191,523	0
5/20/09	50.00	13.50	16.106612	0.00	157,624,191,523	0
8/1/09	50.00	13.50	16.106612	0.80	157,624,191,523	1,260,993,532
9/6/08	51.00	12.70	16.428744	0.20	160,776,675,353	321,553,351
8/3/08	55.00	12.50	17.717273	0.30	173,386,610,675	520,159,832
5/2/09	56.00	12.20	18.039405	0.00	176,539,094,505	0
5/16/09	56.00	12.20	18.039405	0.00	176,539,094,505	0
10/12/09	56.00	12.20	18.039405	0.80	176,539,094,505	1,412,312,756
10/18/09	58.00	11.40	18.683670	0.20	182,844,062,166	365,688,124
5/11/09	59.00	11.20	19.005802	0.30	185,996,545,997	557,989,638
5/10/09	61.00	10.90	19.650067	0.00	192,301,513,658	0
5/17/09	61.00	10.90	19.650067	0.50	192,301,513,658	961,507,568
5/19/09	62.00	10.40	19.972199	0.30	195,453,997,488	586,361,992
5/18/08	64.00	10.10	20.616463	0.20	201,758,965,149	403,517,930
5/15/09	67.00	9.90	21.582860	0.30	211,216,416,640	633,649,250
9/2/08	70.00	9.60	22.549257	0.20	220,673,868,132	441,347,736
5/1/09	71.00	9.40	22.871389	0.00	223,826,351,962	0
5/9/09	71.00	9.40	22.871389	0.60	223,826,351,962	1,342,958,112
10/25/07	73.00	8.80	23.515654	0.20	230,131,319,623	460,262,639
5/18/09	76.00	8.60	24.482050	0.30	239,588,771,115	718,766,313
10/20/07	78.00	8.30	25.126315	0.00	245,893,738,775	0
5/5/08	78.00	8.30	25.126315	0.50	245,893,738,775	1,229,468,694
8/23/08	81.00	7.80	26.092712	0.30	255,351,190,267	766,053,571

DRAFT—Marsh Bayou (Subsegment 030603) Fecal Coliform Bacteria TMDL
 Origination Date August 23, 2010

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	26.736976	0.20	261,656,157,928	523,312,316
9/16/08	84.00	7.30	27.059108	0.00	264,808,641,758	0
5/8/09	84.00	7.30	27.059108	0.50	264,808,641,758	1,324,043,209
5/4/08	86.00	6.80	27.703373	0.30	271,113,609,419	813,340,828
5/14/09	96.00	6.50	30.924695	0.20	302,638,447,724	605,276,895
9/14/08	103.00	6.30	33.179621	0.30	324,705,834,537	974,117,504
8/22/08	106.00	6.00	34.146018	0.30	334,163,286,028	1,002,489,858
5/7/09	115.00	5.70	37.045208	0.20	362,535,640,502	725,071,281
10/17/07	146.00	5.50	47.031307	0.30	460,262,639,246	1,380,787,918
10/23/07	150.00	5.20	48.319836	0.20	472,872,574,568	945,745,149
5/17/08	155.00	5.00	49.930497	0.30	488,634,993,720	1,465,904,981
9/15/08	158.00	4.70	50.896894	0.30	498,092,445,212	1,494,277,336
10/24/07	160.00	4.40	51.541159	0.20	504,397,412,873	1,008,794,826
9/5/08	175.00	4.20	56.373142	0.30	551,684,670,329	1,655,054,011
5/15/08	199.00	3.90	64.104316	0.20	627,344,282,260	1,254,688,565
10/19/07	208.00	3.70	67.003506	0.30	655,716,636,734	1,967,149,910
10/16/09	240.00	3.40	77.311738	0.20	756,596,119,309	1,513,192,239
10/13/09	243.00	3.20	78.278135	0.30	766,053,570,800	2,298,160,712
5/13/09	250.00	2.90	80.533060	0.30	788,120,957,614	2,364,362,873
9/3/08	300.00	2.60	96.639672	0.20	945,745,149,136	1,891,490,298
9/4/08	348.00	2.40	112.102020	0.30	1,097,064,372,998	3,291,193,119
5/16/08	358.00	2.10	115.323342	0.20	1,128,589,211,303	2,257,178,423
5/3/09	377.00	1.90	121.443855	0.30	1,188,486,404,081	3,565,459,212
10/18/07	421.00	1.60	135.617673	0.30	1,327,195,692,621	3,981,587,078
5/12/09	499.00	1.30	160.743988	0.20	1,573,089,431,397	3,146,178,863
5/6/09	547.00	1.10	176.206336	0.30	1,724,408,655,258	5,173,225,966
10/14/09	549.00	0.80	176.850600	0.20	1,730,713,622,919	3,461,427,246
10/15/09	790.00	0.60	254.484470	0.30	2,490,462,226,059	7,471,386,678
5/5/09	1,290.00	0.30	415.550591	0.30	4,066,704,141,286	12,200,112,424
5/4/09	1,460.00	0.00	470.313072	0.00	4,602,626,392,463	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?
4/28/2009	9000	28.02550495	41.5	6.171E+12	1.097E+12	1.097E+12	Yes
12/16/2008	1100	38.6558689	31.3	1.040E+12	1.849E+11	1.513E+12	Yes
2/10/2009	500	11.59676067	83.8	1.419E+11	2.522E+10	4.540E+11	Yes
1/20/2009	170	12.88528963	77.7	5.359E+10	9.528E+09	5.044E+11	Yes
11/17/2008	130	8.697570501	92	2.766E+10	4.918E+09	3.405E+11	Yes
3/24/2009	30	16.10661204	66.3	1.182E+10	2.102E+09	6.305E+11	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 =	82.2	
Allowable percentage of exceedences =	0%	
No. of exceedences after reductions =	0	
Sum of flow on sampling day	116	cfs
Sum of current loads	7.446E+12	MPN/d
Flow weighted avg conc	2,624	MPN/100 mL
Average flow	60	cfs
Existing total load	3.825E+12	MPN/d
Existing point source load	9.993E+06	MPN/d
Existing remaining load	3.825E+12	MPN/d
Total allowable loading	2.730E+12	MPN/d
Explicit MOS (20%)	5.461E+11	MPN/d
WLA	9.993E+06	MPN/d
LA	2.184E+12	MPN/d
USGS drainage area (mi ²) =	120.0	
SS drainage area (mi ²) =	38.66	

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)
						2,730,476,582,490
11/6/08	13.00	100.00	4.187719	0.20	204,911,448,980	409,822,898
11/1/08	14.00	99.80	4.509851	0.00	220,673,868,132	0
11/2/08	14.00	99.80	4.509851	0.00	220,673,868,132	0
11/3/08	14.00	99.80	4.509851	0.00	220,673,868,132	0
11/4/08	14.00	99.80	4.509851	0.00	220,673,868,132	0
11/5/08	14.00	99.80	4.509851	0.00	220,673,868,132	0
11/7/08	14.00	99.80	4.509851	0.00	220,673,868,132	0
11/8/08	14.00	99.80	4.509851	0.00	220,673,868,132	0
11/9/08	14.00	99.80	4.509851	2.20	220,673,868,132	4,854,825,099
11/10/08	15.00	97.60	4.831984	0.30	236,436,287,284	709,308,862
11/11/08	16.00	97.30	5.154116	0.30	252,198,706,436	756,596,119
11/21/08	20.00	97.00	6.442645	0.00	315,248,383,045	0
11/22/08	20.00	97.00	6.442645	0.00	315,248,383,045	0
11/23/08	20.00	97.00	6.442645	0.00	315,248,383,045	0
11/24/08	20.00	97.00	6.442645	1.10	315,248,383,045	3,467,732,213
11/20/08	21.00	95.90	6.764777	0.00	331,010,802,198	0
11/25/08	21.00	95.90	6.764777	0.50	331,010,802,198	1,655,054,011
11/19/08	22.00	95.40	7.086909	0.30	346,773,221,350	1,040,319,664
11/18/08	23.00	95.10	7.409042	0.30	362,535,640,502	1,087,606,922
11/8/07	24.00	94.80	7.731174	0.00	378,298,059,655	0
11/9/07	24.00	94.80	7.731174	0.00	378,298,059,655	0
11/26/08	24.00	94.80	7.731174	0.80	378,298,059,655	3,026,384,477
11/7/07	25.00	94.00	8.053306	0.00	394,060,478,807	0
11/10/07	25.00	94.00	8.053306	0.00	394,060,478,807	0
11/11/07	25.00	94.00	8.053306	0.00	394,060,478,807	0
11/28/08	25.00	94.00	8.053306	1.10	394,060,478,807	4,334,665,267
11/4/07	26.00	92.90	8.375438	0.00	409,822,897,959	0
11/12/07	26.00	92.90	8.375438	0.00	409,822,897,959	0
11/17/07	26.00	92.90	8.375438	0.90	409,822,897,959	3,688,406,082
11/1/07	27.00	92.00	8.697571	0.00	425,585,317,111	0
11/3/07	27.00	92.00	8.697571	0.00	425,585,317,111	0
11/6/07	27.00	92.00	8.697571	0.00	425,585,317,111	0
11/16/07	27.00	92.00	8.697571	0.00	425,585,317,111	0
11/17/08	27.00	92.00	8.697571	1.30	425,585,317,111	5,532,609,122
11/2/07	28.00	90.70	9.019703	0.00	441,347,736,264	0
11/5/07	28.00	90.70	9.019703	0.00	441,347,736,264	0
11/15/07	28.00	90.70	9.019703	0.00	441,347,736,264	0
11/29/08	28.00	90.70	9.019703	1.10	441,347,736,264	4,854,825,099
11/13/07	29.00	89.60	9.341835	0.00	457,110,155,416	0
11/14/07	29.00	89.60	9.341835	0.60	457,110,155,416	2,742,660,932
3/10/09	30.00	89.00	9.663967	0.30	472,872,574,568	1,418,617,724
11/27/08	31.00	88.70	9.986099	0.00	488,634,993,720	0

DRAFT—Marsh Bayou (Subsegment 030603) Fecal Coliform Bacteria TMDL
 Origination Date August 23, 2010

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)
3/9/09	31.00	88.70	9.986099	0.50	488,634,993,720	2,443,174,969
3/5/09	32.00	88.20	10.308232	0.00	504,397,412,873	0
3/6/09	32.00	88.20	10.308232	0.00	504,397,412,873	0
3/7/09	32.00	88.20	10.308232	0.00	504,397,412,873	0
3/8/09	32.00	88.20	10.308232	1.10	504,397,412,873	5,548,371,542
4/16/08	33.00	87.10	10.630364	0.00	520,159,832,025	0
4/17/08	33.00	87.10	10.630364	0.00	520,159,832,025	0
12/8/08	33.00	87.10	10.630364	0.00	520,159,832,025	0
2/1/09	33.00	87.10	10.630364	0.00	520,159,832,025	0
3/4/09	33.00	87.10	10.630364	0.00	520,159,832,025	0
3/11/09	33.00	87.10	10.630364	1.70	520,159,832,025	8,842,717,144
4/15/08	34.00	85.40	10.952496	0.00	535,922,251,177	0
1/31/09	34.00	85.40	10.952496	0.00	535,922,251,177	0
3/3/09	34.00	85.40	10.952496	0.00	535,922,251,177	0
3/12/09	34.00	85.40	10.952496	1.10	535,922,251,177	5,895,144,763
4/30/08	35.00	84.30	11.274628	0.00	551,684,670,329	0
11/16/08	35.00	84.30	11.274628	0.50	551,684,670,329	2,758,423,352
4/14/08	36.00	83.80	11.596761	0.00	567,447,089,482	0
1/24/09	36.00	83.80	11.596761	0.00	567,447,089,482	0
1/25/09	36.00	83.80	11.596761	0.00	567,447,089,482	0
1/26/09	36.00	83.80	11.596761	0.00	567,447,089,482	0
1/27/09	36.00	83.80	11.596761	0.00	567,447,089,482	0
1/28/09	36.00	83.80	11.596761	0.00	567,447,089,482	0
1/30/09	36.00	83.80	11.596761	0.00	567,447,089,482	0
2/9/09	36.00	83.80	11.596761	0.00	567,447,089,482	0
2/10/09	36.00	83.80	11.596761	0.00	567,447,089,482	0
3/2/09	36.00	83.80	11.596761	2.80	567,447,089,482	15,888,518,505
4/22/08	37.00	81.00	11.918893	0.00	583,209,508,634	0
1/22/09	37.00	81.00	11.918893	0.00	583,209,508,634	0
1/23/09	37.00	81.00	11.918893	0.00	583,209,508,634	0
1/29/09	37.00	81.00	11.918893	0.00	583,209,508,634	0
2/8/09	37.00	81.00	11.918893	1.40	583,209,508,634	8,164,933,121
4/13/08	38.00	79.60	12.241025	0.00	598,971,927,786	0
12/3/08	38.00	79.60	12.241025	0.00	598,971,927,786	0
1/21/09	38.00	79.60	12.241025	0.00	598,971,927,786	0
2/7/09	38.00	79.60	12.241025	0.00	598,971,927,786	0
2/11/09	38.00	79.60	12.241025	0.00	598,971,927,786	0
3/1/09	38.00	79.60	12.241025	1.60	598,971,927,786	9,583,550,845
4/29/08	39.00	78.00	12.563157	0.30	614,734,346,939	1,844,203,041
4/12/08	40.00	77.70	12.885290	0.00	630,496,766,091	0
1/20/09	40.00	77.70	12.885290	0.00	630,496,766,091	0
2/28/09	40.00	77.70	12.885290	0.90	630,496,766,091	5,674,470,895
12/4/08	41.00	76.80	13.207422	0.00	646,259,185,243	0
12/7/08	41.00	76.80	13.207422	0.00	646,259,185,243	0

DRAFT—Marsh Bayou (Subsegment 030603) Fecal Coliform Bacteria TMDL
 Origination Date August 23, 2010

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)
1/17/09	41.00	76.80	13.207422	0.00	646,259,185,243	0
1/18/09	41.00	76.80	13.207422	0.00	646,259,185,243	0
1/19/09	41.00	76.80	13.207422	0.00	646,259,185,243	0
2/6/09	41.00	76.80	13.207422	0.00	646,259,185,243	0
2/26/09	41.00	76.80	13.207422	0.00	646,259,185,243	0
2/27/09	41.00	76.80	13.207422	2.20	646,259,185,243	14,217,702,075
4/11/08	42.00	74.60	13.529554	0.00	662,021,604,395	0
4/18/08	42.00	74.60	13.529554	0.00	662,021,604,395	0
2/25/09	42.00	74.60	13.529554	0.00	662,021,604,395	0
4/11/09	42.00	74.60	13.529554	0.00	662,021,604,395	0
4/12/09	42.00	74.60	13.529554	1.30	662,021,604,395	8,606,280,857
4/21/08	43.00	73.30	13.851686	0.00	677,784,023,548	0
1/16/09	43.00	73.30	13.851686	0.00	677,784,023,548	0
4/10/09	43.00	73.30	13.851686	0.90	677,784,023,548	6,100,056,212
2/2/09	44.00	72.40	14.173819	0.00	693,546,442,700	0
2/24/09	44.00	72.40	14.173819	0.50	693,546,442,700	3,467,732,213
4/10/08	45.00	71.90	14.495951	0.00	709,308,861,852	0
4/28/08	45.00	71.90	14.495951	0.00	709,308,861,852	0
1/15/09	45.00	71.90	14.495951	0.00	709,308,861,852	0
2/12/09	45.00	71.90	14.495951	0.00	709,308,861,852	0
4/9/09	45.00	71.90	14.495951	1.40	709,308,861,852	9,930,324,066
4/27/08	46.00	70.50	14.818083	0.00	725,071,281,004	0
2/23/09	46.00	70.50	14.818083	0.60	725,071,281,004	4,350,427,686
12/8/07	47.00	69.90	15.140215	0.00	740,833,700,157	0
12/9/07	47.00	69.90	15.140215	0.00	740,833,700,157	0
4/8/09	47.00	69.90	15.140215	0.80	740,833,700,157	5,926,669,601
12/7/07	48.00	69.10	15.462348	0.00	756,596,119,309	0
12/12/07	48.00	69.10	15.462348	0.00	756,596,119,309	0
1/14/09	48.00	69.10	15.462348	0.80	756,596,119,309	6,052,768,954
12/11/07	49.00	68.30	15.784480	0.00	772,358,538,461	0
12/13/07	49.00	68.30	15.784480	0.00	772,358,538,461	0
4/9/08	49.00	68.30	15.784480	0.00	772,358,538,461	0
4/19/08	49.00	68.30	15.784480	0.00	772,358,538,461	0
12/5/08	49.00	68.30	15.784480	0.00	772,358,538,461	0
2/5/09	49.00	68.30	15.784480	0.00	772,358,538,461	0
4/16/09	49.00	68.30	15.784480	2.00	772,358,538,461	15,447,170,769
2/22/09	50.00	66.30	16.106612	0.00	788,120,957,614	0
3/24/09	50.00	66.30	16.106612	0.50	788,120,957,614	3,940,604,788
12/6/07	51.00	65.80	16.428744	0.00	803,883,376,766	0
12/10/07	51.00	65.80	16.428744	0.00	803,883,376,766	0
4/4/08	51.00	65.80	16.428744	0.00	803,883,376,766	0
1/13/09	51.00	65.80	16.428744	0.00	803,883,376,766	0
4/7/09	51.00	65.80	16.428744	0.00	803,883,376,766	0
4/27/09	51.00	65.80	16.428744	1.70	803,883,376,766	13,666,017,405

DRAFT—Marsh Bayou (Subsegment 030603) Fecal Coliform Bacteria TMDL
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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)
12/14/07	52.00	64.10	16.750877	0.00	819,645,795,918	0
1/4/08	52.00	64.10	16.750877	0.00	819,645,795,918	0
1/5/08	52.00	64.10	16.750877	0.00	819,645,795,918	0
3/30/08	52.00	64.10	16.750877	0.00	819,645,795,918	0
3/31/08	52.00	64.10	16.750877	1.30	819,645,795,918	10,655,395,347
1/6/08	53.00	62.80	17.073009	0.00	835,408,215,070	0
4/3/08	53.00	62.80	17.073009	0.00	835,408,215,070	0
4/20/08	53.00	62.80	17.073009	0.00	835,408,215,070	0
4/26/08	53.00	62.80	17.073009	0.00	835,408,215,070	0
2/13/09	53.00	62.80	17.073009	1.40	835,408,215,070	11,695,715,011
1/7/08	54.00	61.40	17.395141	0.00	851,170,634,223	0
1/8/08	54.00	61.40	17.395141	0.00	851,170,634,223	0
3/26/08	54.00	61.40	17.395141	0.00	851,170,634,223	0
3/27/08	54.00	61.40	17.395141	0.00	851,170,634,223	0
3/28/08	54.00	61.40	17.395141	0.00	851,170,634,223	0
3/29/08	54.00	61.40	17.395141	0.00	851,170,634,223	0
3/23/09	54.00	61.40	17.395141	2.00	851,170,634,223	17,023,412,684
12/5/07	55.00	59.40	17.717273	0.00	866,933,053,375	0
2/21/09	55.00	59.40	17.717273	0.50	866,933,053,375	4,334,665,267
12/3/07	56.00	58.90	18.039405	0.00	882,695,472,527	0
12/4/07	56.00	58.90	18.039405	0.00	882,695,472,527	0
1/3/08	56.00	58.90	18.039405	0.00	882,695,472,527	0
1/15/08	56.00	58.90	18.039405	0.00	882,695,472,527	0
4/17/09	56.00	58.90	18.039405	0.00	882,695,472,527	0
4/26/09	56.00	58.90	18.039405	1.70	882,695,472,527	15,005,823,033
3/25/08	57.00	57.20	18.361538	0.00	898,457,891,679	0
1/12/09	57.00	57.20	18.361538	0.00	898,457,891,679	0
3/25/09	57.00	57.20	18.361538	0.00	898,457,891,679	0
4/13/09	57.00	57.20	18.361538	1.10	898,457,891,679	9,883,036,808
12/2/07	58.00	56.10	18.683670	0.00	914,220,310,832	0
1/9/08	58.00	56.10	18.683670	0.00	914,220,310,832	0
4/8/08	58.00	56.10	18.683670	0.00	914,220,310,832	0
12/23/08	58.00	56.10	18.683670	1.10	914,220,310,832	10,056,423,419
1/12/08	59.00	55.00	19.005802	0.00	929,982,729,984	0
4/6/09	59.00	55.00	19.005802	0.50	929,982,729,984	4,649,913,650
12/19/07	60.00	54.50	19.327934	0.00	945,745,149,136	0
4/1/08	60.00	54.50	19.327934	0.00	945,745,149,136	0
3/22/09	60.00	54.50	19.327934	0.90	945,745,149,136	8,511,706,342
1/10/08	62.00	53.60	19.972199	0.00	977,269,987,441	0
3/24/08	62.00	53.60	19.972199	0.00	977,269,987,441	0
4/2/08	62.00	53.60	19.972199	0.80	977,269,987,441	7,818,159,900
1/2/08	63.00	52.80	20.294331	0.00	993,032,406,593	0
1/13/08	63.00	52.80	20.294331	0.00	993,032,406,593	0
1/14/08	63.00	52.80	20.294331	0.00	993,032,406,593	0

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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)
4/5/08	63.00	52.80	20.294331	0.00	993,032,406,593	0
12/6/08	63.00	52.80	20.294331	0.00	993,032,406,593	0
2/20/09	63.00	52.80	20.294331	0.00	993,032,406,593	0
4/25/09	63.00	52.80	20.294331	1.90	993,032,406,593	18,867,615,725
12/1/07	64.00	50.90	20.616463	0.00	1,008,794,825,745	0
1/11/08	64.00	50.90	20.616463	0.00	1,008,794,825,745	0
1/3/09	64.00	50.90	20.616463	0.00	1,008,794,825,745	0
1/11/09	64.00	50.90	20.616463	1.10	1,008,794,825,745	11,096,743,083
11/15/08	65.00	49.80	20.938596	0.30	1,024,557,244,898	3,073,671,735
3/23/08	68.00	49.50	21.904992	0.30	1,071,844,502,354	3,215,533,507
1/4/09	69.00	49.20	22.227125	0.30	1,087,606,921,507	3,262,820,765
3/21/09	70.00	48.90	22.549257	0.00	1,103,369,340,659	0
4/15/09	70.00	48.90	22.549257	0.50	1,103,369,340,659	5,516,846,703
11/30/08	71.00	48.40	22.871389	0.00	1,119,131,759,811	0
1/2/09	71.00	48.40	22.871389	0.00	1,119,131,759,811	0
4/5/09	71.00	48.40	22.871389	0.80	1,119,131,759,811	8,953,054,078
2/3/09	72.00	47.60	23.193521	0.30	1,134,894,178,964	3,404,682,537
12/15/07	73.00	47.30	23.515654	0.30	1,150,656,598,116	3,451,969,794
11/30/07	74.00	47.00	23.837786	0.00	1,166,419,017,268	0
12/22/08	74.00	47.00	23.837786	0.00	1,166,419,017,268	0
1/10/09	74.00	47.00	23.837786	0.00	1,166,419,017,268	0
4/24/09	74.00	47.00	23.837786	1.10	1,166,419,017,268	12,830,609,190
1/1/08	75.00	45.90	24.159918	0.00	1,182,181,436,420	0
2/4/09	75.00	45.90	24.159918	0.50	1,182,181,436,420	5,910,907,182
2/19/09	76.00	45.40	24.482050	0.30	1,197,943,855,573	3,593,831,567
3/22/08	77.00	45.10	24.804183	0.00	1,213,706,274,725	0
12/2/08	77.00	45.10	24.804183	0.60	1,213,706,274,725	7,282,237,648
12/18/07	78.00	44.50	25.126315	0.30	1,229,468,693,877	3,688,406,082
2/11/08	79.00	44.20	25.448447	0.20	1,245,231,113,029	2,490,462,226
3/18/08	82.00	44.00	26.414844	0.00	1,292,518,370,486	0
4/2/09	82.00	44.00	26.414844	0.60	1,292,518,370,486	7,755,110,223
4/7/08	84.00	43.40	27.059108	0.00	1,324,043,208,791	0
1/1/09	84.00	43.40	27.059108	0.00	1,324,043,208,791	0
4/4/09	84.00	43.40	27.059108	0.80	1,324,043,208,791	10,592,345,670
12/26/07	85.00	42.60	27.381240	0.00	1,339,805,627,943	0
3/20/09	85.00	42.60	27.381240	0.00	1,339,805,627,943	0
4/3/09	85.00	42.60	27.381240	0.80	1,339,805,627,943	10,718,445,024
12/15/08	86.00	41.80	27.703373	0.30	1,355,568,047,095	4,066,704,141
4/28/09	87.00	41.50	28.025505	0.30	1,371,330,466,248	4,113,991,399
3/2/08	88.00	41.20	28.347637	0.00	1,387,092,885,400	0
3/19/08	88.00	41.20	28.347637	0.50	1,387,092,885,400	6,935,464,427
12/24/08	89.00	40.70	28.669769	0.30	1,402,855,304,552	4,208,565,914
2/12/08	90.00	40.40	28.991902	0.30	1,418,617,723,704	4,255,853,171
2/10/08	91.00	40.10	29.314034	0.00	1,434,380,142,857	0

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3/17/08	91.00	40.10	29.314034	0.00	1,434,380,142,857	0
3/21/08	91.00	40.10	29.314034	0.00	1,434,380,142,857	0
2/18/09	91.00	40.10	29.314034	0.00	1,434,380,142,857	0
4/1/09	91.00	40.10	29.314034	1.40	1,434,380,142,857	20,081,322,000
3/1/08	92.00	38.70	29.636166	0.30	1,450,142,562,009	4,350,427,686
3/3/08	93.00	38.40	29.958298	0.00	1,465,904,981,161	0
4/14/09	93.00	38.40	29.958298	0.50	1,465,904,981,161	7,329,524,906
3/20/08	94.00	37.90	30.280431	0.00	1,481,667,400,313	0
1/9/09	94.00	37.90	30.280431	0.60	1,481,667,400,313	8,890,004,402
11/29/07	95.00	37.30	30.602563	0.00	1,497,429,819,466	0
12/31/07	95.00	37.30	30.602563	0.00	1,497,429,819,466	0
4/23/09	95.00	37.30	30.602563	0.80	1,497,429,819,466	11,979,438,556
2/29/08	96.00	36.50	30.924695	0.30	1,513,192,238,618	4,539,576,716
11/24/07	98.00	36.20	31.568960	0.20	1,544,717,076,923	3,089,434,154
11/22/07	99.00	36.00	31.891092	0.00	1,560,479,496,075	0
4/25/08	99.00	36.00	31.891092	0.60	1,560,479,496,075	9,362,876,976
2/9/08	102.00	35.40	32.857489	0.30	1,607,766,753,532	4,823,300,261
12/21/08	105.00	35.10	33.823885	0.00	1,655,054,010,988	0
4/30/09	105.00	35.10	33.823885	0.50	1,655,054,010,988	8,275,270,055
12/9/08	107.00	34.60	34.468150	0.30	1,686,578,849,293	5,059,736,548
2/28/08	108.00	34.30	34.790282	0.00	1,702,341,268,445	0
3/16/08	108.00	34.30	34.790282	0.50	1,702,341,268,445	8,511,706,342
12/25/07	109.00	33.80	35.112414	0.00	1,718,103,687,598	0
4/6/08	109.00	33.80	35.112414	0.60	1,718,103,687,598	10,308,622,126
12/31/08	110.00	33.20	35.434546	0.30	1,733,866,106,750	5,201,598,320
11/23/07	111.00	32.90	35.756679	0.00	1,749,628,525,902	0
12/17/07	111.00	32.90	35.756679	0.00	1,749,628,525,902	0
12/27/07	111.00	32.90	35.756679	0.80	1,749,628,525,902	13,997,028,207
1/22/08	113.00	32.10	36.400943	0.30	1,781,153,364,207	5,343,460,093
11/12/08	114.00	31.80	36.723075	0.00	1,796,915,783,359	0
3/19/09	114.00	31.80	36.723075	0.50	1,796,915,783,359	8,984,578,917
12/16/08	120.00	31.30	38.655869	0.00	1,891,490,298,273	0
3/31/09	120.00	31.30	38.655869	0.60	1,891,490,298,273	11,348,941,790
1/23/08	123.00	30.70	39.622266	0.30	1,938,777,555,729	5,816,332,667
4/29/09	125.00	30.40	40.266530	0.20	1,970,302,394,034	3,940,604,788
2/27/08	126.00	30.20	40.588662	0.30	1,986,064,813,186	5,958,194,440
2/8/08	129.00	29.90	41.555059	0.00	2,033,352,070,643	0
3/15/08	129.00	29.90	41.555059	0.60	2,033,352,070,643	12,200,112,424
1/8/09	134.00	29.30	43.165720	0.20	2,112,164,166,404	4,224,328,333
2/15/08	137.00	29.10	44.132117	0.30	2,159,451,423,861	6,478,354,272
12/16/07	138.00	28.80	44.454249	0.30	2,175,213,843,013	6,525,641,529
11/18/07	139.00	28.50	44.776381	0.00	2,190,976,262,166	0
12/14/08	139.00	28.50	44.776381	0.50	2,190,976,262,166	10,954,881,311
2/17/09	142.00	28.00	45.742778	0.30	2,238,263,519,623	6,714,790,559

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12/30/07	144.00	27.70	46.387043	0.30	2,269,788,357,927	6,809,365,074
12/29/07	146.00	27.40	47.031307	0.00	2,301,313,196,232	0
12/27/08	146.00	27.40	47.031307	0.60	2,301,313,196,232	13,807,879,177
2/26/08	147.00	26.80	47.353439	0.20	2,317,075,615,384	4,634,151,231
11/25/07	149.00	26.60	47.997704	0.00	2,348,600,453,688	0
12/28/07	149.00	26.60	47.997704	0.00	2,348,600,453,688	0
2/5/08	149.00	26.60	47.997704	0.90	2,348,600,453,688	21,137,404,083
11/21/07	151.00	25.70	48.641968	0.20	2,380,125,291,993	4,760,250,584
3/6/08	153.00	25.50	49.286233	0.30	2,411,650,130,297	7,234,950,391
3/10/08	154.00	25.20	49.608365	0.30	2,427,412,549,450	7,282,237,648
1/5/09	157.00	24.90	50.574762	0.30	2,474,699,806,907	7,424,099,421
12/24/07	161.00	24.60	51.863291	0.00	2,537,749,483,516	0
2/4/08	161.00	24.60	51.863291	0.50	2,537,749,483,516	12,688,747,418
11/14/08	163.00	24.10	52.507555	0.30	2,569,274,321,820	7,707,822,965
3/14/08	164.00	23.80	52.829687	0.30	2,585,036,740,972	7,755,110,223
1/29/08	168.00	23.50	54.118216	0.00	2,648,086,417,582	0
12/18/08	168.00	23.50	54.118216	0.50	2,648,086,417,582	13,240,432,088
1/16/08	175.00	23.00	56.373142	0.30	2,758,423,351,647	8,275,270,055
12/20/08	176.00	22.70	56.695274	0.30	2,774,185,770,800	8,322,557,312
12/17/08	186.00	22.40	59.916597	0.30	2,931,809,962,322	8,795,429,887
3/9/08	187.00	22.10	60.238729	0.20	2,947,572,381,475	5,895,144,763
11/13/08	194.00	21.90	62.493655	0.30	3,057,909,315,541	9,173,727,947
3/13/09	195.00	21.60	62.815787	0.30	3,073,671,734,693	9,221,015,204
1/7/09	196.00	21.30	63.137919	0.30	3,089,434,153,845	9,268,302,462
1/19/08	198.00	21.00	63.782184	0.00	3,120,958,992,150	0
4/23/08	198.00	21.00	63.782184	0.50	3,120,958,992,150	15,604,794,961
2/25/08	199.00	20.50	64.104316	0.30	3,136,721,411,302	9,410,164,234
1/21/08	200.00	20.20	64.426448	0.30	3,152,483,830,454	9,457,451,491
12/30/08	207.00	19.90	66.681374	0.20	3,262,820,764,520	6,525,641,529
1/6/09	211.00	19.70	67.969903	0.30	3,325,870,441,129	9,977,611,323
12/19/08	215.00	19.40	69.258432	0.30	3,388,920,117,738	10,166,760,353
12/1/08	219.00	19.10	70.546961	0.30	3,451,969,794,347	10,355,909,383
4/22/09	227.00	18.80	73.124019	0.20	3,578,069,147,566	7,156,138,295
2/7/08	228.00	18.60	73.446151	0.30	3,593,831,566,718	10,781,494,700
11/28/07	231.00	18.30	74.412548	0.30	3,641,118,824,175	10,923,356,473
12/26/08	232.00	18.00	74.734680	0.30	3,656,881,243,327	10,970,643,730
12/25/08	234.00	17.70	75.378944	0.20	3,688,406,081,631	7,376,812,163
3/18/09	235.00	17.50	75.701077	0.30	3,704,168,500,784	11,112,505,502
12/20/07	237.00	17.20	76.345341	0.30	3,735,693,339,088	11,207,080,017
12/23/07	244.00	16.90	78.600267	0.30	3,846,030,273,154	11,538,090,819
2/3/08	247.00	16.60	79.566663	0.30	3,893,317,530,611	11,679,952,592
1/18/08	249.00	16.30	80.210928	0.00	3,924,842,368,916	0
2/14/08	249.00	16.30	80.210928	0.50	3,924,842,368,916	19,624,211,845
3/7/08	250.00	15.80	80.533060	0.30	3,940,604,788,068	11,821,814,364

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1/30/08	258.00	15.50	83.110118	0.30	4,066,704,141,286	12,200,112,424
2/6/08	259.00	15.20	83.432250	0.20	4,082,466,560,438	8,164,933,121
2/13/08	260.00	15.00	83.754383	0.30	4,098,228,979,590	12,294,686,939
4/24/08	271.00	14.70	87.297837	0.30	4,271,615,590,265	12,814,846,771
3/4/08	282.00	14.40	90.841292	0.30	4,445,002,200,940	13,335,006,603
3/5/08	288.00	14.10	92.774085	0.20	4,539,576,715,854	9,079,153,432
3/8/08	292.00	13.90	94.062614	0.30	4,602,626,392,463	13,807,879,177
1/28/08	300.00	13.60	96.639672	0.30	4,728,725,745,681	14,186,177,237
1/20/08	313.00	13.30	100.827391	0.30	4,933,637,194,661	14,800,911,584
2/21/08	316.00	13.00	101.793788	0.20	4,980,924,452,118	9,961,848,904
1/31/08	326.00	12.80	105.015110	0.30	5,138,548,643,640	15,415,645,931
11/20/07	336.00	12.50	108.236433	0.30	5,296,172,835,163	15,888,518,505
1/24/08	350.00	12.20	112.746284	0.30	5,516,846,703,295	16,550,540,110
12/22/07	357.00	11.90	115.001210	0.20	5,627,183,637,361	11,254,367,275
2/16/09	366.00	11.70	117.900400	0.30	5,769,045,409,731	17,307,136,229
11/19/07	374.00	11.40	120.477458	0.30	5,895,144,762,949	17,685,434,289
2/20/08	386.00	11.10	124.343045	0.30	6,084,293,792,777	18,252,881,378
12/28/08	405.00	10.80	130.463558	0.30	6,383,779,756,670	19,151,339,270
12/29/08	406.00	10.50	130.785690	0.20	6,399,542,175,822	12,799,084,352
1/17/08	414.00	10.30	133.362748	0.30	6,525,641,529,040	19,576,924,587
3/30/09	417.00	10.00	134.329144	0.30	6,572,928,786,497	19,718,786,359
12/21/07	431.00	9.70	138.838996	0.30	6,793,602,654,629	20,380,807,964
1/25/08	444.00	9.40	143.026715	0.20	6,998,514,103,608	13,997,028,207
3/13/08	451.00	9.20	145.281641	0.30	7,108,851,037,674	21,326,553,113
2/14/09	456.00	8.90	146.892302	0.30	7,187,663,133,436	21,562,989,400
11/26/07	486.00	8.60	156.556269	0.30	7,660,535,708,004	22,981,607,124
11/27/07	490.00	8.30	157.844798	0.20	7,723,585,384,613	15,447,170,769
1/26/08	491.00	8.10	158.166930	0.30	7,739,347,803,765	23,218,043,411
12/13/08	496.00	7.80	159.777591	0.30	7,818,159,899,526	23,454,479,699
3/26/09	504.00	7.50	162.354649	0.30	7,944,259,252,745	23,832,777,758
1/27/08	527.00	7.20	169.763691	0.20	8,306,794,893,247	16,613,589,786
2/22/08	535.00	7.00	172.340749	0.30	8,432,894,246,465	25,298,682,739
3/14/09	610.00	6.70	196.500667	0.30	9,615,075,682,885	28,845,227,049
2/24/08	616.00	6.40	198.433460	0.30	9,709,650,197,799	29,128,950,593
3/17/09	675.00	6.10	217.439263	0.20	10,639,632,927,783	21,279,265,856
2/2/08	678.00	5.90	218.405659	0.30	10,686,920,185,240	32,060,760,556
2/23/08	691.00	5.60	222.593378	0.30	10,891,831,634,219	32,675,494,903
3/11/08	709.00	5.30	228.391759	0.30	11,175,555,178,960	33,526,665,537
4/18/09	718.00	5.00	231.290949	0.30	11,317,416,951,331	33,952,250,854
3/29/09	741.00	4.70	238.699990	0.20	11,679,952,591,833	23,359,905,184
2/15/09	757.00	4.50	243.854106	0.30	11,932,151,298,269	35,796,453,895
3/15/09	814.00	4.20	262.215644	0.30	12,830,609,189,949	38,491,827,570
2/1/08	819.00	3.90	263.826305	0.30	12,909,421,285,710	38,728,263,857
3/16/09	852.00	3.60	274.456669	0.20	13,429,581,117,735	26,859,162,235

DRAFT—Marsh Bayou (Subsegment 030603) Fecal Coliform Bacteria TMDL
 Origination Date August 23, 2010

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)
3/12/08	869.00	3.40	279.932917	0.30	13,697,542,243,324	41,092,626,730
12/10/08	914.00	3.10	294.428868	0.30	14,406,851,105,176	43,220,553,316
3/28/09	1,040.00	2.80	335.017530	0.30	16,392,915,918,362	49,178,747,755
12/12/08	1,060.00	2.50	341.460175	0.00	16,708,164,301,407	0
3/27/09	1,060.00	2.50	341.460175	0.50	16,708,164,301,407	83,540,821,507
4/21/09	1,080.00	2.00	347.902820	0.30	17,023,412,684,453	51,070,238,053
2/16/08	1,150.00	1.70	370.452077	0.30	18,126,782,025,112	54,380,346,075
12/11/08	1,190.00	1.40	383.337367	0.20	18,757,278,791,203	37,514,557,582
2/19/08	1,320.00	1.20	425.214558	0.30	20,806,393,280,998	62,419,179,843
4/20/09	2,210.00	0.90	711.912252	0.30	34,834,946,326,519	104,504,838,980
4/19/09	2,250.00	0.60	724.797542	0.30	35,465,443,092,610	106,396,329,278
2/18/08	3,380.00	0.30	1,088.806974	0.30	53,276,976,734,676	159,830,930,204
2/17/08	4,990.00	0.00	1,607.439882	0.00	78,654,471,569,833	0