

Turkey Creek (Subsegment 080906), 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:

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

This fecal coliform TMDL has been developed for Turkey Creek, which is in the Beouf River Basin in northeastern Louisiana. Turkey Creek drains into the Beouf River, which then flows into the Ouachita River and eventually into the Mississippi River.

The fecal coliform TMDL for Turkey Creek 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 reduction for fecal coliform bacteria at the monitoring station on Turkey Creek is 49 percent during the winter and no reduction in the summer (Table ES-1).

Table ES-1. Summary of fecal coliform bacteria TMDL for Turkey Creek

Season	TMDL (MPN/day)	WLA (MPN/day)	LA (MPN/day)	Explicit MOS (MPN/day)	Percent reduction
Winter	3.89E+12	7.31E+09	3.10E+12	7.77E+11	49%
Summer	2.01E+11	7.31E+09	1.53E+11	4.01E+10	0%

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:

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

This fecal coliform TMDL has been developed for Turkey Creek, which is in the Beouf River Basin in northeastern Louisiana (Figure 1-1). Turkey Creek drains into the Beouf River, which then flows into the Ouachita River and eventually into the Mississippi River. Since 1996, Turkey Creek has been included on the state's 303(d) list. Turkey Creek was not supporting its designated use of fish and wildlife propagation because of low levels of dissolved oxygen and total dissolved solids, and not supporting the secondary contact recreation designated use because of fecal coliform. Suspected sources of the fecal coliform impairment include managed pasture grazing and on-site treatment systems (septic systems and similar decentralized systems). Fecal coliform data from 2005 support the current use impairment listing for secondary contact recreation and show violations of the primary contact recreation criterion for Turkey Creek.

The fecal coliform TMDL for Turkey Creek 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.

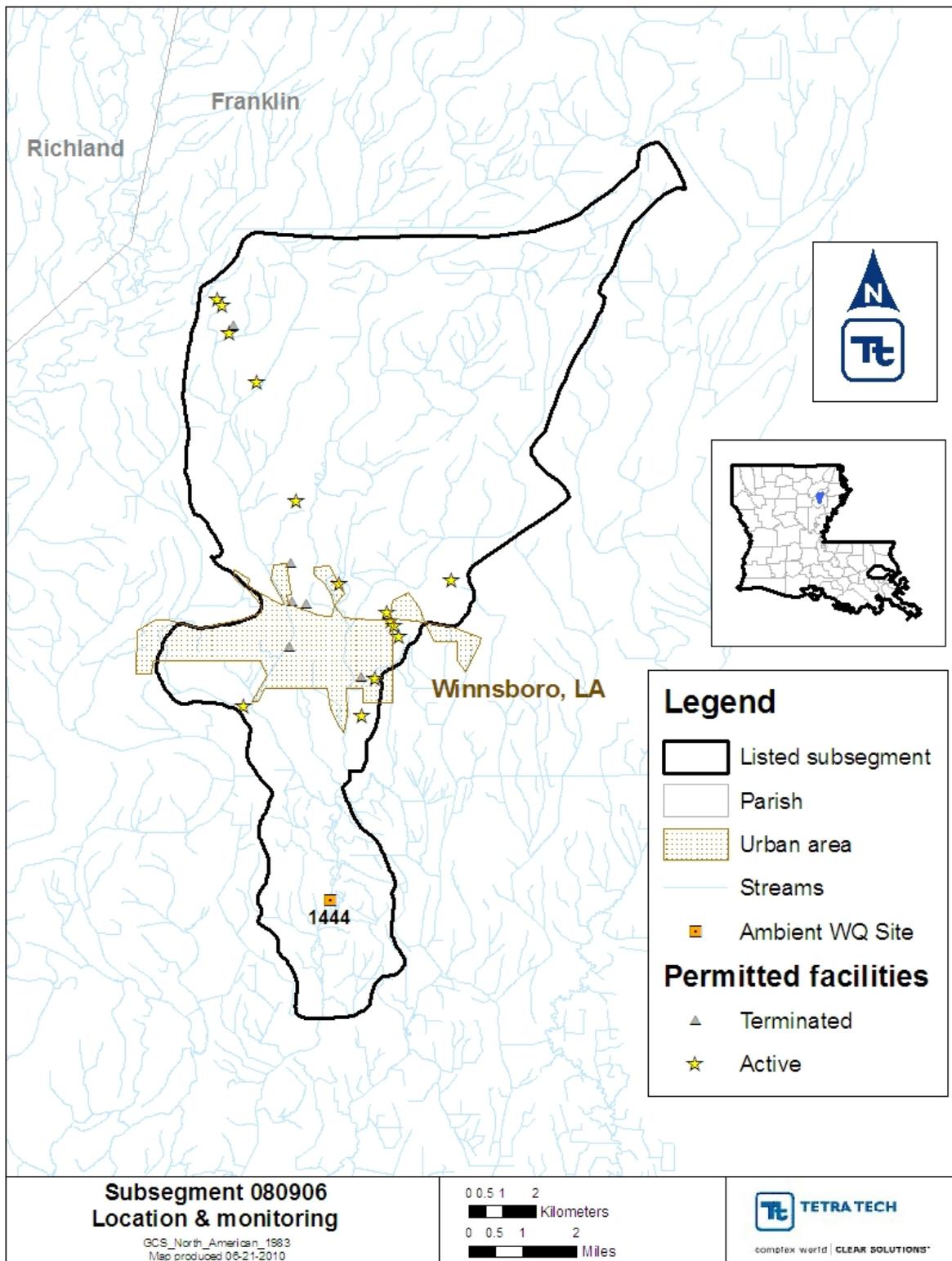


Figure 1-1. Turkey Creek (subsegment 080906) location and monitoring.

2. Study Area Description

2.1 Ouachita River Basin—Beouf River Sub-Basin—Turkey Creek

Turkey Creek is included in the Boeuf River/Bayou Lafourche watershed, one of the prioritized impaired watersheds in the state. The Boeuf River/Bayou Lafourche Basin includes portions of seven parishes: Caldwell, Catahoula, Franklin, Morehouse, Ouachita, Richland and West Carroll and is in the Ouachita River Basin (USGS HUC 08) (LDEQ 2003).

The 1993 Nonpoint Source Assessment Report indicated that Turkey Creek was not fully meeting its designated uses for fishing and swimming (LDEQ 1999). Since 1996, Turkey Creek has been included on the state's 303(d) list. Turkey Creek is currently listed on the state's draft 2008 *Louisiana Water Quality Inventory: Integrated Report (Integrated Report)* as impaired by fecal coliform, low dissolved oxygen, and total dissolved solids. Suspected sources of the fecal coliform impairment include managed pasture grazing and on-site treatment systems (septic systems and similar decentralized systems).

In 1999, fourteen land use/land cover types (classes) of the Ouachita River basin, including 10 specific agricultural crops, were delineated by classifying the multi-spectral, multi-temporal Landsat data. The land use categories by percent area in 1999 were Forest (22.73 percent), Soybeans (16.44 percent), Pasture (16.07 percent), Cotton (13.19 percent), Rice (12.48 percent), and Water (8.28 percent). Those top six categories accounted for 89.19 percent of the total area of the project area and dominated the landscape. Of the top six categories above, four (Soybeans, Pasture, Cotton and Rice) are agricultural crops and accounted for over 58 percent of the entire project area and almost 90 percent of the agricultural land. The other agricultural land use areas in descending order were Idle (2.29 percent); Corn (2.15 percent); Wheat (1.04 percent); Grain Sorghum (0.85 percent); Aquaculture (0.42 percent); and Sweet Potatoes (0.06 percent). The area left unclassified by the semi-automated procedures was only 0.8 percent. Although being able to classify over 99 percent of the area is comprehensive and Louisiana Department of Environmental Quality's (LDEQ's) qualitative assessment indicates a high accuracy of the land use classification, limited field data prohibited the completion of a proper accuracy assessment (LDEQ 2003).

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). The differences in the 1999 and 2001 land use results could be because of the differing land use assessment approaches. Both sources have agriculture as the majority of the land use in the watershed.

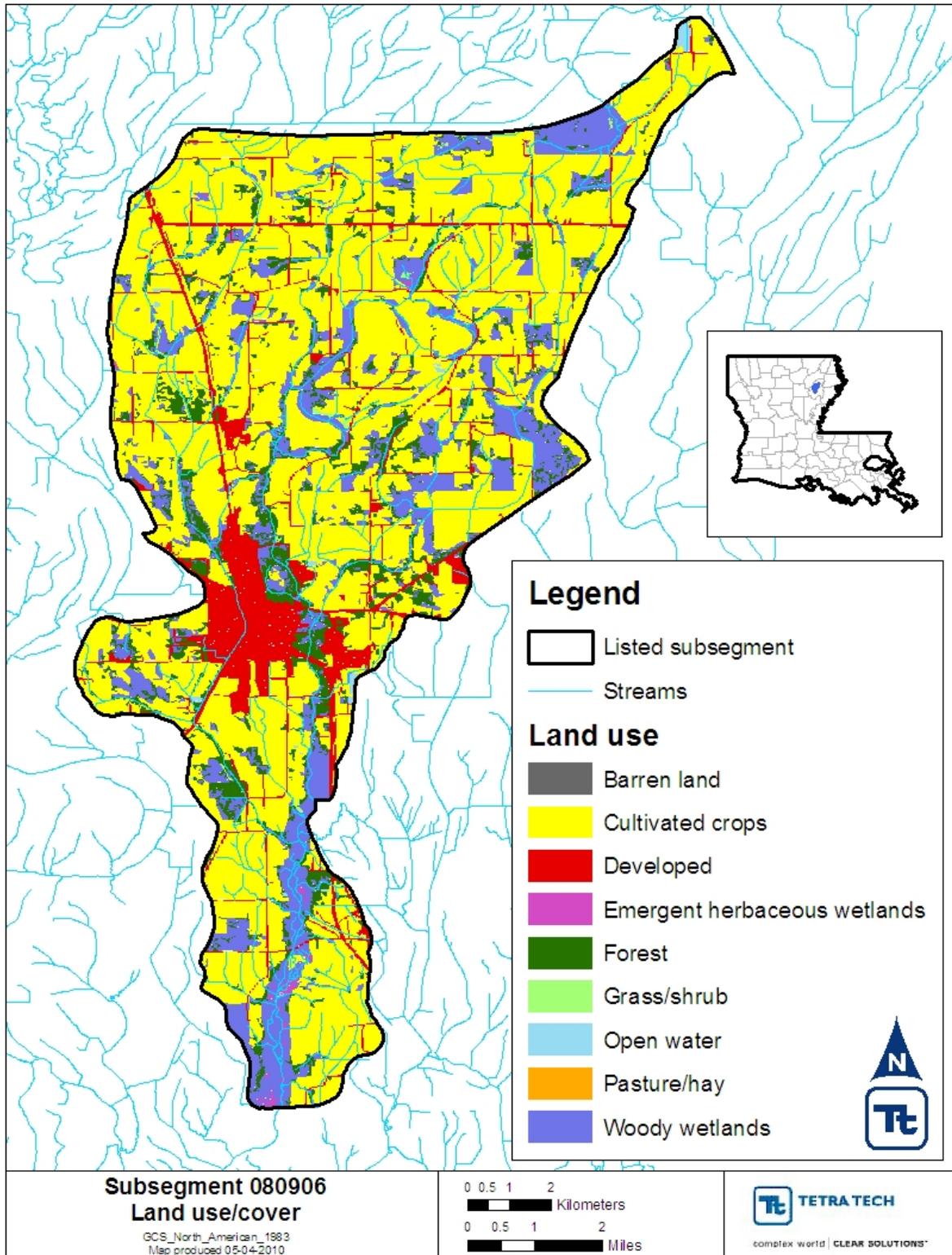


Figure 2-1. Land use in Turkey Creek (subsegment 080906).

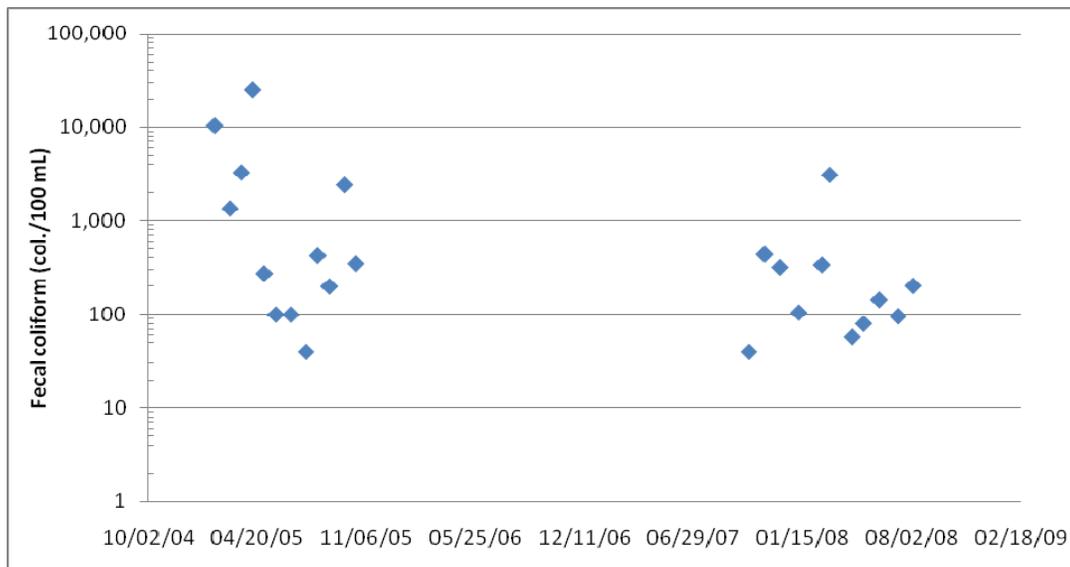
Table 2-1. Subsegment 080906 land use (NLCD 2001)

Land use	Percent
Open water	0.33%
Developed	9.76%
Barren land	0%
Forest	8.84%
Grass/shrub	0.33%
Pasture/hay	0%
Cultivated crops	65.25%
Woody wetlands	15.21%
Emergent herbaceous wetlands	0.29%

2.2 Water Quality Data

One water quality station is on Turkey Creek with fecal coliform data. Station 1444 (Turkey Creek southwest of Chase, Louisiana) had 24 fecal coliform observations collected in 2005, 2007, and 2008. Four of the fecal coliform observations collected at station 1444 exceeded water quality criterion for secondary contact recreation. Two of the exceedances occurred in March, one in February, and one in April. Two observations from 2005 (August and September) exceeded the water quality criterion for primary contact recreation. Of the water quality samples collected after 2004, 17 percent exceeded the water quality criterion for secondary contact recreation and 8 percent for primary contact recreation on Turkey Creek. Appendix A contains the raw water quality data.

The fecal coliform data were plotted over time for subsegment 080906 (Figure 2-2). The exceedances occurred during February, March, April, August, and September. No distinct seasonal trends or patterns are seen in the water quality data.



2.3 Water Quality Standards and Criteria

The designated uses for subsegment 080906 include primary contact recreation, secondary contact recreation and propagation of fish and wildlife. Primary contact recreation includes any recreational or other water contact activity involving 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 2007). 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 2007). 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 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 criteria 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 2007).

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 antidegradation policy (LDEQ 2000).

2.4 Flow

One USGS flow-monitoring gage (07369250) is in the subsegment 080906, but recorded data from the 1960s only for a small tributary to Turkey Creek. Flow for Turkey Creek 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)
07369250	Turkey Creek tributary at Potato RS PD at Chase, LA	0.35	10/01/1960	09/30/1966	0	0.7	109
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 managed pasture grazing and on-site treatment systems (septic systems and similar decentralized systems) as the suspected nonpoint sources of the fecal coliform bacteria impairment in Turkey Creek, subsegment 080906 (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, 14 permitted facilities are discharging into the subsegment (Figure 2-3 and Table 2-3). Additionally, there are six facilities with terminated or canceled permits.

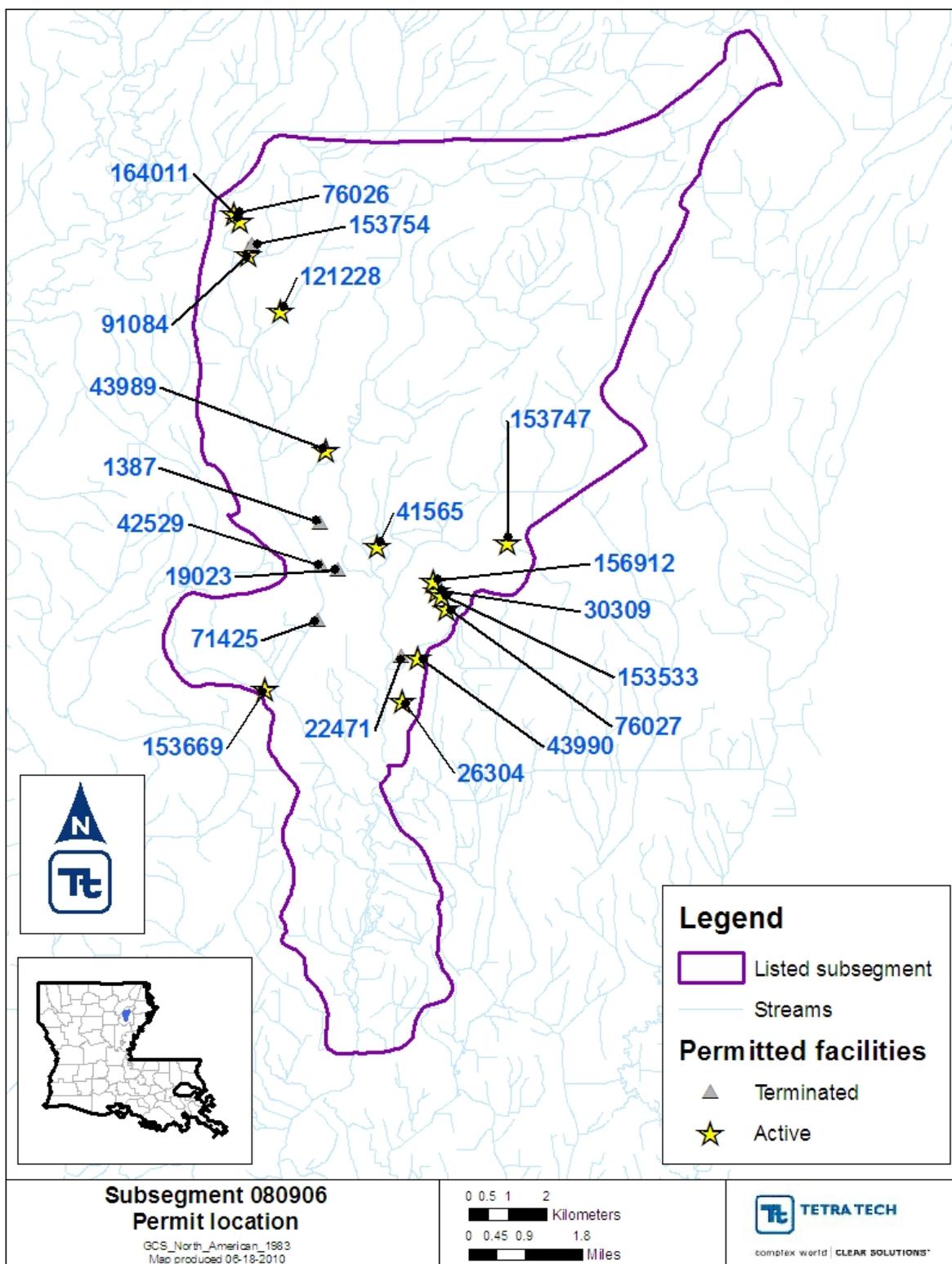


Figure 2-3. Permitted facilities in Turkey Creek (subsegment 080906).

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 Origination Date: October 5, 2010

Table 2-3. Summary of LPDES permits in subsegment 080906

AI #	Permit #	Outfall	Facility name	Exp. date	Facility type	Outfall type	Receiving waterbody
43990	LA0020281	001	Winnsboro City of - Oxidation Lagoon	05/21/11	Electric, Gas, and Sanitary Services	treated sanitary wastewater	Turkey Creek
43989	LA0038253	001	Winnsboro Town of - Industrial Park	09/06/11	General Agency Interest	treated sanitary wastewater	Unnamed ditch to Turkey Creek
153533	LA0124630	001	LADAF - District Office Winnsboro	10/07/14	State Agency	vehicle and equipment washwater	Local drainage to Turkey Creek
153533	LA0124630	002	LADAF - District Office Winnsboro	10/07/14	State Agency	treated sanitary wastewater	Local drainage to Turkey Creek
26304	LAG470107	001	Dennis Crain Dodge Chrysler Inc	09/01/14	Auto dealers and gasoline service stations	washrack wastewater	Turkey Creek
91084	LAG531191	001	Jimmy Wilhite Trailer Park	11/08/12	Hotels, Camps, and Other Lodging Places	treated sanitary wastewater	Unnamed ditch to Ash Slough to Turkey Creek
30309	LAG532441	001	Macon Ridge Propane Service Inc - Winnsboro Branch	11/08/12	Miscellaneous Retail	treated sanitary wastewater	Unnamed ditch to Turkey Creek
153669	LAG532482	001	Abundant Life Evangelistic Ministry	11/08/12	Membership Organizations	treated sanitary wastewater	Unnamed ditch to Pine Bayou, to Ash Slough, to Turkey Creek
153747	LAG532504	001	Franklin Parish Police Jury - Road Barn	11/08/12	Heavy Construction Other Than Bldg. Constr.	treated sanitary wastewater	Drainage canal to Turkey Creek
76027	LAG532553	001	Rick's Best Stop	11/08/12	Auto dealers and gasoline service stations	treated sanitary wastewater	Local drainage to Turkey Creek
156912	LAG532699	001	Unnamed Trailer Park - James C Donnell - WWTP	11/08/12	Real Estate	treated sanitary wastewater	Unnamed ditch to parish canal to Turkey Creek
76026	LAG532944	001	Cupit's Corner	11/08/12	Auto dealers and gasoline service stations	treated sanitary wastewater	Local drainage to Ash Slough to Turkey Creek
164011	LAG533113	001	Rons Warehouse Furniture - Re:RWF LLC	11/08/12	Nonclassifiable Establishments	treated sanitary wastewater	Unnamed ditch to unnamed creek to Ash Slough to Turkey Creek
121228	LAG541693	001	Winnsboro Church of the Nazarene Inc - Family Community Christian School	06/05/13	Nonclassifiable Establishments	treated sanitary wastewater	Ash Slough to Turkey Creek to Turkey Creek Lake
41565	LAG570148	001	Franklin Parish Police Jury - Horace White Sewage District	04/23/14	Electric, Gas, and Sanitary Services	treated sanitary wastewater	Turkey Creek
22471	LAG470112	001	White Ford Lincoln Mercury	Terminated	Auto dealers and gasoline service stations		
71425	LAG830165	001	Thompsons Quick Stop	Terminated	Food and Kindred Products		
19023	LAG380012	001	Winnsboro Town of - Water Treatment Plant	Terminated	Electric, Gas, and Sanitary Services		
42529	LAG110058	001	TXI Operations LP - Ready Mix Plant #26	Terminated	Stone, Clay, Glass, and Concrete Products		
1387	LA0104027	001	Micro Chemical Co Inc	Terminated	Chemicals and Allied Products		
153754	LAG532714	001	Vineyard Express	Cancelled	Motor Freight Transportation and Warehousing		

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:

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

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 the impaired subsegments in Turkey Creek subsegment 080906 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 080906. Detailed flow information for subsegment 080906 was not available. To determine flow, data from the active USGS gage on Bundick Creek near DeRidder, LA (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. Subsegment 080906 has an area of 55 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.

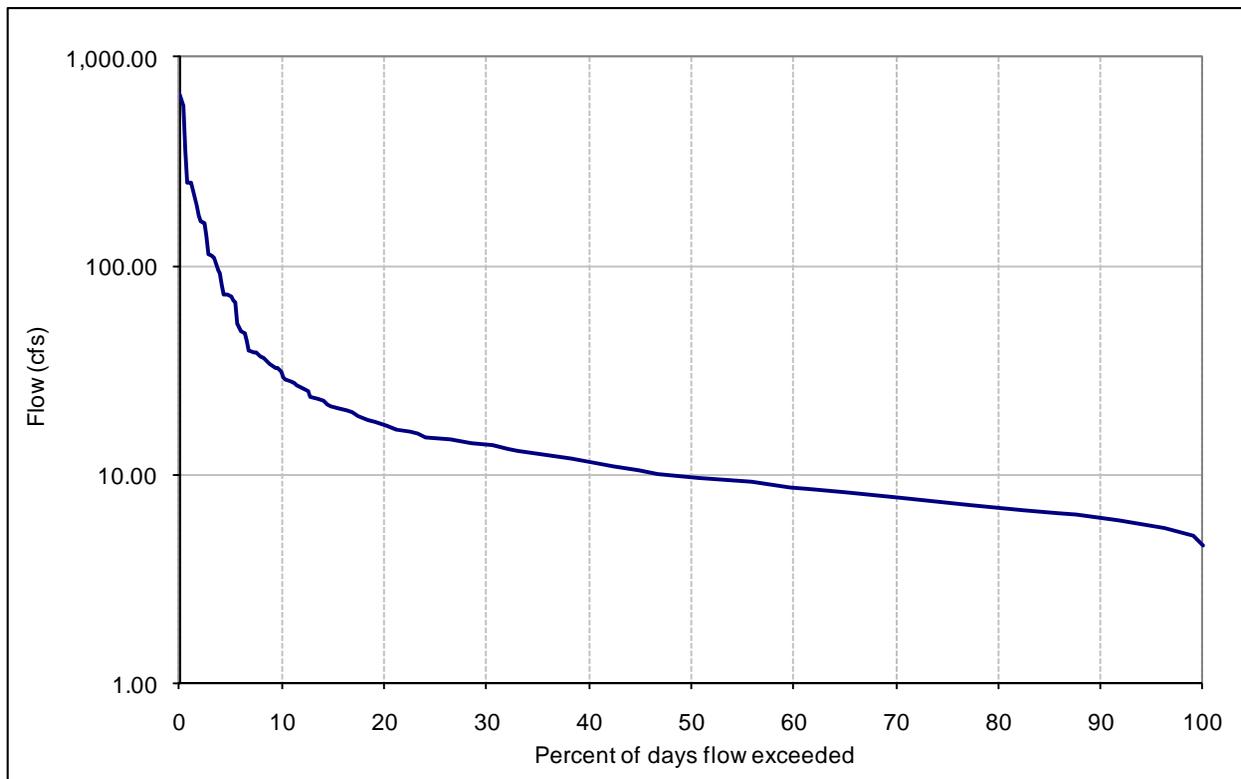


Figure 3-1. Summer flow duration curve for gage 08014800.

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 TMDLs and allocations for the subsegment 080906. Only observed data from 2007 and after were used in this TMDL. The reductions for fecal coliform bacteria at the monitoring station on Turkey Creek are 49 percent during the winter and no reduction 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 Turkey Creek

Season	TMDL (MPN/day)	WLA (MPN/day)	LA (MPN/day)	Explicit MOS (MPN/day)	Percent reduction
Winter	3.89E+12	7.31E+09	3.10E+12	7.77E+11	49%
Summer	2.01E+11	7.31E+09	1.53E+11	4.01E+10	0%

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 080906 include sanitary and industrial wastewater, and industrial stormwater. Table 3-2 lists the individual fecal coliform WLAs for the point source facilities identified in Section 2.5.

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

The equation for WLA calculation is:

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

Table 3-2. WLA summary for subsegment 080906

AI #	Permit #	Outfall	Facility name	Outfall type	Flow type	Flow (gpd)	FCB limit type ¹	Limit (MPN/100 mL)	Load (MPN/d)
43990	LA0020281	001	Winnsboro City of - Oxidation Lagoon	treated sanitary wastewater	expected	800,000	weekly ave.	400	1.21E+10
							monthly ave.	200	6.06E+09
43989	LA0038253	001	Winnsboro Town of - Industrial Park	treated sanitary wastewater	design	100,000	weekly ave.	400	1.51E+09
							monthly ave.	200	7.57E+08
153533	LA0124630	001	LADAF - District Office Winnsboro	vehicle and equipment washwater	not avail.		none		
153533	LA0124630	002	LADAF - District Office Winnsboro	treated sanitary wastewater	expected	500	weekly ave.	400	7.57E+06
							monthly ave.	200	3.79E+06
26304	LAG470107	001	Dennis Crain Dodge Chrysler Inc	washrack wastewater	expected	857	none		
91084	LAG531191	001	Jimmy Wilhite Trailer Park	treated sanitary wastewater	expected	4,500	weekly ave.	400	6.81E+07
							monthly ave.	200	3.41E+07
30309	LAG532441	001	Macon Ridge Propane Service Inc - Winnsboro Branch	treated sanitary wastewater	expected	20	weekly ave.	400	3.03E+05
							monthly ave.	200	1.51E+05
153669	LAG532482	001	Abundant Life Evangelistic Ministry	treated sanitary wastewater	expected	1,000	weekly ave.	400	1.51E+07
							monthly ave.	200	7.57E+06
153747	LAG532504	001	Franklin Parish Police Jury - Road Barn	treated sanitary wastewater	expected	800	weekly ave.	400	1.21E+07
							monthly ave.	200	6.06E+06
76027	LAG532553	001	Rick's Best Stop	treated sanitary wastewater	expected	140	weekly ave.	400	2.12E+06
							monthly ave.	200	1.06E+06
156912	LAG532699	001	Unnamed Trailer Park - James C Donnell - WWTP	treated sanitary wastewater	expected	1,500	weekly ave.	400	2.27E+07
							monthly ave.	200	1.14E+07
76026	LAG532944	001	Cupit's Corner	treated sanitary wastewater	expected	340	weekly ave.	400	5.15E+06
							monthly ave.	200	2.57E+06
164011	LAG533113	001	Rons Warehouse Furniture - Re:RWF LLC	treated sanitary wastewater	expected	80	weekly ave.	400	1.21E+06
							monthly ave.	200	6.06E+05
121228	LAG541693	001	Winnsboro Church of the Nazarene Inc - Family Community Christian School	treated sanitary wastewater	expected	8,250	weekly ave.	400	1.25E+08
							monthly ave.	200	6.25E+07
41565	LAG570148	001	Franklin Parish Police Jury - Horace White Sewage District	treated sanitary wastewater	expected	48,000	weekly ave.	400	7.27E+08
							monthly ave.	200	3.63E+08

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.

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 presented 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 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. Turkey Creek was monitored with the Ouachita River Basin in 2004, 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 water body subsegments are monitored each month under this program. Under the current monitoring schedule, approximately one-half of the state's waters are newly assessed for section 305(b) and section 303(d) listing purposes for each biennial cycle, with sampling occurring statewide each year. The 4-year cycle follows an initial 5-year rotation that covered all basins in the state according to the TMDL priorities. Monitoring allows LDEQ to determine whether any improvement has occurred in water quality after the TMDLs have been implemented. When LDEQ evaluates monitoring results at the end of each year, it may add waterbodies to or remove them from the section 303(d) list of impaired waterbodies.

5. Public Participation

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

6. References

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<<http://www.epa.gov/mrlc/nlcd-2001.html>>. Accessed May 3, 2010.

Appendix A. Fecal Coliform Bacteria Monitoring Data

Table A-1. Fecal coliform bacteria data

Site	Site number	Collection date ^a	Result (MPN/100 mL)	Validation qualifier/ comments	Designated use exceeded
Turkey Creek southwest of Chase, Louisiana	1444	2/1/05	10,480		SCR
Turkey Creek southwest of Chase, Louisiana	1444	3/1/05	1,360		
Turkey Creek southwest of Chase, Louisiana	1444	3/22/05	3,300		SCR
Turkey Creek southwest of Chase, Louisiana	1444	4/12/05	25,275		SCR
Turkey Creek southwest of Chase, Louisiana	1444	5/3/05	275		
Turkey Creek southwest of Chase, Louisiana	1444	5/24/05	100		
Turkey Creek southwest of Chase, Louisiana	1444	6/21/05	100		
Turkey Creek southwest of Chase, Louisiana	1444	7/19/05	40		
Turkey Creek southwest of Chase, Louisiana	1444	8/9/05	425		PCR
Turkey Creek southwest of Chase, Louisiana	1444	8/30/05	200		
Turkey Creek southwest of Chase, Louisiana	1444	9/27/05	2,429	HR- Post-Rita/ Possible Impacts	PCR
Turkey Creek southwest of Chase, Louisiana	1444	10/18/05	350		
Turkey Creek southwest of Chase, Louisiana	1444	10/9/07	40		
Turkey Creek southwest of Chase, Louisiana	1444	11/6/07	440		
Turkey Creek southwest of Chase, Louisiana	1444	12/4/07	320		
Turkey Creek southwest of Chase, Louisiana	1444	1/8/08	105		
Turkey Creek southwest of Chase, Louisiana	1444	2/19/08	340		
Turkey Creek southwest of Chase, Louisiana	1444	3/4/08	3,112		SCR
Turkey Creek southwest of Chase, Louisiana	1444	4/15/08	58		
Turkey Creek southwest of Chase, Louisiana	1444	5/6/08	80		
Turkey Creek southwest of Chase, Louisiana	1444	6/3/08	144		
Turkey Creek southwest of Chase, Louisiana	1444	8/5/08	203		
Turkey Creek southwest of Chase, Louisiana	1444	7/8/08	96		

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

Table A-2. Fecal coliform summary statistics for station 1444

Statistic	Value
Minimum (MPN/100 mL)	40
Maximum (MPN/100 mL)	25,275
Average (MPN/100 mL)	2,142.3
Count	23
Percentage of data that violate the PCR criterion	8.7
Percentage of data that violate the SCR criterion	17.4

Appendix B. Load Duration Curve Plots

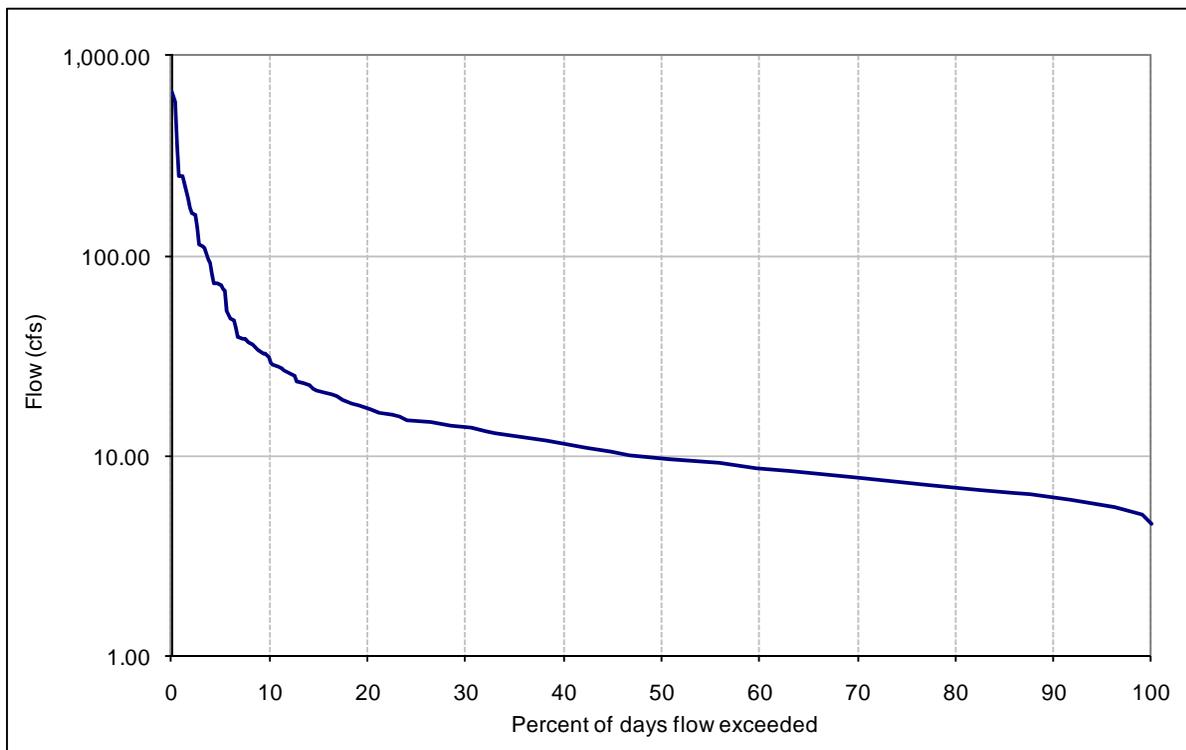


Figure B-1. Summer flow duration curve for gage 08014800.

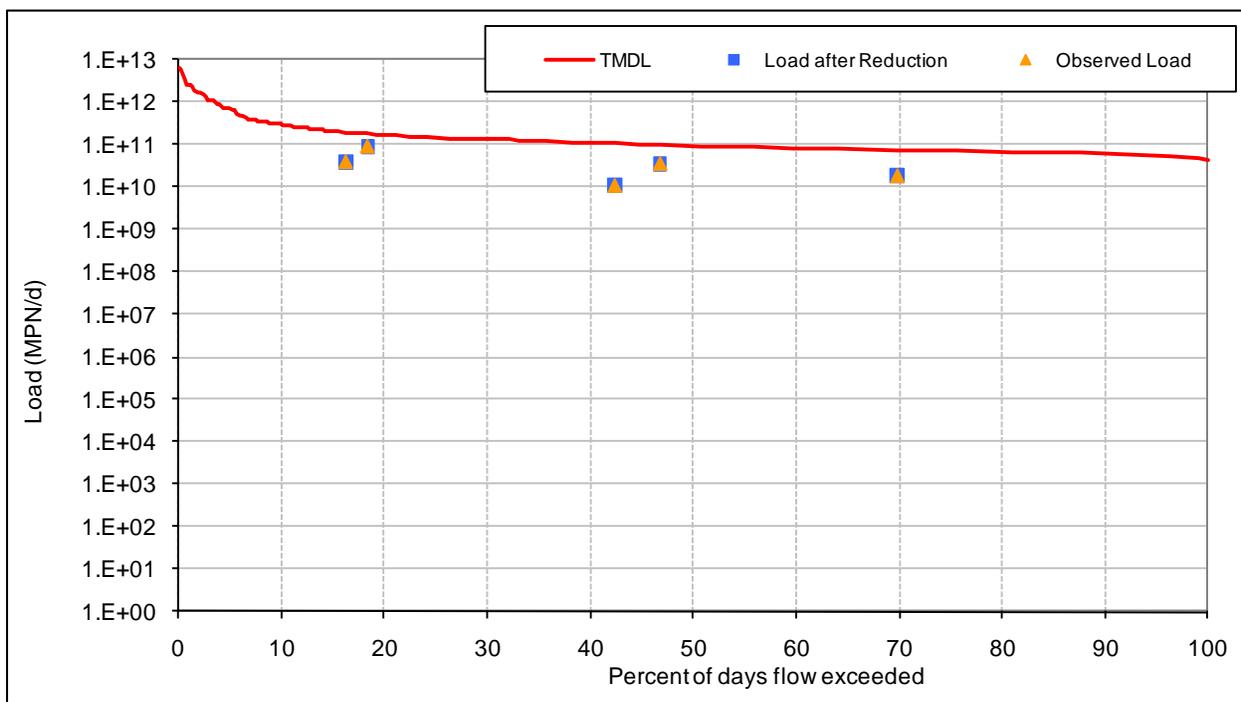


Figure B-2. Summer load duration curve.

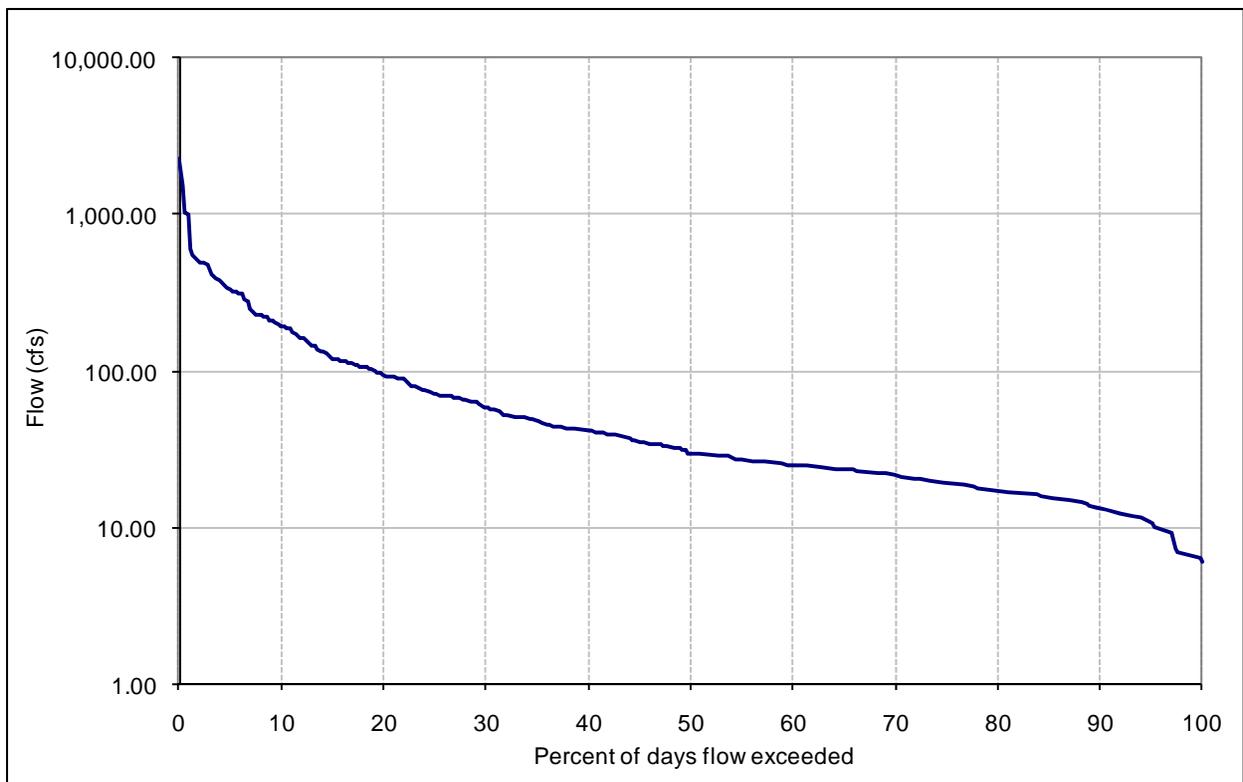


Figure B-3. Winter flow duration curve for gage 08014800.

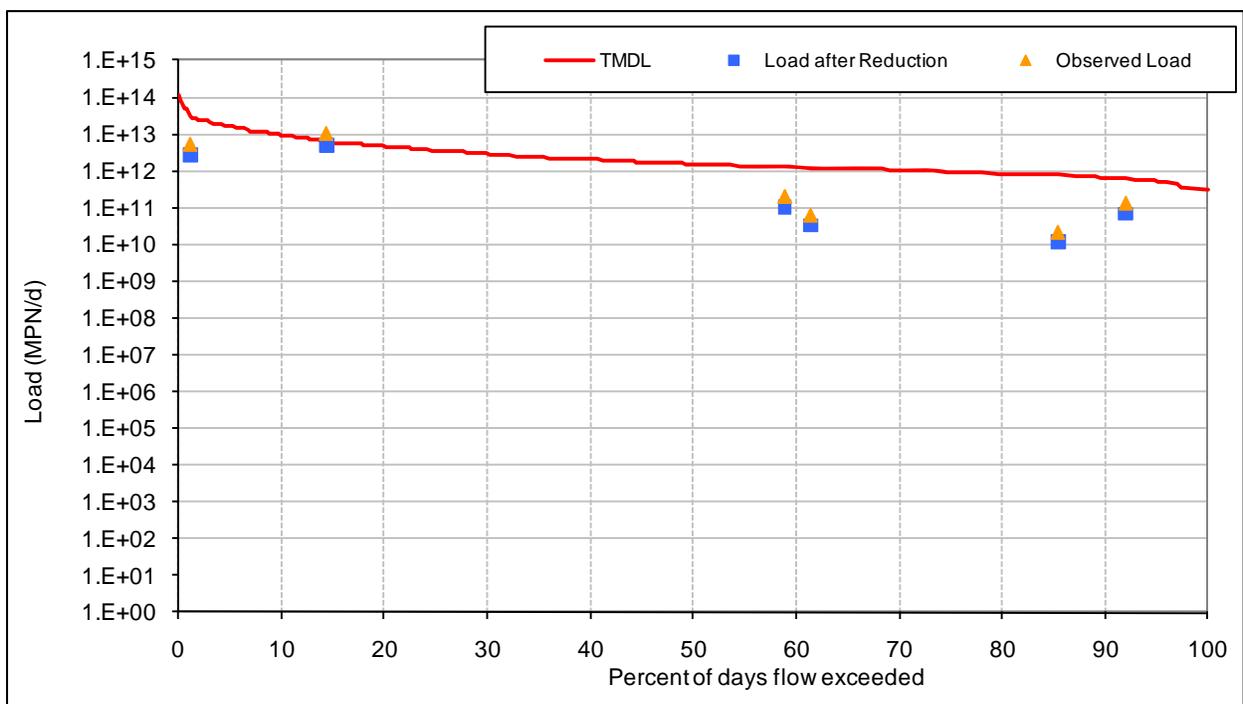


Figure B-4. Winter load duration curve.

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?
8/5/2008	203	18.34	18.4	9.109E+10	9.109E+10	1.436E+11	Yes
6/3/2008	144	10.087	46.8	3.554E+10	3.554E+10	7.897E+10	Yes
7/8/2008	96	7.7945	69.8	1.831E+10	1.831E+10	6.102E+10	Yes
5/6/2008	80	20.174	16.3	3.949E+10	3.949E+10	1.579E+11	Yes
10/9/2007	40	11.004	42.4	1.077E+10	1.077E+10	8.615E+10	Yes

Table C-2. Load duration curve summer statistics

Total No. of samples =	13	
MOS =	20%	
WQ standard for =	400	MPN/100 mL
Percent Reduction Required =	0.0	
Allowable percentage of exceedences =	0%	
No. of exceedences after reductions =	0	
Sum of flow on sampling day	67	cfs
Sum of current loads	1.952E+11	MPN/d
Flow weighted avg conc	178	MPN/100 mL
Average flow	22	cfs
Existing total load	6.332E+10	MPN/d
Existing point source load	7.307E+09	MPN/d
Existing remaining load	5.602E+10	MPN/d
Total allowable loading	2.006E+11	MPN/d
Explicit MOS (20%)	4.011E+10	MPN/d
WLA	7.307E+09	MPN/d
LA	1.532E+11	MPN/d
USGS drainage area (mi ²) =	120.0	
SS drainage area (mi ²) =	55.02	

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)
						200,574,285,068
8/15/09	10	100.000	4.585	0.00	44,870,200,906	0
8/16/09	10	100.000	4.585	0.00	44,870,200,906	0
8/17/09	10	100.000	4.585	0.00	44,870,200,906	0
8/25/09	10	100.000	4.585	1.00	44,870,200,906	448,702,009
7/14/09	11	99.000	5.0435	0.00	49,357,220,996	0
7/15/09	11	99.000	5.0435	0.00	49,357,220,996	0
8/13/09	11	99.000	5.0435	0.00	49,357,220,996	0
8/14/09	11	99.000	5.0435	0.00	49,357,220,996	0
8/18/09	11	99.000	5.0435	0.00	49,357,220,996	0
8/24/09	11	99.000	5.0435	0.00	49,357,220,996	0
9/3/09	11	99.000	5.0435	0.00	49,357,220,996	0
9/4/09	11	99.000	5.0435	0.00	49,357,220,996	0
9/5/09	11	99.000	5.0435	0.00	49,357,220,996	0
9/8/09	11	99.000	5.0435	0.00	49,357,220,996	0
9/9/09	11	99.000	5.0435	2.80	49,357,220,996	1,382,002,188
7/30/08	12	96.200	5.502	0.00	53,844,241,087	0
7/31/08	12	96.200	5.502	0.00	53,844,241,087	0
8/1/08	12	96.200	5.502	0.00	53,844,241,087	0
8/2/08	12	96.200	5.502	0.00	53,844,241,087	0
7/3/09	12	96.200	5.502	0.00	53,844,241,087	0
7/4/09	12	96.200	5.502	0.00	53,844,241,087	0
7/5/09	12	96.200	5.502	0.00	53,844,241,087	0
7/6/09	12	96.200	5.502	0.00	53,844,241,087	0
7/13/09	12	96.200	5.502	0.00	53,844,241,087	0
8/12/09	12	96.200	5.502	0.00	53,844,241,087	0
8/23/09	12	96.200	5.502	0.00	53,844,241,087	0
8/26/09	12	96.200	5.502	0.00	53,844,241,087	0
8/27/09	12	96.200	5.502	0.00	53,844,241,087	0
8/28/09	12	96.200	5.502	0.00	53,844,241,087	0
8/29/09	12	96.200	5.502	0.00	53,844,241,087	0
9/2/09	12	96.200	5.502	0.00	53,844,241,087	0
9/7/09	12	96.200	5.502	4.40	53,844,241,087	2,369,146,608
7/20/08	13	91.800	5.9605	0.00	58,331,261,177	0
7/21/08	13	91.800	5.9605	0.00	58,331,261,177	0
7/22/08	13	91.800	5.9605	0.00	58,331,261,177	0
7/23/08	13	91.800	5.9605	0.00	58,331,261,177	0
7/28/08	13	91.800	5.9605	0.00	58,331,261,177	0
7/29/08	13	91.800	5.9605	0.00	58,331,261,177	0
7/2/09	13	91.800	5.9605	0.00	58,331,261,177	0
7/12/09	13	91.800	5.9605	0.00	58,331,261,177	0
7/17/09	13	91.800	5.9605	0.00	58,331,261,177	0
7/18/09	13	91.800	5.9605	0.00	58,331,261,177	0
8/8/09	13	91.800	5.9605	0.00	58,331,261,177	0

FINAL—Turkey Creek (Subsegment 080906) Fecal Coliform Bacteria TMDL
 Origination Date: October 5, 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)
8/9/09	13	91.800	5.9605	0.00	58,331,261,177	0
8/11/09	13	91.800	5.9605	0.00	58,331,261,177	0
8/19/09	13	91.800	5.9605	0.00	58,331,261,177	0
8/21/09	13	91.800	5.9605	0.00	58,331,261,177	0
9/11/09	13	91.800	5.9605	4.20	58,331,261,177	2,449,912,969
7/17/08	14	87.600	6.419	0.00	62,818,281,268	0
7/18/08	14	87.600	6.419	0.00	62,818,281,268	0
7/19/08	14	87.600	6.419	0.00	62,818,281,268	0
7/24/08	14	87.600	6.419	0.00	62,818,281,268	0
7/27/08	14	87.600	6.419	0.00	62,818,281,268	0
10/27/08	14	87.600	6.419	0.00	62,818,281,268	0
10/28/08	14	87.600	6.419	0.00	62,818,281,268	0
10/29/08	14	87.600	6.419	0.00	62,818,281,268	0
10/30/08	14	87.600	6.419	0.00	62,818,281,268	0
10/31/08	14	87.600	6.419	0.00	62,818,281,268	0
6/27/09	14	87.600	6.419	0.00	62,818,281,268	0
6/28/09	14	87.600	6.419	0.00	62,818,281,268	0
7/1/09	14	87.600	6.419	0.00	62,818,281,268	0
7/7/09	14	87.600	6.419	0.00	62,818,281,268	0
7/10/09	14	87.600	6.419	0.00	62,818,281,268	0
7/11/09	14	87.600	6.419	0.00	62,818,281,268	0
7/27/09	14	87.600	6.419	0.00	62,818,281,268	0
7/28/09	14	87.600	6.419	0.00	62,818,281,268	0
8/7/09	14	87.600	6.419	0.00	62,818,281,268	0
8/10/09	14	87.600	6.419	0.00	62,818,281,268	0
8/20/09	14	87.600	6.419	0.00	62,818,281,268	0
8/22/09	14	87.600	6.419	0.00	62,818,281,268	0
9/1/09	14	87.600	6.419	0.00	62,818,281,268	0
9/10/09	14	87.600	6.419	0.00	62,818,281,268	0
9/12/09	14	87.600	6.419	0.00	62,818,281,268	0
10/1/09	14	87.600	6.419	6.70	62,818,281,268	4,208,824,845
7/13/08	15	80.900	6.8775	0.00	67,305,301,358	0
7/14/08	15	80.900	6.8775	0.00	67,305,301,358	0
7/15/08	15	80.900	6.8775	0.00	67,305,301,358	0
7/16/08	15	80.900	6.8775	0.00	67,305,301,358	0
7/26/08	15	80.900	6.8775	0.00	67,305,301,358	0
8/11/08	15	80.900	6.8775	0.00	67,305,301,358	0
8/12/08	15	80.900	6.8775	0.00	67,305,301,358	0
10/24/08	15	80.900	6.8775	0.00	67,305,301,358	0
10/25/08	15	80.900	6.8775	0.00	67,305,301,358	0
10/26/08	15	80.900	6.8775	0.00	67,305,301,358	0
6/22/09	15	80.900	6.8775	0.00	67,305,301,358	0
6/23/09	15	80.900	6.8775	0.00	67,305,301,358	0
6/24/09	15	80.900	6.8775	0.00	67,305,301,358	0
6/25/09	15	80.900	6.8775	0.00	67,305,301,358	0

FINAL—Turkey Creek (Subsegment 080906) Fecal Coliform Bacteria TMDL
 Origination Date: October 5, 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)
6/26/09	15	80.900	6.8775	0.00	67,305,301,358	0
7/8/09	15	80.900	6.8775	0.00	67,305,301,358	0
7/9/09	15	80.900	6.8775	0.00	67,305,301,358	0
7/21/09	15	80.900	6.8775	0.00	67,305,301,358	0
7/26/09	15	80.900	6.8775	0.00	67,305,301,358	0
8/6/09	15	80.900	6.8775	0.00	67,305,301,358	0
9/30/09	15	80.900	6.8775	5.40	67,305,301,358	3,634,486,273
7/9/08	16	75.500	7.336	0.00	71,792,321,449	0
7/10/08	16	75.500	7.336	0.00	71,792,321,449	0
8/10/08	16	75.500	7.336	0.00	71,792,321,449	0
8/30/08	16	75.500	7.336	0.00	71,792,321,449	0
8/31/08	16	75.500	7.336	0.00	71,792,321,449	0
10/1/08	16	75.500	7.336	0.00	71,792,321,449	0
10/2/08	16	75.500	7.336	0.00	71,792,321,449	0
10/3/08	16	75.500	7.336	0.00	71,792,321,449	0
10/4/08	16	75.500	7.336	0.00	71,792,321,449	0
10/5/08	16	75.500	7.336	0.00	71,792,321,449	0
10/6/08	16	75.500	7.336	0.00	71,792,321,449	0
10/7/08	16	75.500	7.336	0.00	71,792,321,449	0
10/13/08	16	75.500	7.336	0.00	71,792,321,449	0
10/14/08	16	75.500	7.336	0.00	71,792,321,449	0
10/22/08	16	75.500	7.336	0.00	71,792,321,449	0
10/23/08	16	75.500	7.336	0.00	71,792,321,449	0
6/19/09	16	75.500	7.336	0.00	71,792,321,449	0
6/20/09	16	75.500	7.336	0.00	71,792,321,449	0
6/21/09	16	75.500	7.336	0.00	71,792,321,449	0
7/20/09	16	75.500	7.336	0.00	71,792,321,449	0
7/25/09	16	75.500	7.336	0.00	71,792,321,449	0
8/5/09	16	75.500	7.336	5.70	71,792,321,449	4,092,162,323
7/8/08	17	69.800	7.7945	0.00	76,279,341,540	0
7/12/08	17	69.800	7.7945	0.00	76,279,341,540	0
8/9/08	17	69.800	7.7945	0.00	76,279,341,540	0
8/18/08	17	69.800	7.7945	0.00	76,279,341,540	0
8/28/08	17	69.800	7.7945	0.00	76,279,341,540	0
8/29/08	17	69.800	7.7945	0.00	76,279,341,540	0
9/1/08	17	69.800	7.7945	0.00	76,279,341,540	0
9/28/08	17	69.800	7.7945	0.00	76,279,341,540	0
9/29/08	17	69.800	7.7945	0.00	76,279,341,540	0
9/30/08	17	69.800	7.7945	0.00	76,279,341,540	0
10/8/08	17	69.800	7.7945	0.00	76,279,341,540	0
10/9/08	17	69.800	7.7945	0.00	76,279,341,540	0
10/12/08	17	69.800	7.7945	0.00	76,279,341,540	0
10/15/08	17	69.800	7.7945	0.00	76,279,341,540	0
10/21/08	17	69.800	7.7945	0.00	76,279,341,540	0
6/17/09	17	69.800	7.7945	0.00	76,279,341,540	0

FINAL—Turkey Creek (Subsegment 080906) Fecal Coliform Bacteria TMDL
 Origination Date: October 5, 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)
6/18/09	17	69.800	7.7945	0.00	76,279,341,540	0
7/22/09	17	69.800	7.7945	0.00	76,279,341,540	0
7/24/09	17	69.800	7.7945	0.00	76,279,341,540	0
8/31/09	17	69.800	7.7945	0.00	76,279,341,540	0
9/22/09	17	69.800	7.7945	0.00	76,279,341,540	0
9/29/09	17	69.800	7.7945	5.70	76,279,341,540	4,347,922,468
6/20/08	18	64.100	8.253	0.00	80,766,361,630	0
6/21/08	18	64.100	8.253	0.00	80,766,361,630	0
7/7/08	18	64.100	8.253	0.00	80,766,361,630	0
7/25/08	18	64.100	8.253	0.00	80,766,361,630	0
9/26/08	18	64.100	8.253	0.00	80,766,361,630	0
9/27/08	18	64.100	8.253	0.00	80,766,361,630	0
10/11/08	18	64.100	8.253	0.00	80,766,361,630	0
10/20/08	18	64.100	8.253	0.00	80,766,361,630	0
6/15/09	18	64.100	8.253	0.00	80,766,361,630	0
6/16/09	18	64.100	8.253	0.00	80,766,361,630	0
6/29/09	18	64.100	8.253	0.00	80,766,361,630	0
6/30/09	18	64.100	8.253	0.00	80,766,361,630	0
7/23/09	18	64.100	8.253	0.00	80,766,361,630	0
7/29/09	18	64.100	8.253	0.00	80,766,361,630	0
9/21/09	18	64.100	8.253	0.00	80,766,361,630	0
9/28/09	18	64.100	8.253	0.00	80,766,361,630	0
10/2/09	18	64.100	8.253	4.40	80,766,361,630	3,553,719,912
6/10/08	19	59.700	8.7115	0.00	85,253,381,721	0
6/15/08	19	59.700	8.7115	0.00	85,253,381,721	0
6/19/08	19	59.700	8.7115	0.00	85,253,381,721	0
7/3/08	19	59.700	8.7115	0.00	85,253,381,721	0
7/4/08	19	59.700	8.7115	0.00	85,253,381,721	0
8/13/08	19	59.700	8.7115	0.00	85,253,381,721	0
8/19/08	19	59.700	8.7115	0.00	85,253,381,721	0
8/20/08	19	59.700	8.7115	0.00	85,253,381,721	0
8/27/08	19	59.700	8.7115	0.00	85,253,381,721	0
9/12/08	19	59.700	8.7115	0.00	85,253,381,721	0
9/24/08	19	59.700	8.7115	0.00	85,253,381,721	0
9/25/08	19	59.700	8.7115	0.00	85,253,381,721	0
10/19/08	19	59.700	8.7115	0.00	85,253,381,721	0
6/14/09	19	59.700	8.7115	0.00	85,253,381,721	0
8/4/09	19	59.700	8.7115	3.80	85,253,381,721	3,239,628,505
10/14/07	20	55.900	9.17	0.00	89,740,401,811	0
10/15/07	20	55.900	9.17	0.00	89,740,401,811	0
10/16/07	20	55.900	9.17	0.00	89,740,401,811	0
6/6/08	20	55.900	9.17	0.00	89,740,401,811	0
6/7/08	20	55.900	9.17	0.00	89,740,401,811	0
6/8/08	20	55.900	9.17	0.00	89,740,401,811	0
6/9/08	20	55.900	9.17	0.00	89,740,401,811	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	55.900	9.17	0.00	89,740,401,811	0
6/14/08	20	55.900	9.17	0.00	89,740,401,811	0
6/22/08	20	55.900	9.17	0.00	89,740,401,811	0
6/24/08	20	55.900	9.17	0.00	89,740,401,811	0
8/8/08	20	55.900	9.17	0.00	89,740,401,811	0
8/17/08	20	55.900	9.17	0.00	89,740,401,811	0
8/26/08	20	55.900	9.17	0.00	89,740,401,811	0
9/11/08	20	55.900	9.17	0.00	89,740,401,811	0
9/23/08	20	55.900	9.17	0.00	89,740,401,811	0
10/10/08	20	55.900	9.17	0.00	89,740,401,811	0
10/18/08	20	55.900	9.17	0.00	89,740,401,811	0
6/13/09	20	55.900	9.17	0.00	89,740,401,811	0
9/27/09	20	55.900	9.17	5.20	89,740,401,811	4,666,500,894
10/12/07	21	50.700	9.6285	0.00	94,227,421,902	0
10/13/07	21	50.700	9.6285	0.00	94,227,421,902	0
6/4/08	21	50.700	9.6285	0.00	94,227,421,902	0
6/5/08	21	50.700	9.6285	0.00	94,227,421,902	0
6/12/08	21	50.700	9.6285	0.00	94,227,421,902	0
6/13/08	21	50.700	9.6285	0.00	94,227,421,902	0
6/16/08	21	50.700	9.6285	0.00	94,227,421,902	0
6/17/08	21	50.700	9.6285	0.00	94,227,421,902	0
6/29/08	21	50.700	9.6285	0.00	94,227,421,902	0
9/10/08	21	50.700	9.6285	0.00	94,227,421,902	0
9/22/08	21	50.700	9.6285	0.00	94,227,421,902	0
6/12/09	21	50.700	9.6285	0.00	94,227,421,902	0
9/6/09	21	50.700	9.6285	0.00	94,227,421,902	0
9/23/09	21	50.700	9.6285	0.00	94,227,421,902	0
9/26/09	21	50.700	9.6285	3.90	94,227,421,902	3,674,869,454
10/11/07	22	46.800	10.087	0.00	98,714,441,992	0
6/3/08	22	46.800	10.087	0.00	98,714,441,992	0
7/1/08	22	46.800	10.087	0.00	98,714,441,992	0
9/21/08	22	46.800	10.087	0.00	98,714,441,992	0
10/17/08	22	46.800	10.087	0.00	98,714,441,992	0
6/11/09	22	46.800	10.087	0.00	98,714,441,992	0
7/30/09	22	46.800	10.087	0.00	98,714,441,992	0
9/20/09	22	46.800	10.087	2.00	98,714,441,992	1,974,288,840
10/4/07	23	44.800	10.5455	0.00	103,201,462,083	0
10/5/07	23	44.800	10.5455	0.00	103,201,462,083	0
10/7/07	23	44.800	10.5455	0.00	103,201,462,083	0
10/10/07	23	44.800	10.5455	0.00	103,201,462,083	0
6/18/08	23	44.800	10.5455	0.00	103,201,462,083	0
9/9/08	23	44.800	10.5455	0.00	103,201,462,083	0
9/20/08	23	44.800	10.5455	0.00	103,201,462,083	0
6/10/09	23	44.800	10.5455	0.00	103,201,462,083	0
7/19/09	23	44.800	10.5455	2.40	103,201,462,083	2,476,835,090

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10/3/07	24	42.400	11.004	0.00	107,688,482,173	0
10/8/07	24	42.400	11.004	0.00	107,688,482,173	0
10/9/07	24	42.400	11.004	0.00	107,688,482,173	0
6/2/08	24	42.400	11.004	0.00	107,688,482,173	0
6/28/08	24	42.400	11.004	0.00	107,688,482,173	0
7/11/08	24	42.400	11.004	0.00	107,688,482,173	0
8/25/08	24	42.400	11.004	0.00	107,688,482,173	0
7/16/09	24	42.400	11.004	2.00	107,688,482,173	2,153,769,643
10/2/07	25	40.400	11.4625	0.00	112,175,502,264	0
10/6/07	25	40.400	11.4625	0.00	112,175,502,264	0
5/13/08	25	40.400	11.4625	0.00	112,175,502,264	0
6/27/08	25	40.400	11.4625	0.00	112,175,502,264	0
7/2/08	25	40.400	11.4625	0.00	112,175,502,264	0
8/15/08	25	40.400	11.4625	0.00	112,175,502,264	0
6/9/09	25	40.400	11.4625	0.00	112,175,502,264	0
10/3/09	25	40.400	11.4625	2.10	112,175,502,264	2,355,685,548
5/12/08	26	38.300	11.921	0.00	116,662,522,355	0
5/28/08	26	38.300	11.921	0.00	116,662,522,355	0
6/1/08	26	38.300	11.921	0.00	116,662,522,355	0
6/26/08	26	38.300	11.921	0.00	116,662,522,355	0
8/7/08	26	38.300	11.921	0.00	116,662,522,355	0
9/19/08	26	38.300	11.921	0.00	116,662,522,355	0
6/3/09	26	38.300	11.921	0.00	116,662,522,355	0
8/3/09	26	38.300	11.921	0.00	116,662,522,355	0
9/13/09	26	38.300	11.921	0.00	116,662,522,355	0
9/25/09	26	38.300	11.921	2.60	116,662,522,355	3,033,225,581
10/1/07	27	35.700	12.3795	0.00	121,149,542,445	0
5/11/08	27	35.700	12.3795	0.00	121,149,542,445	0
5/27/08	27	35.700	12.3795	0.00	121,149,542,445	0
6/23/08	27	35.700	12.3795	0.00	121,149,542,445	0
6/25/08	27	35.700	12.3795	0.00	121,149,542,445	0
6/30/08	27	35.700	12.3795	0.00	121,149,542,445	0
9/8/08	27	35.700	12.3795	0.00	121,149,542,445	0
6/2/09	27	35.700	12.3795	0.00	121,149,542,445	0
6/8/09	27	35.700	12.3795	0.00	121,149,542,445	0
10/8/09	27	35.700	12.3795	2.60	121,149,542,445	3,149,888,104
10/31/07	28	33.100	12.838	0.00	125,636,562,536	0
6/1/09	28	33.100	12.838	0.00	125,636,562,536	0
8/30/09	28	33.100	12.838	0.00	125,636,562,536	0
9/18/09	28	33.100	12.838	1.00	125,636,562,536	1,256,365,625
10/30/07	29	32.100	13.2965	0.00	130,123,582,626	0
5/10/08	29	32.100	13.2965	0.00	130,123,582,626	0
7/5/08	29	32.100	13.2965	0.00	130,123,582,626	0
10/16/08	29	32.100	13.2965	0.00	130,123,582,626	0
5/31/09	29	32.100	13.2965	0.00	130,123,582,626	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	32.100	13.2965	1.60	130,123,582,626	2,081,977,322
5/14/08	30	30.500	13.755	0.00	134,610,602,717	0
5/22/08	30	30.500	13.755	0.00	134,610,602,717	0
5/23/08	30	30.500	13.755	0.00	134,610,602,717	0
5/26/08	30	30.500	13.755	0.00	134,610,602,717	0
5/31/08	30	30.500	13.755	0.00	134,610,602,717	0
7/6/08	30	30.500	13.755	0.00	134,610,602,717	0
6/7/09	30	30.500	13.755	0.00	134,610,602,717	0
9/19/09	30	30.500	13.755	2.00	134,610,602,717	2,692,212,054
10/29/07	31	28.500	14.2135	0.00	139,097,622,807	0
5/2/08	31	28.500	14.2135	0.00	139,097,622,807	0
5/9/08	31	28.500	14.2135	0.00	139,097,622,807	0
8/14/08	31	28.500	14.2135	0.00	139,097,622,807	0
8/16/08	31	28.500	14.2135	0.00	139,097,622,807	0
6/5/09	31	28.500	14.2135	0.00	139,097,622,807	0
9/16/09	31	28.500	14.2135	0.00	139,097,622,807	0
9/24/09	31	28.500	14.2135	2.10	139,097,622,807	2,921,050,079
5/1/08	32	26.400	14.672	0.00	143,584,642,898	0
5/21/08	32	26.400	14.672	0.00	143,584,642,898	0
9/13/08	32	26.400	14.672	0.00	143,584,642,898	0
9/18/08	32	26.400	14.672	0.00	143,584,642,898	0
5/30/09	32	26.400	14.672	0.00	143,584,642,898	0
6/4/09	32	26.400	14.672	0.00	143,584,642,898	0
6/6/09	32	26.400	14.672	0.00	143,584,642,898	0
10/5/09	32	26.400	14.672	0.00	143,584,642,898	0
10/20/09	32	26.400	14.672	2.30	143,584,642,898	3,302,446,787
10/28/07	33	24.100	15.1305	0.00	148,071,662,988	0
5/8/08	33	24.100	15.1305	0.00	148,071,662,988	0
10/4/09	33	24.100	15.1305	0.80	148,071,662,988	1,184,573,304
5/24/08	34	23.300	15.589	0.00	152,558,683,079	0
5/30/08	34	23.300	15.589	0.00	152,558,683,079	0
9/7/08	34	23.300	15.589	0.80	152,558,683,079	1,220,469,465
5/3/08	35	22.500	16.0475	0.00	157,045,703,170	0
8/24/08	35	22.500	16.0475	0.00	157,045,703,170	0
5/29/09	35	22.500	16.0475	0.00	157,045,703,170	0
9/15/09	35	22.500	16.0475	0.00	157,045,703,170	0
10/6/09	35	22.500	16.0475	1.30	157,045,703,170	2,041,594,141
5/7/08	36	21.200	16.506	0.00	161,532,723,260	0
5/25/08	36	21.200	16.506	0.00	161,532,723,260	0
8/6/08	36	21.200	16.506	0.00	161,532,723,260	0
10/10/09	36	21.200	16.506	1.00	161,532,723,260	1,615,327,233
10/27/07	37	20.200	16.9645	0.00	166,019,743,351	0
5/20/08	37	20.200	16.9645	0.00	166,019,743,351	0
9/17/09	37	20.200	16.9645	0.00	166,019,743,351	0
10/7/09	37	20.200	16.9645	1.00	166,019,743,351	1,660,197,434

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5/23/09	39	19.200	17.8815	0.00	174,993,783,532	0
5/28/09	39	19.200	17.8815	0.00	174,993,783,532	0
10/11/09	39	19.200	17.8815	0.80	174,993,783,532	1,399,950,268
8/5/08	40	18.400	18.34	0.00	179,480,803,622	0
5/22/09	40	18.400	18.34	0.00	179,480,803,622	0
7/31/09	40	18.400	18.34	0.00	179,480,803,622	0
10/19/09	40	18.400	18.34	1.00	179,480,803,622	1,794,808,036
10/21/07	41	17.400	18.7985	0.00	183,967,823,713	0
5/26/09	41	17.400	18.7985	0.60	183,967,823,713	1,103,806,942
8/21/08	43	16.800	19.7155	0.00	192,941,863,894	0
9/14/09	43	16.800	19.7155	0.50	192,941,863,894	964,709,319
5/6/08	44	16.300	20.174	0.00	197,428,883,985	0
9/17/08	44	16.300	20.174	0.00	197,428,883,985	0
5/21/09	44	16.300	20.174	0.70	197,428,883,985	1,382,002,188
5/19/08	45	15.600	20.6325	0.00	201,915,904,075	0
5/25/09	45	15.600	20.6325	0.00	201,915,904,075	0
5/27/09	45	15.600	20.6325	0.80	201,915,904,075	1,615,327,233
10/26/07	46	14.800	21.091	0.30	206,402,924,166	619,208,772
8/2/09	47	14.500	21.5495	0.20	210,889,944,256	421,779,889
8/4/08	48	14.300	22.008	0.30	215,376,964,347	646,130,893
10/22/07	49	14.000	22.4665	0.00	219,863,984,437	0
5/24/09	49	14.000	22.4665	0.50	219,863,984,437	1,099,319,922
5/29/08	50	13.500	22.925	0.00	224,351,004,528	0
5/20/09	50	13.500	22.925	0.00	224,351,004,528	0
8/1/09	50	13.500	22.925	0.80	224,351,004,528	1,794,808,036
9/6/08	51	12.700	23.3835	0.20	228,838,024,619	457,676,049
8/3/08	55	12.500	25.2175	0.30	246,786,104,981	740,358,315
5/2/09	56	12.200	25.676	0.00	251,273,125,071	0
5/16/09	56	12.200	25.676	0.00	251,273,125,071	0
10/12/09	56	12.200	25.676	0.80	251,273,125,071	2,010,185,001
10/18/09	58	11.400	26.593	0.20	260,247,165,252	520,494,331
5/11/09	59	11.200	27.0515	0.30	264,734,185,343	794,202,556
5/10/09	61	10.900	27.9685	0.00	273,708,225,524	0
5/17/09	61	10.900	27.9685	0.50	273,708,225,524	1,368,541,128
5/19/09	62	10.400	28.427	0.30	278,195,245,615	834,585,737
5/18/08	64	10.100	29.344	0.20	287,169,285,796	574,338,572
5/15/09	67	9.900	30.7195	0.30	300,630,346,068	901,891,038
9/2/08	70	9.600	32.095	0.20	314,091,406,339	628,182,813
5/1/09	71	9.400	32.5535	0.00	318,578,426,430	0
5/9/09	71	9.400	32.5535	0.60	318,578,426,430	1,911,470,559
10/25/07	73	8.800	33.4705	0.20	327,552,466,611	655,104,933
5/18/09	76	8.600	34.846	0.30	341,013,526,883	1,023,040,581
10/20/07	78	8.300	35.763	0.00	349,987,567,064	0
5/5/08	78	8.300	35.763	0.50	349,987,567,064	1,749,937,835
8/23/08	81	7.800	37.1385	0.30	363,448,627,335	1,090,345,882

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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)
10/17/09	83	7.500	38.0555	0.20	372,422,667,516	744,845,335
9/16/08	84	7.300	38.514	0.00	376,909,687,607	0
5/8/09	84	7.300	38.514	0.50	376,909,687,607	1,884,548,438
5/4/08	86	6.800	39.431	0.30	385,883,727,788	1,157,651,183
5/14/09	96	6.500	44.016	0.20	430,753,928,694	861,507,857
9/14/08	103	6.300	47.2255	0.30	462,163,069,328	1,386,489,208
8/22/08	106	6.000	48.601	0.30	475,624,129,599	1,426,872,389
5/7/09	115	5.700	52.7275	0.20	516,007,310,414	1,032,014,621
10/17/07	146	5.500	66.941	0.30	655,104,933,222	1,965,314,800
10/23/07	150	5.200	68.775	0.20	673,053,013,584	1,346,106,027
5/17/08	155	5.000	71.0675	0.30	695,488,114,037	2,086,464,342
9/15/08	158	4.700	72.443	0.30	708,949,174,308	2,126,847,523
10/24/07	160	4.400	73.36	0.20	717,923,214,490	1,435,846,429
9/5/08	175	4.200	80.2375	0.30	785,228,515,848	2,355,685,548
5/15/08	199	3.900	91.2415	0.20	892,916,998,021	1,785,833,996
10/19/07	208	3.700	95.368	0.30	933,300,178,836	2,799,900,537
10/16/09	240	3.400	110.04	0.20	1,076,884,821,734	2,153,769,643
10/13/09	243	3.200	111.4155	0.30	1,090,345,882,006	3,271,037,646
5/13/09	250	2.900	114.625	0.30	1,121,755,022,640	3,365,265,068
9/3/08	300	2.600	137.55	0.20	1,346,106,027,168	2,692,212,054
9/4/08	348	2.400	159.558	0.30	1,561,482,991,515	4,684,448,975
5/16/08	358	2.100	164.143	0.20	1,606,353,192,420	3,212,706,385
5/3/09	377	1.900	172.8545	0.30	1,691,606,574,141	5,074,819,722
10/18/07	421	1.600	193.0285	0.30	1,889,035,458,126	5,667,106,374
5/12/09	499	1.300	228.7915	0.20	2,239,023,025,189	4,478,046,050
5/6/09	547	1.100	250.7995	0.30	2,454,399,989,536	7,363,199,969
10/14/09	549	0.800	251.7165	0.20	2,463,374,029,717	4,926,748,059
10/15/09	790	0.600	362.215	0.30	3,544,745,871,542	10,634,237,615
5/5/09	1290	0.300	591.465	0.30	5,788,255,916,822	17,364,767,750
5/4/09	1460	0.000	669.41	0.00	6,551,049,332,218	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?
3/4/2008	3112	129.297	14.4	9.844E+12	5.061E+12	5.061E+12	Yes
11/6/2007	440	12.3795	92	1.333E+11	6.852E+10	4.846E+11	Yes
2/19/2008	340	605.22	1.2	5.034E+12	2.588E+12	2.369E+13	Yes
12/4/2007	320	25.676	58.9	2.010E+11	1.034E+11	1.005E+12	Yes
1/8/2008	105	24.759	61.4	6.360E+10	3.270E+10	9.692E+11	Yes
4/15/2008	58	15.589	85.4	2.212E+10	1.137E+10	6.102E+11	Yes

Table C-5. Load duration curve winter statistics

Total No. of samples =	10	
MOS =	20%	
WQ standard for =	2,000	MPN/100 mL
Percent Reduction Required =	48.6	
Allowable percentage of exceedences =	0%	
No. of exceedences after reductions =	0	
Sum of flow on sampling day	813	cfs
Sum of current loads	1.530E+13	MPN/d
Flow weighted avg conc	769	MPN/100 mL
Average flow	85	cfs
Existing total load	1.596E+12	MPN/d
Existing point source load	7.307E+09	MPN/d
Existing remaining load	1.588E+12	MPN/d
Total allowable loading	3.886E+12	MPN/d
Explicit MOS (20%)	7.773E+11	MPN/d
WLA	7.307E+09	MPN/d
LA	3.102E+12	MPN/d
USGS drainage area (mi ²) =	120.0	
SS drainage area (mi ²) =	55.02	

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)
						3,886,365,146,137
11/6/08	13	100.000	5.9605	0.20	291,656,305,886	583,312,612
11/1/08	14	99.800	6.419	0.00	314,091,406,339	0
11/2/08	14	99.800	6.419	0.00	314,091,406,339	0
11/3/08	14	99.800	6.419	0.00	314,091,406,339	0
11/4/08	14	99.800	6.419	0.00	314,091,406,339	0
11/5/08	14	99.800	6.419	0.00	314,091,406,339	0
11/7/08	14	99.800	6.419	0.00	314,091,406,339	0
11/8/08	14	99.800	6.419	0.00	314,091,406,339	0
11/9/08	14	99.800	6.419	2.20	314,091,406,339	6,910,010,939
11/10/08	15	97.600	6.8775	0.30	336,526,506,792	1,009,579,520
11/11/08	16	97.300	7.336	0.30	358,961,607,245	1,076,884,822
11/21/08	20	97.000	9.17	0.00	448,702,009,056	0
11/22/08	20	97.000	9.17	0.00	448,702,009,056	0
11/23/08	20	97.000	9.17	0.00	448,702,009,056	0
11/24/08	20	97.000	9.17	1.10	448,702,009,056	4,935,722,100
11/20/08	21	95.900	9.6285	0.00	471,137,109,509	0
11/25/08	21	95.900	9.6285	0.50	471,137,109,509	2,355,685,548
11/19/08	22	95.400	10.087	0.30	493,572,209,962	1,480,716,630
11/18/08	23	95.100	10.5455	0.30	516,007,310,414	1,548,021,931
11/8/07	24	94.800	11.004	0.00	538,442,410,867	0
11/9/07	24	94.800	11.004	0.00	538,442,410,867	0
11/26/08	24	94.800	11.004	0.80	538,442,410,867	4,307,539,287
11/7/07	25	94.000	11.4625	0.00	560,877,511,320	0
11/10/07	25	94.000	11.4625	0.00	560,877,511,320	0
11/11/07	25	94.000	11.4625	0.00	560,877,511,320	0
11/28/08	25	94.000	11.4625	1.10	560,877,511,320	6,169,652,625
11/4/07	26	92.900	11.921	0.00	583,312,611,773	0
11/12/07	26	92.900	11.921	0.00	583,312,611,773	0
11/17/07	26	92.900	11.921	0.90	583,312,611,773	5,249,813,506
11/1/07	27	92.000	12.3795	0.00	605,747,712,226	0
11/3/07	27	92.000	12.3795	0.00	605,747,712,226	0
11/6/07	27	92.000	12.3795	0.00	605,747,712,226	0
11/16/07	27	92.000	12.3795	0.00	605,747,712,226	0
11/17/08	27	92.000	12.3795	1.30	605,747,712,226	7,874,720,259
11/2/07	28	90.700	12.838	0.00	628,182,812,678	0
11/5/07	28	90.700	12.838	0.00	628,182,812,678	0
11/15/07	28	90.700	12.838	0.00	628,182,812,678	0
11/29/08	28	90.700	12.838	1.10	628,182,812,678	6,910,010,939
11/13/07	29	89.600	13.2965	0.00	650,617,913,131	0
11/14/07	29	89.600	13.2965	0.60	650,617,913,131	3,903,707,479
3/10/09	30	89.000	13.755	0.30	673,053,013,584	2,019,159,041
11/27/08	31	88.700	14.2135	0.00	695,488,114,037	0
3/9/09	31	88.700	14.2135	0.50	695,488,114,037	3,477,440,570

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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)
3/5/09	32	88.200	14.672	0.00	717,923,214,490	0
3/6/09	32	88.200	14.672	0.00	717,923,214,490	0
3/7/09	32	88.200	14.672	0.00	717,923,214,490	0
3/8/09	32	88.200	14.672	1.10	717,923,214,490	7,897,155,359
4/16/08	33	87.100	15.1305	0.00	740,358,314,942	0
4/17/08	33	87.100	15.1305	0.00	740,358,314,942	0
12/8/08	33	87.100	15.1305	0.00	740,358,314,942	0
2/1/09	33	87.100	15.1305	0.00	740,358,314,942	0
3/4/09	33	87.100	15.1305	0.00	740,358,314,942	0
3/11/09	33	87.100	15.1305	1.70	740,358,314,942	12,586,091,354
4/15/08	34	85.400	15.589	0.00	762,793,415,395	0
1/31/09	34	85.400	15.589	0.00	762,793,415,395	0
3/3/09	34	85.400	15.589	0.00	762,793,415,395	0
3/12/09	34	85.400	15.589	1.10	762,793,415,395	8,390,727,569
4/30/08	35	84.300	16.0475	0.00	785,228,515,848	0
11/16/08	35	84.300	16.0475	0.50	785,228,515,848	3,926,142,579
4/14/08	36	83.800	16.506	0.00	807,663,616,301	0
1/24/09	36	83.800	16.506	0.00	807,663,616,301	0
1/25/09	36	83.800	16.506	0.00	807,663,616,301	0
1/26/09	36	83.800	16.506	0.00	807,663,616,301	0
1/27/09	36	83.800	16.506	0.00	807,663,616,301	0
1/28/09	36	83.800	16.506	0.00	807,663,616,301	0
1/30/09	36	83.800	16.506	0.00	807,663,616,301	0
2/9/09	36	83.800	16.506	0.00	807,663,616,301	0
2/10/09	36	83.800	16.506	0.00	807,663,616,301	0
3/2/09	36	83.800	16.506	2.80	807,663,616,301	22,614,581,256
4/22/08	37	81.000	16.9645	0.00	830,098,716,754	0
1/22/09	37	81.000	16.9645	0.00	830,098,716,754	0
1/23/09	37	81.000	16.9645	0.00	830,098,716,754	0
1/29/09	37	81.000	16.9645	0.00	830,098,716,754	0
2/8/09	37	81.000	16.9645	1.40	830,098,716,754	11,621,382,035
4/13/08	38	79.600	17.423	0.00	852,533,817,206	0
12/3/08	38	79.600	17.423	0.00	852,533,817,206	0
1/21/09	38	79.600	17.423	0.00	852,533,817,206	0
2/7/09	38	79.600	17.423	0.00	852,533,817,206	0
2/11/09	38	79.600	17.423	0.00	852,533,817,206	0
3/1/09	38	79.600	17.423	1.60	852,533,817,206	13,640,541,075
4/29/08	39	78.000	17.8815	0.30	874,968,917,659	2,624,906,753
4/12/08	40	77.700	18.34	0.00	897,404,018,112	0
1/20/09	40	77.700	18.34	0.00	897,404,018,112	0
2/28/09	40	77.700	18.34	0.90	897,404,018,112	8,076,636,163
12/4/08	41	76.800	18.7985	0.00	919,839,118,565	0
12/7/08	41	76.800	18.7985	0.00	919,839,118,565	0
1/17/09	41	76.800	18.7985	0.00	919,839,118,565	0
1/18/09	41	76.800	18.7985	0.00	919,839,118,565	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)
1/19/09	41	76.800	18.7985	0.00	919,839,118,565	0
2/6/09	41	76.800	18.7985	0.00	919,839,118,565	0
2/26/09	41	76.800	18.7985	0.00	919,839,118,565	0
2/27/09	41	76.800	18.7985	2.20	919,839,118,565	20,236,460,608
4/11/08	42	74.600	19.257	0.00	942,274,219,018	0
4/18/08	42	74.600	19.257	0.00	942,274,219,018	0
2/25/09	42	74.600	19.257	0.00	942,274,219,018	0
4/11/09	42	74.600	19.257	0.00	942,274,219,018	0
4/12/09	42	74.600	19.257	1.30	942,274,219,018	12,249,564,847
4/21/08	43	73.300	19.7155	0.00	964,709,319,470	0
1/16/09	43	73.300	19.7155	0.00	964,709,319,470	0
4/10/09	43	73.300	19.7155	0.90	964,709,319,470	8,682,383,875
2/2/09	44	72.400	20.174	0.00	987,144,419,923	0
2/24/09	44	72.400	20.174	0.50	987,144,419,923	4,935,722,100
4/10/08	45	71.900	20.6325	0.00	1,009,579,520,376	0
4/28/08	45	71.900	20.6325	0.00	1,009,579,520,376	0
1/15/09	45	71.900	20.6325	0.00	1,009,579,520,376	0
2/12/09	45	71.900	20.6325	0.00	1,009,579,520,376	0
4/9/09	45	71.900	20.6325	1.40	1,009,579,520,376	14,134,113,285
4/27/08	46	70.500	21.091	0.00	1,032,014,620,829	0
2/23/09	46	70.500	21.091	0.60	1,032,014,620,829	6,192,087,725
12/8/07	47	69.900	21.5495	0.00	1,054,449,721,282	0
12/9/07	47	69.900	21.5495	0.00	1,054,449,721,282	0
4/8/09	47	69.900	21.5495	0.80	1,054,449,721,282	8,435,597,770
12/7/07	48	69.100	22.008	0.00	1,076,884,821,734	0
12/12/07	48	69.100	22.008	0.00	1,076,884,821,734	0
1/14/09	48	69.100	22.008	0.80	1,076,884,821,734	8,615,078,574
12/11/07	49	68.300	22.4665	0.00	1,099,319,922,187	0
12/13/07	49	68.300	22.4665	0.00	1,099,319,922,187	0
4/9/08	49	68.300	22.4665	0.00	1,099,319,922,187	0
4/19/08	49	68.300	22.4665	0.00	1,099,319,922,187	0
12/5/08	49	68.300	22.4665	0.00	1,099,319,922,187	0
2/5/09	49	68.300	22.4665	0.00	1,099,319,922,187	0
4/16/09	49	68.300	22.4665	2.00	1,099,319,922,187	21,986,398,444
2/22/09	50	66.300	22.925	0.00	1,121,755,022,640	0
3/24/09	50	66.300	22.925	0.50	1,121,755,022,640	5,608,775,113
12/6/07	51	65.800	23.3835	0.00	1,144,190,123,093	0
12/10/07	51	65.800	23.3835	0.00	1,144,190,123,093	0
4/4/08	51	65.800	23.3835	0.00	1,144,190,123,093	0
1/13/09	51	65.800	23.3835	0.00	1,144,190,123,093	0
4/7/09	51	65.800	23.3835	0.00	1,144,190,123,093	0
4/27/09	51	65.800	23.3835	1.70	1,144,190,123,093	19,451,232,093
12/14/07	52	64.100	23.842	0.00	1,166,625,223,546	0
1/4/08	52	64.100	23.842	0.00	1,166,625,223,546	0
1/5/08	52	64.100	23.842	0.00	1,166,625,223,546	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)
3/30/08	52	64.100	23.842	0.00	1,166,625,223,546	0
3/31/08	52	64.100	23.842	1.30	1,166,625,223,546	15,166,127,906
1/6/08	53	62.800	24.3005	0.00	1,189,060,323,998	0
4/3/08	53	62.800	24.3005	0.00	1,189,060,323,998	0
4/20/08	53	62.800	24.3005	0.00	1,189,060,323,998	0
4/26/08	53	62.800	24.3005	0.00	1,189,060,323,998	0
2/13/09	53	62.800	24.3005	1.40	1,189,060,323,998	16,646,844,536
1/7/08	54	61.400	24.759	0.00	1,211,495,424,451	0
1/8/08	54	61.400	24.759	0.00	1,211,495,424,451	0
3/26/08	54	61.400	24.759	0.00	1,211,495,424,451	0
3/27/08	54	61.400	24.759	0.00	1,211,495,424,451	0
3/28/08	54	61.400	24.759	0.00	1,211,495,424,451	0
3/29/08	54	61.400	24.759	0.00	1,211,495,424,451	0
3/23/09	54	61.400	24.759	2.00	1,211,495,424,451	24,229,908,489
12/5/07	55	59.400	25.2175	0.00	1,233,930,524,904	0
2/21/09	55	59.400	25.2175	0.50	1,233,930,524,904	6,169,652,625
12/3/07	56	58.900	25.676	0.00	1,256,365,625,357	0
12/4/07	56	58.900	25.676	0.00	1,256,365,625,357	0
1/3/08	56	58.900	25.676	0.00	1,256,365,625,357	0
1/15/08	56	58.900	25.676	0.00	1,256,365,625,357	0
4/17/09	56	58.900	25.676	0.00	1,256,365,625,357	0
4/26/09	56	58.900	25.676	1.70	1,256,365,625,357	21,358,215,631
3/25/08	57	57.200	26.1345	0.00	1,278,800,725,810	0
1/12/09	57	57.200	26.1345	0.00	1,278,800,725,810	0
3/25/09	57	57.200	26.1345	0.00	1,278,800,725,810	0
4/13/09	57	57.200	26.1345	1.10	1,278,800,725,810	14,066,807,984
12/2/07	58	56.100	26.593	0.00	1,301,235,826,262	0
1/9/08	58	56.100	26.593	0.00	1,301,235,826,262	0
4/8/08	58	56.100	26.593	0.00	1,301,235,826,262	0
12/23/08	58	56.100	26.593	1.10	1,301,235,826,262	14,313,594,089
1/12/08	59	55.000	27.0515	0.00	1,323,670,926,715	0
4/6/09	59	55.000	27.0515	0.50	1,323,670,926,715	6,618,354,634
12/19/07	60	54.500	27.51	0.00	1,346,106,027,168	0
4/1/08	60	54.500	27.51	0.00	1,346,106,027,168	0
3/22/09	60	54.500	27.51	0.90	1,346,106,027,168	12,114,954,245
1/10/08	62	53.600	28.427	0.00	1,390,976,228,074	0
3/24/08	62	53.600	28.427	0.00	1,390,976,228,074	0
4/2/08	62	53.600	28.427	0.80	1,390,976,228,074	11,127,809,825
1/2/08	63	52.800	28.8855	0.00	1,413,411,328,526	0
1/13/08	63	52.800	28.8855	0.00	1,413,411,328,526	0
1/14/08	63	52.800	28.8855	0.00	1,413,411,328,526	0
4/5/08	63	52.800	28.8855	0.00	1,413,411,328,526	0
12/6/08	63	52.800	28.8855	0.00	1,413,411,328,526	0
2/20/09	63	52.800	28.8855	0.00	1,413,411,328,526	0
4/25/09	63	52.800	28.8855	1.90	1,413,411,328,526	26,854,815,242

FINAL—Turkey Creek (Subsegment 080906) Fecal Coliform Bacteria TMDL
 Origination Date: October 5, 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)
12/1/07	64	50.900	29.344	0.00	1,435,846,428,979	0
1/11/08	64	50.900	29.344	0.00	1,435,846,428,979	0
1/3/09	64	50.900	29.344	0.00	1,435,846,428,979	0
1/11/09	64	50.900	29.344	1.10	1,435,846,428,979	15,794,310,719
11/15/08	65	49.800	29.8025	0.30	1,458,281,529,432	4,374,844,588
3/23/08	68	49.500	31.178	0.30	1,525,586,830,790	4,576,760,492
1/4/09	69	49.200	31.6365	0.30	1,548,021,931,243	4,644,065,794
3/21/09	70	48.900	32.095	0.00	1,570,457,031,696	0
4/15/09	70	48.900	32.095	0.50	1,570,457,031,696	7,852,285,158
11/30/08	71	48.400	32.5535	0.00	1,592,892,132,149	0
1/2/09	71	48.400	32.5535	0.00	1,592,892,132,149	0
4/5/09	71	48.400	32.5535	0.80	1,592,892,132,149	12,743,137,057
2/3/09	72	47.600	33.012	0.30	1,615,327,232,602	4,845,981,698
12/15/07	73	47.300	33.4705	0.30	1,637,762,333,054	4,913,286,999
11/30/07	74	47.000	33.929	0.00	1,660,197,433,507	0
12/22/08	74	47.000	33.929	0.00	1,660,197,433,507	0
1/10/09	74	47.000	33.929	0.00	1,660,197,433,507	0
4/24/09	74	47.000	33.929	1.10	1,660,197,433,507	18,262,171,769
1/1/08	75	45.900	34.3875	0.00	1,682,632,533,960	0
2/4/09	75	45.900	34.3875	0.50	1,682,632,533,960	8,413,162,670
2/19/09	76	45.400	34.846	0.30	1,705,067,634,413	5,115,202,903
3/22/08	77	45.100	35.3045	0.00	1,727,502,734,866	0
12/2/08	77	45.100	35.3045	0.60	1,727,502,734,866	10,365,016,409
12/18/07	78	44.500	35.763	0.30	1,749,937,835,318	5,249,813,506
2/11/08	79	44.200	36.2215	0.20	1,772,372,935,771	3,544,745,872
3/18/08	82	44.000	37.597	0.00	1,839,678,237,130	0
4/2/09	82	44.000	37.597	0.60	1,839,678,237,130	11,038,069,423
4/7/08	84	43.400	38.514	0.00	1,884,548,438,035	0
1/1/09	84	43.400	38.514	0.00	1,884,548,438,035	0
4/4/09	84	43.400	38.514	0.80	1,884,548,438,035	15,076,387,504
12/26/07	85	42.600	38.9725	0.00	1,906,983,538,488	0
3/20/09	85	42.600	38.9725	0.00	1,906,983,538,488	0
4/3/09	85	42.600	38.9725	0.80	1,906,983,538,488	15,255,868,308
12/15/08	86	41.800	39.431	0.30	1,929,418,638,941	5,788,255,917
4/28/09	87	41.500	39.8895	0.30	1,951,853,739,394	5,855,561,218
3/2/08	88	41.200	40.348	0.00	1,974,288,839,846	0
3/19/08	88	41.200	40.348	0.50	1,974,288,839,846	9,871,444,199
12/24/08	89	40.700	40.8065	0.30	1,996,723,940,299	5,990,171,821
2/12/08	90	40.400	41.265	0.30	2,019,159,040,752	6,057,477,122
2/10/08	91	40.100	41.7235	0.00	2,041,594,141,205	0
3/17/08	91	40.100	41.7235	0.00	2,041,594,141,205	0
3/21/08	91	40.100	41.7235	0.00	2,041,594,141,205	0
2/18/09	91	40.100	41.7235	0.00	2,041,594,141,205	0
4/1/09	91	40.100	41.7235	1.40	2,041,594,141,205	28,582,317,977
3/1/08	92	38.700	42.182	0.30	2,064,029,241,658	6,192,087,725

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3/3/08	93	38.400	42.6405	0.00	2,086,464,342,110	0
4/14/09	93	38.400	42.6405	0.50	2,086,464,342,110	10,432,321,711
3/20/08	94	37.900	43.099	0.00	2,108,899,442,563	0
1/9/09	94	37.900	43.099	0.60	2,108,899,442,563	12,653,396,655
11/29/07	95	37.300	43.5575	0.00	2,131,334,543,016	0
12/31/07	95	37.300	43.5575	0.00	2,131,334,543,016	0
4/23/09	95	37.300	43.5575	0.80	2,131,334,543,016	17,050,676,344
2/29/08	96	36.500	44.016	0.30	2,153,769,643,469	6,461,308,930
11/24/07	98	36.200	44.933	0.20	2,198,639,844,374	4,397,279,689
11/22/07	99	36.000	45.3915	0.00	2,221,074,944,827	0
4/25/08	99	36.000	45.3915	0.60	2,221,074,944,827	13,326,449,669
2/9/08	102	35.400	46.767	0.30	2,288,380,246,186	6,865,140,739
12/21/08	105	35.100	48.1425	0.00	2,355,685,547,544	0
4/30/09	105	35.100	48.1425	0.50	2,355,685,547,544	11,778,427,738
12/9/08	107	34.600	49.0595	0.30	2,400,555,748,450	7,201,667,245
2/28/08	108	34.300	49.518	0.00	2,422,990,848,902	0
3/16/08	108	34.300	49.518	0.50	2,422,990,848,902	12,114,954,245
12/25/07	109	33.800	49.9765	0.00	2,445,425,949,355	0
4/6/08	109	33.800	49.9765	0.60	2,445,425,949,355	14,672,555,696
12/31/08	110	33.200	50.435	0.30	2,467,861,049,808	7,403,583,149
11/23/07	111	32.900	50.8935	0.00	2,490,296,150,261	0
12/17/07	111	32.900	50.8935	0.00	2,490,296,150,261	0
12/27/07	111	32.900	50.8935	0.80	2,490,296,150,261	19,922,369,202
1/22/08	113	32.100	51.8105	0.30	2,535,166,351,166	7,605,499,053
11/12/08	114	31.800	52.269	0.00	2,557,601,451,619	0
3/19/09	114	31.800	52.269	0.50	2,557,601,451,619	12,788,007,258
12/16/08	120	31.300	55.02	0.00	2,692,212,054,336	0
3/31/09	120	31.300	55.02	0.60	2,692,212,054,336	16,153,272,326
1/23/08	123	30.700	56.3955	0.30	2,759,517,355,694	8,278,552,067
4/29/09	125	30.400	57.3125	0.20	2,804,387,556,600	5,608,775,113
2/27/08	126	30.200	57.771	0.30	2,826,822,657,053	8,480,467,971
2/8/08	129	29.900	59.1465	0.00	2,894,127,958,411	0
3/15/08	129	29.900	59.1465	0.60	2,894,127,958,411	17,364,767,750
1/8/09	134	29.300	61.439	0.20	3,006,303,460,675	6,012,606,921
2/15/08	137	29.100	62.8145	0.30	3,073,608,762,034	9,220,826,286
12/16/07	138	28.800	63.273	0.30	3,096,043,862,486	9,288,131,587
11/18/07	139	28.500	63.7315	0.00	3,118,478,962,939	0
12/14/08	139	28.500	63.7315	0.50	3,118,478,962,939	15,592,394,815
2/17/09	142	28.000	65.107	0.30	3,185,784,264,298	9,557,352,793
12/30/07	144	27.700	66.024	0.30	3,230,654,465,203	9,691,963,396
12/29/07	146	27.400	66.941	0.00	3,275,524,666,109	0
12/27/08	146	27.400	66.941	0.60	3,275,524,666,109	19,653,147,997
2/26/08	147	26.800	67.3995	0.20	3,297,959,766,562	6,595,919,533
11/25/07	149	26.600	68.3165	0.00	3,342,829,967,467	0
12/28/07	149	26.600	68.3165	0.00	3,342,829,967,467	0

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2/5/08	149	26.600	68.3165	0.90	3,342,829,967,467	30,085,469,707
11/21/07	151	25.700	69.2335	0.20	3,387,700,168,373	6,775,400,337
3/6/08	153	25.500	70.1505	0.30	3,432,570,369,278	10,297,711,108
3/10/08	154	25.200	70.609	0.30	3,455,005,469,731	10,365,016,409
1/5/09	157	24.900	71.9845	0.30	3,522,310,771,090	10,566,932,313
12/24/07	161	24.600	73.8185	0.00	3,612,051,172,901	0
2/4/08	161	24.600	73.8185	0.50	3,612,051,172,901	18,060,255,865
11/14/08	163	24.100	74.7355	0.30	3,656,921,373,806	10,970,764,121
3/14/08	164	23.800	75.194	0.30	3,679,356,474,259	11,038,069,423
1/29/08	168	23.500	77.028	0.00	3,769,096,876,070	0
12/18/08	168	23.500	77.028	0.50	3,769,096,876,070	18,845,484,380
1/16/08	175	23.000	80.2375	0.30	3,926,142,579,240	11,778,427,738
12/20/08	176	22.700	80.696	0.30	3,948,577,679,693	11,845,733,039
12/17/08	186	22.400	85.281	0.30	4,172,928,684,221	12,518,786,053
3/9/08	187	22.100	85.7395	0.20	4,195,363,784,674	8,390,727,569
11/13/08	194	21.900	88.949	0.30	4,352,409,487,843	13,057,228,464
3/13/09	195	21.600	89.4075	0.30	4,374,844,588,296	13,124,533,765
1/7/09	196	21.300	89.866	0.30	4,397,279,688,749	13,191,839,066
1/19/08	198	21.000	90.783	0.00	4,442,149,889,654	0
4/23/08	198	21.000	90.783	0.50	4,442,149,889,654	22,210,749,448
2/25/08	199	20.500	91.2415	0.30	4,464,584,990,107	13,393,754,970
1/21/08	200	20.200	91.7	0.30	4,487,020,090,560	13,461,060,272
12/30/08	207	19.900	94.9095	0.20	4,644,065,793,730	9,288,131,587
1/6/09	211	19.700	96.7435	0.30	4,733,806,195,541	14,201,418,587
12/19/08	215	19.400	98.5775	0.30	4,823,546,597,352	14,470,639,792
12/1/08	219	19.100	100.4115	0.30	4,913,286,999,163	14,739,860,997
4/22/09	227	18.800	104.0795	0.20	5,092,767,802,786	10,185,535,606
2/7/08	228	18.600	104.538	0.30	5,115,202,903,238	15,345,608,710
11/28/07	231	18.300	105.9135	0.30	5,182,508,204,597	15,547,524,614
12/26/08	232	18.000	106.372	0.30	5,204,943,305,050	15,614,829,915
12/25/08	234	17.700	107.289	0.20	5,249,813,505,955	10,499,627,012
3/18/09	235	17.500	107.7475	0.30	5,272,248,606,408	15,816,745,819
12/20/07	237	17.200	108.6645	0.30	5,317,118,807,314	15,951,356,422
12/23/07	244	16.900	111.874	0.30	5,474,164,510,483	16,422,493,531
2/3/08	247	16.600	113.2495	0.30	5,541,469,811,842	16,624,409,436
1/18/08	249	16.300	114.1665	0.00	5,586,340,012,747	0
2/14/08	249	16.300	114.1665	0.50	5,586,340,012,747	27,931,700,064
3/7/08	250	15.800	114.625	0.30	5,608,775,113,200	16,826,325,340
1/30/08	258	15.500	118.293	0.30	5,788,255,916,822	17,364,767,750
2/6/08	259	15.200	118.7515	0.20	5,810,691,017,275	11,621,382,035
2/13/08	260	15.000	119.21	0.30	5,833,126,117,728	17,499,378,353
4/24/08	271	14.700	124.2535	0.30	6,079,912,222,709	18,239,736,668
3/4/08	282	14.400	129.297	0.30	6,326,698,327,690	18,980,094,983
3/5/08	288	14.100	132.048	0.20	6,461,308,930,406	12,922,617,861
3/8/08	292	13.900	133.882	0.30	6,551,049,332,218	19,653,147,997

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1/28/08	300	13.600	137.55	0.30	6,730,530,135,840	20,191,590,408
1/20/08	313	13.300	143.5105	0.30	7,022,186,441,726	21,066,559,325
2/21/08	316	13.000	144.886	0.20	7,089,491,743,085	14,178,983,486
1/31/08	326	12.800	149.471	0.30	7,313,842,747,613	21,941,528,243
11/20/07	336	12.500	154.056	0.30	7,538,193,752,141	22,614,581,256
1/24/08	350	12.200	160.475	0.30	7,852,285,158,480	23,556,855,475
12/22/07	357	11.900	163.6845	0.20	8,009,330,861,650	16,018,661,723
2/16/09	366	11.700	167.811	0.30	8,211,246,765,725	24,633,740,297
11/19/07	374	11.400	171.479	0.30	8,390,727,569,347	25,172,182,708
2/20/08	386	11.100	176.981	0.30	8,659,948,774,781	25,979,846,324
12/28/08	405	10.800	185.6925	0.30	9,086,215,683,384	27,258,647,050
12/29/08	406	10.500	186.151	0.20	9,108,650,783,837	18,217,301,568
1/17/08	414	10.300	189.819	0.30	9,288,131,587,459	27,864,394,762
3/30/09	417	10.000	191.1945	0.30	9,355,436,888,818	28,066,310,666
12/21/07	431	9.700	197.6135	0.30	9,669,528,295,157	29,008,584,885
1/25/08	444	9.400	203.574	0.20	9,961,184,601,043	19,922,369,202
3/13/08	451	9.200	206.7835	0.30	10,118,230,304,213	30,354,690,913
2/14/09	456	8.900	209.076	0.30	10,230,405,806,477	30,691,217,419
11/26/07	486	8.600	222.831	0.30	10,903,458,820,061	32,710,376,460
11/27/07	490	8.300	224.665	0.20	10,993,199,221,872	21,986,398,444
1/26/08	491	8.100	225.1235	0.30	11,015,634,322,325	33,046,902,967
12/13/08	496	7.800	227.416	0.30	11,127,809,824,589	33,383,429,474
3/26/09	504	7.500	231.084	0.30	11,307,290,628,211	33,921,871,885
1/27/08	527	7.200	241.6295	0.20	11,823,297,938,626	23,646,595,877
2/22/08	535	7.000	245.2975	0.30	12,002,778,742,248	36,008,336,227
3/14/09	610	6.700	279.685	0.30	13,685,411,276,208	41,056,233,829
2/24/08	616	6.400	282.436	0.30	13,820,021,878,925	41,460,065,637
3/17/09	675	6.100	309.4875	0.20	15,143,692,805,640	30,287,385,611
2/2/08	678	5.900	310.863	0.30	15,210,998,106,998	45,632,994,321
2/23/08	691	5.600	316.8235	0.30	15,502,654,412,885	46,507,963,239
3/11/08	709	5.300	325.0765	0.30	15,906,486,221,035	47,719,458,663
4/18/09	718	5.000	329.203	0.30	16,108,402,125,110	48,325,206,375
3/29/09	741	4.700	339.7485	0.20	16,624,409,435,525	33,248,818,871
2/15/09	757	4.500	347.0845	0.30	16,983,371,042,770	50,950,113,128
3/15/09	814	4.200	373.219	0.30	18,262,171,768,579	54,786,515,306
2/1/08	819	3.900	375.5115	0.30	18,374,347,270,843	55,123,041,813
3/16/09	852	3.600	390.642	0.20	19,114,705,585,786	38,229,411,172
3/12/08	869	3.400	398.4365	0.30	19,496,102,293,483	58,488,306,880
12/10/08	914	3.100	419.069	0.30	20,505,681,813,859	61,517,045,442
3/28/09	1040	2.800	476.84	0.30	23,332,504,470,912	69,997,513,413
12/12/08	1060	2.500	486.01	0.00	23,781,206,479,968	0
3/27/09	1060	2.500	486.01	0.50	23,781,206,479,968	118,906,032,400
4/21/09	1080	2.000	495.18	0.30	24,229,908,489,024	72,689,725,467
2/16/08	1150	1.700	527.275	0.30	25,800,365,520,720	77,401,096,562
12/11/08	1190	1.400	545.615	0.20	26,697,769,538,832	53,395,539,078

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2/19/08	1320	1.200	605.22	0.30	29,614,332,597,696	88,842,997,793
4/20/09	2210	0.900	1013.285	0.30	49,581,572,000,688	148,744,716,002
4/19/09	2250	0.600	1031.625	0.30	50,478,976,018,800	151,436,928,056
2/18/08	3380	0.300	1549.73	0.30	75,830,639,530,464	227,491,918,591
2/17/08	4990	0.000	2287.915	0.00	111,951,151,259,472	0