

Draft

TMDLs for Chloride, Sulfate, Total Dissolved Solids, Copper, Lead and Zinc for the Bayou de L'Outre Basin, Arkansas

(HUC 08040202-006, -007, and -008)

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EXECUTIVE SUMMARY

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulations (at Title 40 of the *Code of Federal Regulations* [CFR] Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for impaired 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 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 lack of knowledge concerning the relationship between pollutant loads and the water quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

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

The study area for this TMDL is the Bayou de L'Outre Basin, which is on the Arkansas/Louisiana state border in southern Arkansas and is in Planning Segment 2D. Forest is the dominant land use in the Bayou de L'Outre Basin.

The Arkansas Department of Environmental Quality (ADEQ) included Bayou de L'Outre on the state's 2004 section 303(d) list for impairments caused by chloride, sulfate, total dissolved solids, copper, lead, and zinc (Table ES-1). The impaired designated uses for Big Creek are fisheries (streams, Typical Gulf Coastal Ecoregion) and agriculture and industry water supply.

The numeric water quality criteria that apply to the Bayou de L'Outre and were used to calculate the total allowable loads for minerals (Cl, SO₄, and TDS) and dissolved metals (Cu, Pb, and Zn) are presented in Tables ES-2 and ES-3, respectively.

Table ES-1. Section 303(d) and Integrated Report information for Bayou de L'Outre

Stream segment number	Stream segment name	Impaired use ^a	Causes of impairment	Suspected sources of impairment
08040202-006	Bayou de L'Outre	AL(metals); AI(Cl, SO ₄ , TDS)	Chloride, sulfate, TDS, copper, lead, and zinc	Resource extraction
08040202-007	Bayou de L'Outre	AL(metals); AI(Cl, SO ₄ , TDS)	Chloride, sulfate, TDS, copper, lead, and zinc	Resource extraction
08040202-008	Bayou de L'Outre	AL(metals); AI(Cl, SO ₄ , TDS)	Chloride, sulfate, TDS, copper, lead, and zinc	Resource extraction

^aAL = aquatic life; AI = agriculture and industry water supply

Source: ADEQ 2005

Table ES-2. Numeric water quality criteria for chloride, sulfate, and TDS in the Bayou de L'Outre Basin

Stream segment number	Stream segment name	Chloride ^{a,b}	Sulfate ^{a,b}	TDS ^{a,b}
		(mg/L)	(mg/L)	(mg/L)
08040202-008	Bayou de L'Outre (above Loutre Creek)	180	31	970
08040202-008	Bayou de L'Outre (from Loutre Creek to the discharge for the city of El Dorado - south facility)	264	635	1,236
08040202-007	Bayou de L'Outre (from the discharge for the city of El Dorado - south downstream to the mouth of Gum Creek)	250	431	966
08040202-007	Bayou de L'Outre (from the mouth of Gum Creek downstream to the mouth of Boggy Creek)	250	345	780
08040202-006	Bayou de L'Outre (from the mouth of Boggy Creek downstream to the mouth of Hibank Creek)	250	296	750
08040202-006	Bayou de L'Outre (from the mouth Hibank Creek downstream to the mouth of Mill Creek)	250	263	750
08040202-006	Bayou de L'Outre (from the mouth Mill Creek downstream to the mouth of Buckaloo Branch)	250	237	750
08040202-006	Bayou de L'Outre (from the mouth Buckaloo Branch downstream to the mouth of Bear Creek)	250	216	750
08040202-006	Bayou de L'Outre (from the mouth Bear Creek downstream to the final segment of Bayou de L'Outre)	250	198	750
08040202-006	Bayou de L'Outre – Final segment (from the mouth Bear Creek to the Arkansas/Louisiana state line)	250	171	750

Note: mg/L = milligrams per liter

^aThese criteria shall apply to all surface waters of the state at all times except during periods when flows are less than the applicable critical flow. Streams with regulated flow will be addressed on a case-by-case basis to maintain designated instream uses. These standards apply outside the applicable mixing zone. Waters may, on occasion, have natural background levels of certain substances outside the limits established by these criteria, in which case these criteria do not apply to the naturally occurring excursions. These criteria are not to be exceeded in more than one in ten samples collected over a period of not less than 30 days or more than 360 days.

^bNote that the most stringent criteria were applied to each segment (e.g., for segment 08040202-008, the chloride, sulfate, and TDS criteria of 180, 31, and 970, respectively, were applied to the entire segment).

Source: APCEC 2007.

Table ES-3. Numeric water quality criteria for dissolved copper, lead, and zinc in the Bayou de L'Outre Basin

Stream segment number	Acute dissolved copper ^a	Chronic dissolved copper ^b	Acute dissolved lead ^c	Chronic dissolved lead ^d	Acute dissolved zinc ^e	Chronic dissolved zinc ^f
	(μ g/L)	(μ g/L)	(μ g/L)	(μ g/L)	(μ g/L)	(μ g/L)
08040202-008	5.6	4.2	17.7	0.7	42.4	38.7
08040202-007	5.6	4.2	17.7	0.7	42.4	38.7
08040202-006	5.6	4.2	17.7	0.7	42.4	38.7

Note: μ g/L = micrograms per liter.

Note: The hardness of 31 mg/L used to calculate the metals criteria is the default hardness for the Gulf Coastal Plain Ecoregion of Arkansas.

^aThe acute dissolved copper criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[0.9422(\ln \text{hardness})] - 1.464}) \times 0.960$.

^bThe chronic dissolved copper criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[0.8545(\ln \text{hardness})] - 1.465}) \times 0.960$.

^cThe acute dissolved lead criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[1.273(\ln \text{hardness})] - 1.460}) \times 1.46203 - [(\ln \text{hardness})(0.145712)]$.

^dThe chronic dissolved lead criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[1.273(\ln \text{hardness})] - 4.705}) \times 1.46203 - [(\ln \text{hardness})(0.145712)]$.

^eThe acute dissolved zinc criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[0.8473(\ln \text{hardness})] + 0.8604}) \times 0.978$.

^fThe chronic dissolved zinc criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[0.8473(\ln \text{hardness})] + 0.7614}) \times 0.986$.

Source: APCEC 2007.

The TMDLs for all pollutants (chloride, sulfate, TDS, dissolved copper, dissolved lead, and dissolved zinc) were developed using the load duration curve methodology. This method illustrates allowable loading at a wide range of stream flow conditions. The steps for applying the methodology were as follows: (1) develop a flow duration curve; (2) convert the flow duration curve to load duration curves; (3) plot observed loads with load duration curves; and (4) calculate the TMDL, MOS, WLA, and LA. The TMDLs were not developed for a particular season, and they apply year-round.

In TMDL development, 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. WLAs were given to permitted point source discharges. The LAs include background loadings as well as human-induced nonpoint sources. An explicit MOS of 10 percent was included. A summary of the TMDLs for the Bayou de L'Outre Basin is presented in Table ES-4.

Table ES-4. Summary of TMDLs, MOS, WLAs, and LAs for the Bayou de L'Outre Basin

HUC/segment	Water quality station	Pollutant	Total allowable loading	Explicit MOS (10%)	Σ WLA	Σ LA
			lb/day			
08040202-006	OUA0005	Chloride	145,162	14,516	0	130,645
08040202-006	OUA0005	Dissolved copper	2.44	0.24	0.01	2.19
08040202-006	OUA0005	Dissolved lead	0.41	0.04	0.02	0.34
08040202-006	OUA0006	Sulfate	99,291	9,929	0	89,361
08040202-006	OUA0005	TDS	435,485	43,548	2,517	389,419
08040202-006	OUA0005	Dissolved zinc	22.47	2.25	0.96	19.27
08040202-007		Chloride	34,226	3,423	2,825	27,978
08040202-007		Dissolved copper	0.575	0.057	0	0.517
08040202-007		Dissolved lead	0.096	0.010	0.011	0.075
08040202-007		Sulfate	23,410	2,341	0	21,069
08040202-007		TDS	102,677	10,268	0	92,409
08040202-007		Dissolved zinc	5.298	0.530	0.958	3.811
08040202-008		Chloride	10,174	1,017	5,207	3,950
08040202-008		Dissolved copper	0.171	0.017	0	0.154
08040202-008		Dissolved lead	0.028	0.003	0.002	0.023
08040202-008		Sulfate	6,959	696	6,216	47
08040202-008		TDS	30,523	3,052	24,060	3,410
08040202-008		Dissolved zinc	1.575	0.157	0.958	0.460

Note: Loadings for segment 08040202-008 are included in segment 08040202-007. Loadings for segment 08040202-007 are included in segment 08040202-006.

CONTENTS

1 INTRODUCTION	1
2 BACKGROUND INFORMATION	2
2.1 General Description.....	2
2.2 Land Use	4
2.3 Flow Characteristics.....	6
2.4 Designated Uses and Water Quality Criteria	6
2.4.1 Chloride, Sulfate, and TDS.....	8
2.4.2 Copper, Lead, and Zinc	8
2.4.3 Antidegradation Policy	8
2.5 Point Sources.....	9
2.6 Nonpoint Sources	12
2.6.1 Chloride, Sulfate, and TDS.....	12
2.6.2 Copper, Lead, and Zinc	12
3 CHARACTERIZATION OF EXISTING WATER QUALITY.....	14
3.1 Comparison of Observed Data to Criteria.....	14
3.1.1 Chloride	14
3.1.2 Sulfate.....	14
3.1.3 Total Dissolved Solids.....	14
3.1.4 Copper	16
3.1.5 Lead	16
3.1.6 Zinc	16
3.2 Trends and Patterns in Observed Data	16
3.2.1 Chloride	16
3.2.2 Sulfate.....	16
3.2.3 Total Dissolved Solids.....	17
3.2.4 Copper	17
3.2.5 Lead	17
3.2.6 Zinc	17
4 TMDL DEVELOPMENT.....	18
4.1 TMDL Analytical Approach	18
4.1.1 Flow Duration Curve	18
4.1.2 Load Duration Curve	19
4.1.3 Observed Loads	20
4.2 TMDL.....	20
4.3 Wasteload Allocation	21
4.4 Load Allocation.....	22
4.5 Margin of Safety.....	24
4.6 Seasonality and Critical Conditions	24
4.7 Future Growth	24
5 FUTURE WATERSHED ACTIVITIES	25
6 PUBLIC PARTICIPATION	26
7 REFERENCES	27

APPENDICES

- Appendix A Summary of Water Quality Data
- Appendix B Water Quality Data by Sampling Location (CD-ROM)
- Appendix C Chloride, Sulfate, and TDS Figures for Bayou de L'Outre Basin
- Appendix D Copper, lead, and Zinc Figures for Bayou de L'Outre Basin
- Appendix E Flow Duration Curves for the Bayou de L'Outre Basin
- Appendix F Load Duration Calculations for all TMDLs (CD-ROM)
- Appendix G Load Duration Curve Summaries and Plots for Chloride
- Appendix H Load Duration Curve Summaries and Plots for Sulfate
- Appendix I Load Duration Curve Summaries and Plots for Total Dissolved Solids
- Appendix J Load Duration Curve Summaries and Plots for Dissolved Copper
- Appendix K Load Duration Curve Summaries and Plots for Dissolved Lead
- Appendix L Load Duration Curve Summaries and Plots for Dissolved Zinc

TABLES

Table 1-1. Section 303(d) and Integrated Report information for Bayou de L'Outre	1
Table 2-1. County and drainage area for each listed segment in the Bayou de L'Outre Basin	2
Table 2-2. Land use by stream segment.....	4
Table 2-3. Numeric criteria for chloride, sulfate, and TDS in the segments of concern in the Bayou de L'Outre Basin	7
Table 2-5. Point source discharge information for chloride in the Bayou de L'Outre Basin	9
Table 2-6. Point source discharge information for sulfate in the Bayou de L'Outre Basin	10
Table 2-7. Point source discharge information for TDS in the Bayou de L'Outre Basin.....	10
Table 2-8. Point source discharge information for total copper in the Bayou de L'Outre Basin .	11
Table 2-9. Point source discharge information for total lead in the Bayou de L'Outre Basin	11
Table 2-10. Point source discharge information for total zinc in the Bayou de L'Outre Basin ...	11
Table 2-11. Point source discharges not included in the TMDLs for the Bayou de L'Outre Basin	12
Table 4-1. USGS flow gauge and represented segments for the Bayou de L'Outre Basin	19
Table 4-2. Summary of TMDLs, MOS, WLAs, and LAs for the Bayou de L'Outre Basin.....	21
Table 4-3. Mineral WLAs for the Bayou de L'Outre Basin	23
Table 4-4. Dissolved and total metal WLAs for the Bayou de L'Outre Basin.....	23

FIGURES

Figure 2-1. Location of the Bayou de L'Outre Basin.....	3
Figure 2-2. Land use in the Bayou de L'Outre Basin.....	5
Figure 2-3. Location of NPDES facilities in the Bayou de L'Outre Basin.....	13
Figure 3-1. Location of the water quality monitoring station in the Bayou de L'Outre Basin....	15
Figure 4-1. Example of a flow duration curve.....	19

1 INTRODUCTION

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulations (at Title 40 of the *Code of Federal Regulations* [CFR] Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for waterbodies that are not supporting their designated uses even after 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 to restore and maintain the quality of the state's water resources (USEPA 1991).

Monitoring data collected by the Arkansas Department of Environmental Quality (ADEQ) indicate that observed pollutant levels sometimes exceed water quality criteria for three segments of Bayou de L'Outre. The impaired designated uses for the waterbody are (1) fisheries (streams, Typical Gulf Coastal Ecoregion) and (2) agriculture and industry water supply. The pollutants causing these impairments include chloride, sulfate, total dissolved solids (TDS), copper, lead, and zinc. Table 1-1 presents information from Arkansas's 2004 Integrated Report (ADEQ 2005) for Bayou de L'Outre.

Table 1-1. Section 303(d) and Integrated Report information for Bayou de L'Outre

Stream segment number	Stream segment name	Impaired use ^a	Cause of impairment	Suspected sources of impairment
08040202-006	Bayou de L'Outre	AL (metals); AI (Cl, SO ₄ , TDS)	Chloride, sulfate, TDS, copper, lead, and zinc	Resource extraction
08040202-007	Bayou de L'Outre	AL (metals); AI (Cl, SO ₄ , TDS)	Chloride, sulfate, TDS, copper, lead, and zinc	Resource extraction
08040202-008	Bayou de L'Outre	AL (metals); AI (Cl, SO ₄ , TDS)	Chloride, sulfate, TDS, copper, lead, and zinc	Resource extraction

^aAL = aquatic life; AI = agriculture and industry water supply.

Source: ADEQ 2005.

2 BACKGROUND INFORMATION

2.1 General Description

The three stream segments addressed in this TMDL report are near the Arkansas/Louisiana state line in southern Arkansas (Figure 2-1) in a portion of U.S. Geological Survey (USGS) hydrologic unit code (HUC) 08040202. The impaired segments are entirely within Union County. Table 2-1 lists the county in which each segment is located and the approximate drainage area of each segment. Segment 08040202-008 is part of 08040202-007, which in turn is part of 08040202-006.

Table 2-1. County and drainage area for each listed segment in the Bayou de L'Outre Basin

Stream segment number	Stream segment name	County	Total drainage area (acres)	Unique subwatershed area (acres)
08040202-006	Bayou de L'Outre	Union	80,535	61,547
08040202-007	Bayou de L'Outre	Union	18,988	13,345
08040202-008	Bayou de L'Outre	Union	5,643	5,643

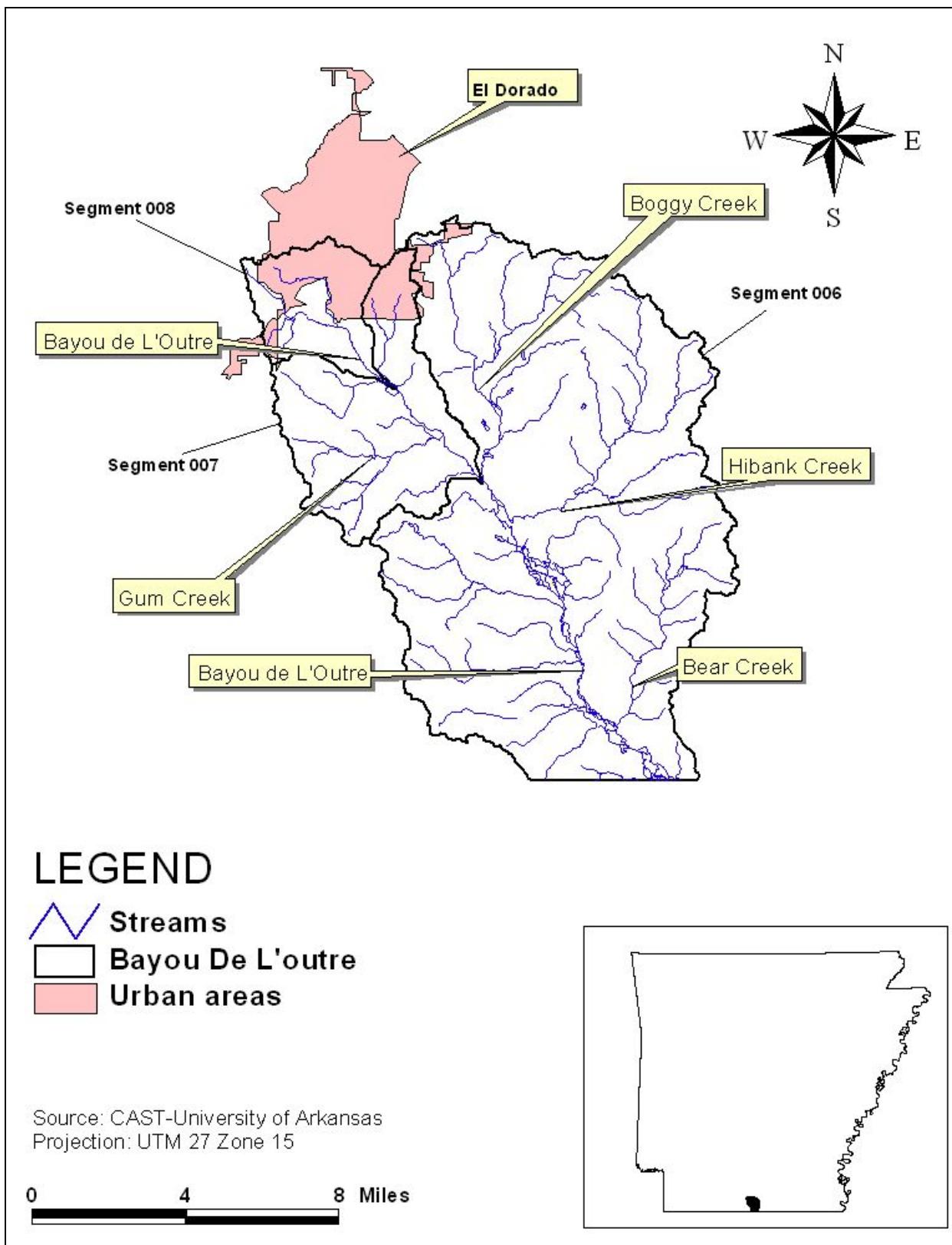


Figure 2-1. Location of the Bayou de L'Outre Basin.

2.2 Land Use

Land use data were obtained from the Center for Advanced Spatial Technologies (CAST) at the University of Arkansas in Fayetteville (2005). Table 2-2 and Figure 2-2 present the percentage of stream segment area covered by each land use and the land use coverage, respectively. Forest constitutes more than 50 percent of the land area in all the listed segments in the Bayou de L'Outre Basin. Segment 008 has the largest amount of urban area (27 percent) because a large portion of the City of El Dorado is located in this segment.

Table 2-2. Land use by stream segment

Land use	Stream segment number					
	08040202-006		08040202-007		08040202-008	
	Area (acres)	Percent coverage	Area (acres)	Percent coverage	Area (acres)	Percent coverage
Barren	162	0.2	101	0.5	63	1.1
Forest	69,538	86.4	13,961	73.5	2,920	51.8
Pasture/forage	6,795	8.5	2,332	12.3	1,021	18.1
Urban	3,455	4.3	2,447	12.9	1,542	27.3
Water	493	0.6	144	0.8	94	1.7
TOTAL	80,444	100	18,985	100	5,640	100

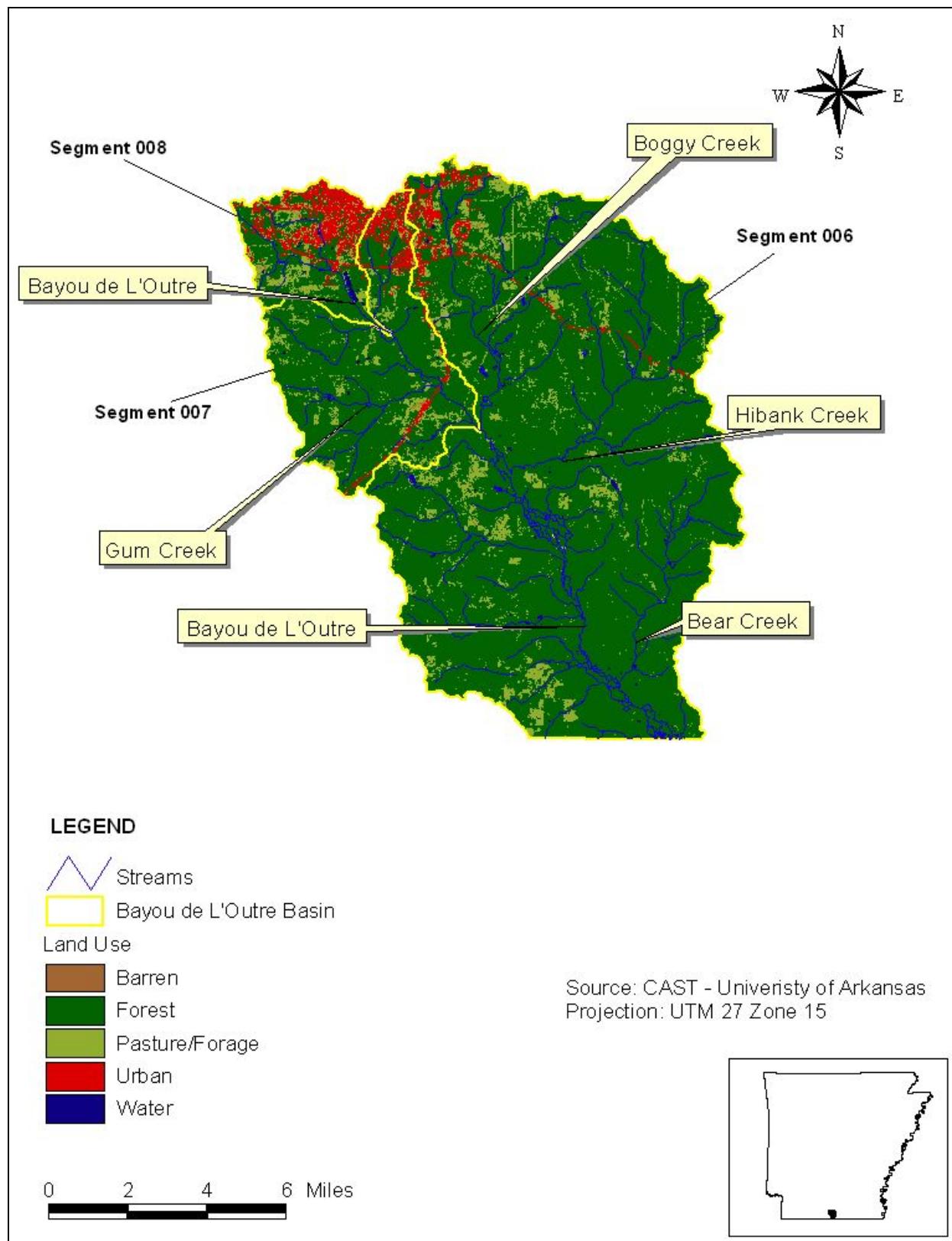


Figure 2-2. Land use in the Bayou de L'Outre Basin.

2.3 Flow Characteristics

There are no USGS stream flow gauges in the Bayou de L'Outre Basin to characterize flow in the watershed.

2.4 Designated Uses and Water Quality Criteria

The designated uses for Bayou de L'Outre are primary contact recreation; secondary contact recreation; domestic, industrial, and agricultural water supply; and fisheries (subcategory streams, Typical Gulf Coastal Ecoregion) (APCEC 2007). Arkansas's 2004 Integrated Report (ADEQ 2005) indicates that the three listed segments have impaired uses of aquatic life due to metals (Cu, Pb, and Zn) and agriculture and industry water supply due to minerals (Cl, SO₄, and TDS). While aquatic life is noted as an impaired use in Arkansas's 2004 Integrated Report (ADEQ 2005), the actual impaired designated use is fisheries (subcategory streams, Typical Gulf Coastal Ecoregion).

The designated use of fisheries “provides for the protection and propagation of fish, shellfish, and other forms of aquatic life (APCEC 2007, p. 3-1)”. The subcategory of “streams” indicates “water which is suitable for the protection and propagation of fish and other forms of aquatic life adapted to flowing water systems whether or not the flow is perennial (APCEC 2007, p. 3-2)”. The subcategory of “Typical Gulf Coastal Ecoregion” designates “Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. Fish communities are characterized by a limited proportion of sensitive species; sunfishes are distinctly dominant followed by darters and minnows (APCEC 2007, p. 3-4)”. The Typical Gulf Coastal Ecoregion fish community may generally be characterized by the key species of redfin shiner, spotted sucker, yellow bullhead, warmouth, slough darter, and grass pickerel and the indicator species of pirate perch, flier, spotted sunfish, dusky darter, creek chubsucker, and banded pygmy sunfish. Agricultural water supply designates waters that will be protected for irrigation of crops and/or consumption by livestock (APCEC 2007). Industrial water supply indicates waters that will be protected for use as process or cooling water (APCEC 2007).

Water quality criteria for Bayou de L'Outre are discussed below and presented in Tables 2-3 and 2-4 for minerals and metals, respectively.

Table 2-3. Numeric criteria for chloride, sulfate, and TDS in the segments of concern in the Bayou de L'Outre Basin

Stream segment number	Stream segment name	Chloride ^{ab}	Sulfate ^{ab}	TDS ^{ab}
		(mg/L)	(mg/L)	(mg/L)
08040202-008	Bayou de L'Outre (above Loutre Creek)	180	31	970
08040202-008	Bayou de L'Outre (from Loutre Creek to the discharge for the city of El Dorado - south facility)	264	635	1,236
08040202-007	Bayou de L'Outre (from the discharge for the city of El Dorado - south downstream to the mouth of Gum Creek)	250	431	966
08040202-007	Bayou de L'Outre (from the mouth of Gum Creek downstream to the mouth of Boggy Creek)	250	345	780
08040202-006	Bayou de L'Outre (from the mouth of Boggy Creek downstream to the mouth of Hibank Creek)	250	296	750
08040202-006	Bayou de L'Outre (from the mouth Hibank Creek downstream to the mouth of Mill Creek)	250	263	750
08040202-006	Bayou de L'Outre (from the mouth Mill Creek downstream to the mouth of Buckaloo Branch)	250	237	750
08040202-006	Bayou de L'Outre (from the mouth Buckaloo Branch downstream to the mouth of Bear Creek)	250	216	750
08040202-006	Bayou de L'Outre (from the mouth Bear Creek downstream to the final segment of Bayou de L'Outre)	250	198	750
08040202-006	Bayou de L'Outre – Final segment (from the mouth Bear Creek to the Arkansa/Louisiana state line)	250	171	750

Note: mg/L = milligrams per liter.

^aThese criteria shall apply to all surface waters of the state at all times except during periods when flows are less than the applicable critical flow. Streams with regulated flow will be addressed on a case-by-case basis to maintain designated instream uses. These standards apply outside the applicable mixing zone. Waters may, on occasion, have natural background levels of certain substances outside the limits established by these criteria, in which case these criteria do not apply to the naturally occurring excursions. These criteria are not to be exceeded in more than one in ten samples collected over a period of not less than 30 days or more than 360 days.

^bNote that the most stringent criteria were applied to each segment (e.g., for segment 08040202-008, the chloride, sulfate, and TDS criteria of 180, 31, and 970, respectively, were applied to the entire segment).

Source: APCEC 2007.

Table 2-4. Numeric criteria for dissolved copper, lead, and zinc in the segments of concern in the Bayou de L'Outre Basin

Stream segment number	Acute dissolved copper ^a	Chronic dissolved copper ^b	Acute dissolved lead ^c	Chronic dissolved lead ^d	Acute dissolved zinc ^e	Chronic dissolved zinc ^f
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
08040202-008	5.6	4.2	17.7	0.7	42.4	38.7
08040202-007	5.6	4.2	17.7	0.7	42.4	38.7
08040202-006	5.6	4.2	17.7	0.7	42.4	38.7

Note: µg/L = micrograms per liter.

Note: The hardness of 31 mg/L used to calculate the metals criteria is the default hardness for the Gulf Coastal Plain Ecoregion of Arkansas.

^aThe acute dissolved copper criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[0.9422(\ln \text{hardness})] - 1.464}) \times 0.960$.

^bThe chronic dissolved copper criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[0.8545(\ln \text{hardness})] - 1.465}) \times 0.960$.

^cThe acute dissolved lead criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[1.273(\ln \text{hardness})] - 1.460}) \times 1.46203 - [(\ln \text{hardness})(0.145712)]$.

^dThe chronic dissolved lead criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[1.273(\ln \text{hardness})] - 4.705}) \times 1.46203 - [(\ln \text{hardness})(0.145712)]$.

^eThe acute dissolved zinc criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[0.8473(\ln \text{hardness})] + 0.8604}) \times 0.978$.

^fThe chronic dissolved zinc criterion was calculated using the following equation with a hardness of 31 mg/L: $(e^{[0.8473(\ln \text{hardness})] + 0.7614}) \times 0.986$.

Source: APCEC 2007.

2.4.1 Chloride, Sulfate, and TDS

This report addresses three stream segments in the Bayou de L'Outre Basin that are included on Arkansas's 2004 section 303(d) list for chloride, sulfate, and TDS impairments. The impaired designated use of all the segments is agriculture and industry water supply.

Arkansas's water quality standards (APCEC 2007) provide site-specific chloride, sulfate, and TDS criteria for various portions of Bayou de L'Outre (Table 2-3). The chloride, sulfate, and TDS criteria apply at all times except during periods when flows are less than the applicable critical flow. The criteria are not to be exceeded in more than 1 in 10 samples collected over a period of not less than 30 days or more than 360 days. The monitoring station for this TMDL is in the portion of Bayou de L'Outre from Hibank Creek to the mouth of Mill Creek. These criteria are used in this TMDL.

2.4.2 Copper, Lead, and Zinc

This report addresses three stream segments in the Bayou de L'Outre Basin that are included on Arkansas's 2004 section 303(d) list for copper, lead, and zinc pollutants. The impaired designated use of all the segments is fisheries (subcategory streams, Typical Gulf Coastal Ecoregion).

The Arkansas water quality standards provide both narrative and numeric criteria for toxic substances like copper, lead, and zinc. The narrative criterion states that "toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota (APCEC 2007, p.5-5)." The numeric water quality criterion for copper, lead, and zinc is based on hardness and applies to both acute and chronic conditions. The acute criteria are based on toxicity resulting from short-term exposure to high pollutant concentrations, whereas the chronic criteria are based on toxicity resulting from long-term exposure to lower pollutant concentrations. Because this TMDL focuses on critical conditions over the long term, the chronic criteria were used to calculate the TMDL for lead. Based on ADEQ's monitoring data, the average hardness in Bayou de L'Outre is 56.83 mg/L. ADEQ's Continuing Planning Process (CPP) (ADEQ 2000) specifies that the default hardness for the Gulf Coastal Plain ecoregion, in which Bayou de L'Outre is located, is 31 mg/L (Table 2-4). The use of the lower default hardness value of 31 mg/L as opposed to the average value of 56.83 mg/L was used to calculate the numeric metals criteria for Bayou de L'Outre (Table 2-4) based on best professional judgment because it is more protective of downstream waterbodies.

2.4.3 Antidegradation Policy

The Arkansas water quality standards also include an antidegradation policy (APCEC 2007), which states that existing in-stream water uses and the level of water quality necessary to protect the existing uses must be maintained and protected.

State water exhibiting high water quality must be maintained and protected unless the state finds that allowing lower water quality is necessary to accommodate important economic or social

development in the area in which the waters are located. In allowing such degradation or lower water quality, the state must ensure water quality adequate to protect the existing uses fully.

Those uses and the water quality for which the outstanding resource waters were designated must be protected by (1) implementing water quality controls, (2) maintaining the natural flow regime, (3) protecting in-stream habitat, and (4) encouraging land management practices protective of the watershed.

In cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method must be consistent with section 316 of the federal Clean Water Act.

2.5 Point Sources

Two point sources in the Bayou de L'Outre Basin are permitted to discharge chloride or total residual chlorine, two are permitted to discharge sulfate, three are permitted to discharge TDS, one is permitted to discharge total copper, three are permitted to discharge total lead, and one is permitted to discharge total zinc (Tables 2-5, 2-6, 2-7, 2-8, 2-9, and 2-10). Table 2-11 presents additional point sources facilities that are in the Bayou de L'Outre Basin, but not included in the TMDLs. Figure 2-3 shows the location of the National Pollutant Discharge Elimination System (NPDES)-permitted facilities included in the TMDL.

Table 2-5. Point source discharge information for chloride in the Bayou de L'Outre Basin

NPDES permit number	Facility name	Location	Outfall	Discharge (mgd)	Receiving waters	Average limit concentration	Maximum limit concentration
						mg/L	mg/L
Segment 007							
AR0000680	Great Lakes South	324 Southfield Cutoff, El Dorado	1	1.354	Gum Creek & Walker Creek	No monitoring	Report
Segment 008							
AR0001171	Great Lakes Chemical Corp-Central Plant	2226 Haynesville Hwy (Hwy 15S), El Dorado	1	0.93	Bayou de L'Outre	Report	Report
			2	0.321	Bayou de L'Outre	129	193.5
			4	0.45	Bayou de L'Outre	98	147
AR0033723	City of El Dorado-South WWTP	325 Quail Crossing, El Dorado	1	7.00	Bayou de L'Outre	No monitoring	

Note: mg/L = milligrams per liter.

Table 2-6. Point source discharge information for sulfate in the Bayou de L'Outre Basin

NPDES permit	Facility name	Location	Outfall	Discharge (mgd)	Receiving waters	Average limit concentration	Max. limit concentration	Average quantity limit	Max. quantity limit
						mg/L	mg/L	lb/day	lb/day
Segment 008									
AR0000647	Lion Oil Company-El Dorado Refinery	1000 McHenry Ave, El Dorado	1	2.67	Loutre Creek	68	102	1,514	2,271
AR0001171	Great Lakes Chemical Corp-Central Plant	2226 Haynesville Hwy (Hwy 15S), El Dorado	1	0.93	Bayou de L'Outre	90	135		
			2	0.321	Bayou de L'Outre	250	375		
			4	0.45	Bayou de L'Outre	Report	Report		
AR0033723	City of El Dorado-South WWTP	325 Quail Crossing, El Dorado	1	7.00	Bayou de L'Outre	No monitoring			

Note: mg/L = milligrams per liter.

Table 2-7. Point source discharge information for TDS in the Bayou de L'Outre Basin

NPDES permit	Facility name	Location	Outfall	Discharge (mgd)	Receiving waters	Average limit concentration	Max. limit concentration	Average quantity limit	Max. quantity limit
						mg/L	mg/L	lb/day	lb/day
Segment 008									
AR0000647	Lion Oil Company-El Dorado Refinery	1000 McHenry Ave, El Dorado	1	2.67	Loutre Creek	86	129	1,915	2,872
AR0001171	Great Lakes Chemical Corp-Central Plant	2226 Haynesville Hwy (Hwy 15S), El Dorado	2	0.321	Bayou de L'Outre	500	750		
			4	0.45	Bayou de L'Outre	500	750		
AR0033723	City of El Dorado-South WWTP	325 Quail Crossing, El Dorado	1	7.00	Bayou de L'Outre	No monitoring			
Segment 006									
AR0037800	Clean Harbors El Dorado, LLC	309 American Cir, El Dorado Twp	9	1.214	Boggy Creek	343	515	2,517	3,779

Note: mg/L = milligrams per liter.

Table 2-8. Point source discharge information for total copper in the Bayou de L'Outre Basin

NPDES permit	Facility name	Location	Outfall	Discharge (mgd)	Receiving waters	Average limit concentration	Max. limit concentration	Average quantity limit	Max. quantity limit
						ug/L	ug/L	lb/day	lb/day
AR00000574	Cooper Standard Automotive	1.5 mi east of El Dorado	2	0.224	ditch Boggy Creek, Bayou de L'Outre	12.2	24.5	0.023	0.046

Note: ug/L = micrograms per liter.

Table 2-9. Point source discharge information for total lead in the Bayou de L'Outre Basin

NPDES permit	Facility name	Location	Outfall	Discharge (mgd)	Receiving waters	Average limit concentration	Max. limit concentration	Average quantity limit	Max. quantity limit
						ug/L	ug/L	lb/day	lb/day
Segment 008									
AR00000647	Lion Oil Company-El Dorado Refinery	1000 McHenry Ave, El Dorado	6	0.165	Loutre Creek	3.9	7.8	0.14	0.28
			7	0.165	Loutre Creek	3.9	7.8	0.14	0.28
Segment 007									
AR00000680	Great Lakes South	324 Southfield Cutoff, El Dorado	1	1.354	Gum Creek & Walker Creek	3.8	7.6		
Segment 006									
AR0037800	Clean Harbors El Dorado, LLC	309 American Cir, El Dorado Twp	9	1.214	Boggy Creek	3.8	7.6	0.03	0.06

Note: ug/L = micrograms per liter.

Table 2-10. Point source discharge information for total zinc in the Bayou de L'Outre Basin

NPDES permit	Facility name	Location	Outfall	Discharge (mgd)	Receiving waters	Average limit concentration	Max. limit concentration	Average quantity limit	Max. quantity limit
						ug/L	ug/L	lb/day	lb/day
Segment 008									
AR00000647	Lion Oil Company-El Dorado Refinery	1000 McHenry Ave, El Dorado	1	2.67	Loutre Creek	118	237	2.63	5.28
			6	0.165	Loutre Creek	117	235	4.2	8.4
			7	0.165	Loutre Creek	117	235	4.2	8.4

Note: ug/L = micrograms per liter.

Table 2-11. Point source discharges not included in the TMDLs for the Bayou de L'Outre Basin

NPDES permit	Facility name	Location	Reason for not including
Segment 007			
AR0036072	Georgia Pacific Wood Production, LLC-	5482 Junction City Hwy (167)	This permit contained limits for floating debris, oil and grease, TSS, BOD ₅ , and pH. None of these were of interest to the TMDL and were not included.
Segment 006			
AR0047368	Columbian Chemicals Company	713 Industrial Rd	This permit contained limits for TSS, chemical oxygen demand, and pH. None of these were of interest to the TMDL and were not included.

2.6 Nonpoint Sources

2.6.1 Chloride, Sulfate, and TDS

Sources of dissolved minerals like chloride, sulfate, and TDS include urban and agricultural runoff, forestry, and natural geology. Chloride is found in all human and animal waste, and therefore septic systems and areas where animal waste is deposited can be chloride sources. Fertilizers are also a common source of chlorides (University of Florida 2003). TDS can originate from natural sources (e.g., mineral springs, carbonate deposits, salt deposits) and urban and agricultural runoff (Wilkes University 2005).

2.6.2 Copper, Lead, and Zinc

According to Arkansas's 2004 305(b) report, the oil, brine, and bromine extraction industry has contributed nonpoint source contamination to waters of the Lower Ouachita River and its tributaries, including Bayou de L'Outre, for many years. The Lower Ouachita River Basin has seen recent water quality improvements that are most likely the result of cleaning up the extraction sites; improving storage, such as phasing out open pits; and better maintaining transmission lines (e.g., repairing and replacing broken and leaking pipelines) (ADEQ 2005).

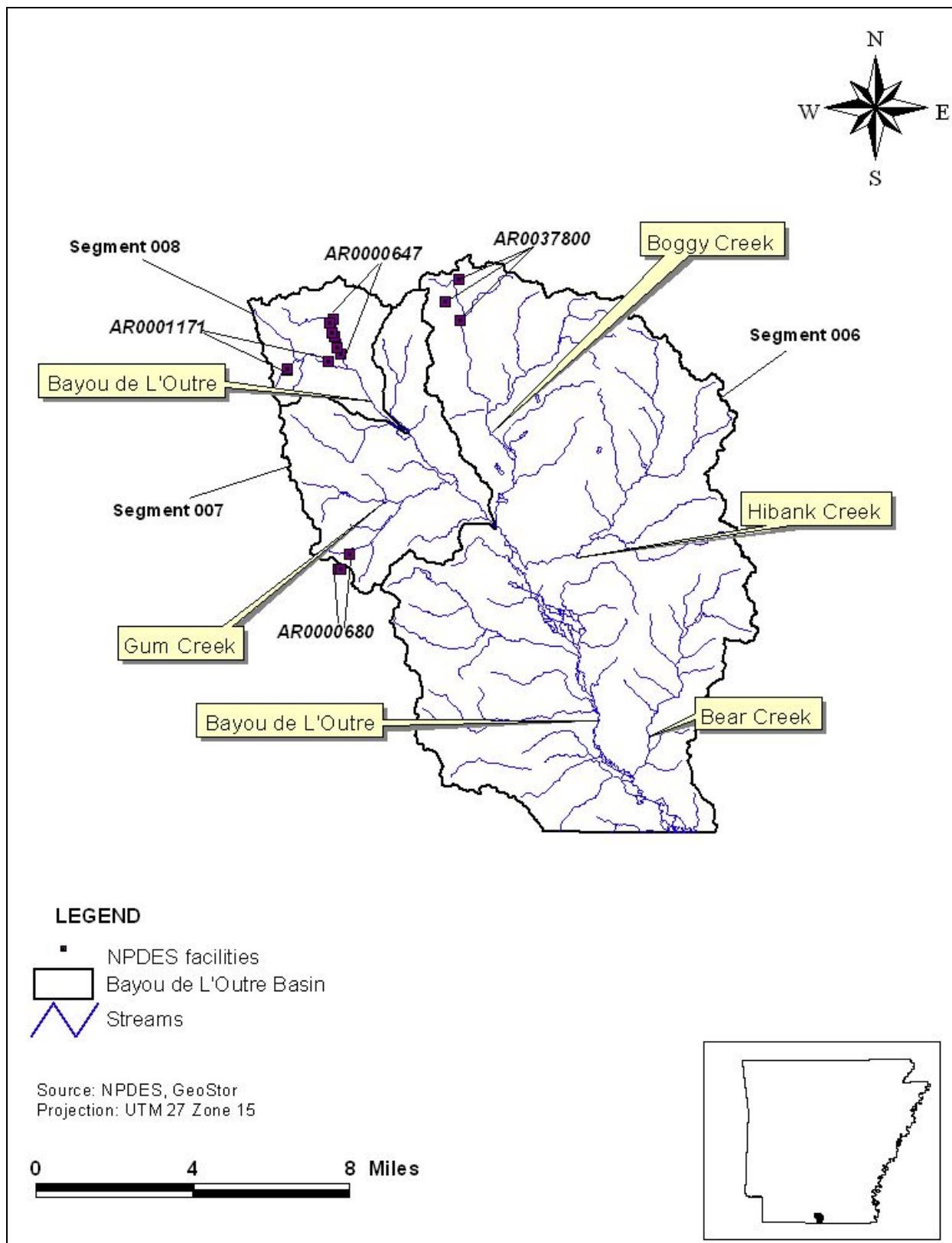


Figure 2-3. Location of NPDES facilities in the Bayou de L'Outre Basin.

3 CHARACTERIZATION OF EXISTING WATER QUALITY

ADEQ has collected water quality data for chloride, sulfate, TDS, dissolved copper, dissolved lead, dissolved zinc, and other parameters in Bayou de L'Outre near Junction City (station OUA0005), which is approximately 7.4 miles upstream of the Arkansas/Louisiana state line (Figure 3-1).

3.1 Comparison of Observed Data to Criteria

3.1.1 Chloride

Water quality monitoring station OUA0005 (Bayou de L'Outre near Junction City, AR) has 190 chloride observations from 1990 to the present. Table A-1 in Appendix A provides a summary of the chloride observations at station OUA0005, including the number of observations; the period of record; the minimum, maximum, mean, and median observations; the number of exceedances of the criterion; and the percentage of observations exceeding the criterion. Appendix B contains the original chloride water quality data. Seven percent of the observations at station OUA0005 exceed the 250 mg/L chloride criterion for Bayou de L'Outre.

3.1.2 Sulfate

Water quality monitoring station OUA0005 (Bayou de L'Outre near Junction City, AR) has 192 sulfate observations from 1990 to the present. Table A-1 in Appendix A provides a summary of the sulfate observations at station OUA0005, including the number of observations; the period of record; the minimum, maximum, mean, and median observations; the number of exceedances of the criterion; and the percentage of observations exceeding the criterion. Appendix B contains the original sulfate water quality data. Seven percent of the observations at station OUA0005 exceed the 263 mg/L sulfate criterion for Bayou de L'Outre.

3.1.3 Total Dissolved Solids

Water quality monitoring station OUA0005 (Bayou de L'Outre near Junction City, AR) has 195 TDS observations from 1990 to the present. Table A-1 in Appendix A provides a summary of the TDS observations at station OUA0005, including the number of observations; the period of record; the minimum, maximum, mean, and median observations; the number of exceedances of the criterion; and the percentage of observations exceeding the criterion. Appendix B contains the original TDS water quality data. Fourteen percent of the observations at station OUA0005 exceed the 750 mg/L TDS criterion for Bayou de L'Outre.

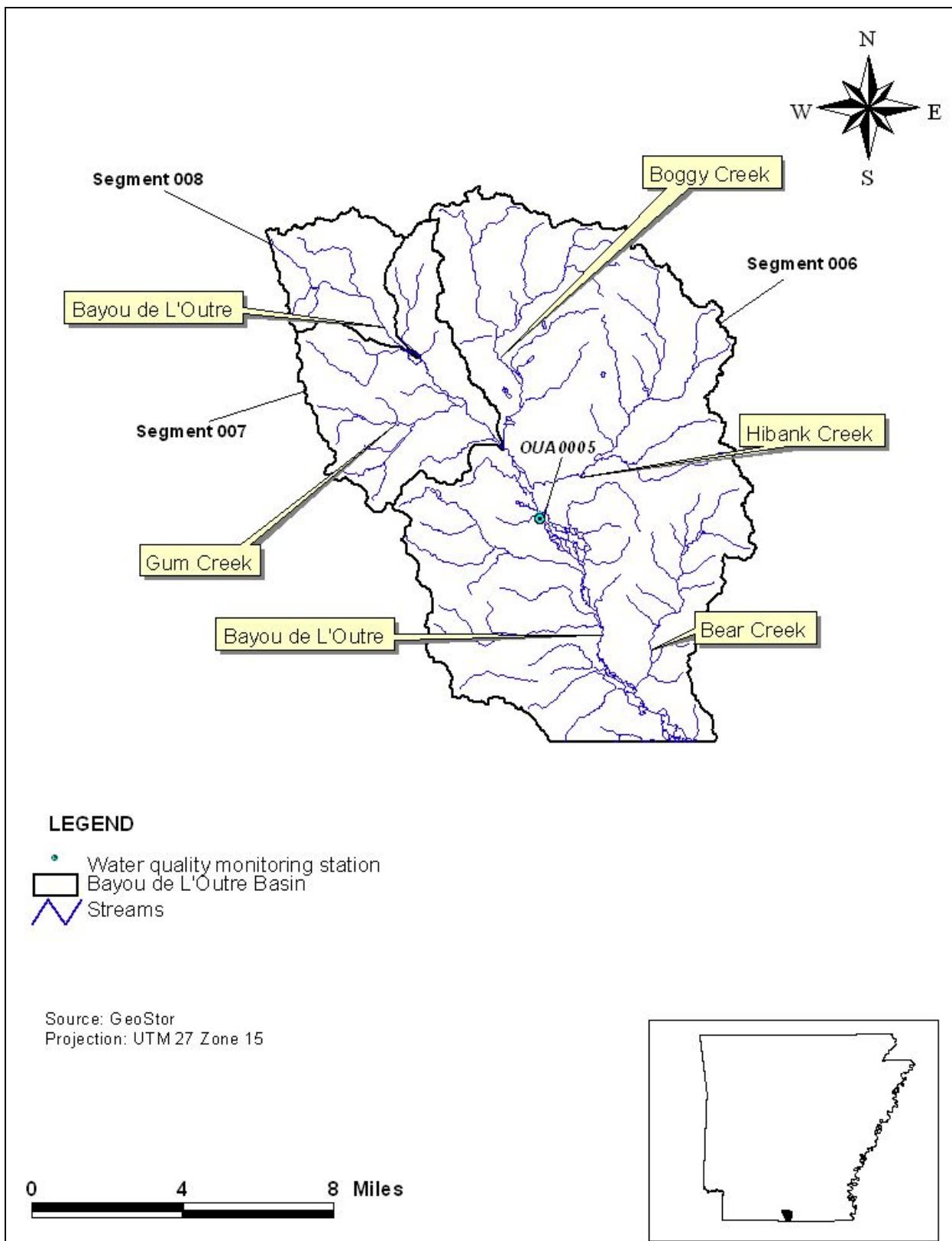


Figure 3-1. Location of the water quality monitoring station in the Bayou de L'Outre Basin.

3.1.4 Copper

Water quality monitoring station OUA0005 (Bayou de L'Outre near Junction City, AR) has 77 dissolved copper observations from 1995 to the present. Table A-2 in Appendix A provides a summary of the dissolved copper observations at station OUA0005, including the number of observations; the period of record; the minimum, maximum, mean, and median observations; the number of exceedances of the criterion; and the percentage of observations exceeding the criterion. Appendix B contains the original dissolved copper water quality data. Thirty percent of the observations at station OUA0005 exceed the 4.2 µg/L dissolved copper criterion for Bayou de L'Outre.

3.1.5 Lead

Water quality monitoring station OUA0005 (Bayou de L'Outre near Junction City, AR) has 54 dissolved lead observations from 1998 to the present. Table A-2 in Appendix A provides a summary of the dissolved lead observations at station OUA0005, including the number of observations; the period of record; the minimum, maximum, mean, and median observations; the number of exceedances of the criterion; and the percentage of observations exceeding the criterion. Appendix B contains the original dissolved lead water quality data. Thirty-five percent of the observations at station OUA0005 exceed the 0.7 µg/L dissolved lead criterion for Bayou de L'Outre.

3.1.6 Zinc

Water quality monitoring station OUA0005 (Bayou de L'Outre near Junction City, AR) has 74 dissolved zinc observations from 1995 to the present. Table A-2 in Appendix A provides a summary of the dissolved zinc observations at station OUA0005, including the number of observations; the period of record; the minimum, maximum, mean, and median observations; the number of exceedances of the criterion; and the percentage of observations exceeding the criterion. Appendix B contains the original dissolved zinc water quality data. Thirty percent of the observations at station OUA0005 exceed the 38.7 µg/L dissolved zinc criterion for Bayou de L'Outre.

3.2 Trends and Patterns in Observed Data

3.2.1 Chloride

The chloride observations at station OUA0005 do not show any strong seasonal trends or patterns, but the highest observations were in the summer months. The highest chloride observations tended to be seen at low flows; however, not enough samples were collected during high flows to allow a valid comparison. Appendix C contains the chloride sampling results plotted over time and versus flow.

3.2.2 Sulfate

The sulfate observations at station OUA0005 do not show a strong seasonal trend or pattern, but the highest observations were in September, October, and November. High sulfate observations

seemed to correlate with low flows; however, not enough samples were collected during high flows to allow a valid comparison. Appendix C contains the sulfate sampling results plotted over time and versus flow.

3.2.3 Total Dissolved Solids

The TDS observations at station OUA0005 do not show a strong seasonal trend or pattern, but the highest observations were in the summer and fall months. Like, chloride and sulfate, high TDS observations seemed to correlate with low flows; however, not enough samples were collected during high flows to allow a valid comparison. Appendix C contains the TDS sampling results plotted over time and versus flow.

3.2.4 Copper

The dissolved copper observations at station OUA0005 at Bayou de L'Outre do not show any distinct trends or patterns with season or hydrology. Appendix D contains the dissolved copper sampling results plotted over time and versus flow.

3.2.5 Lead

The dissolved lead observations at station OUA0005 do not show any strong seasonal trends; however, the highest lead observations were seen from January through May. Higher dissolved lead observations did tend to occur with low flows; however, not enough samples were collected during high flows to allow a valid comparison. Appendix D contains the dissolved lead sampling results plotted over time and versus flow.

3.2.6 Zinc

There were no distinct seasonal or hydrologic trends with the dissolved zinc observations at station OUA0005. Appendix D contains the dissolved zinc sampling results plotted over time and versus flow.

4 TMDL DEVELOPMENT

A TMDL is the total amount of a pollutant that can be assimilated by the receiving waterbody while still achieving water quality standards. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established, 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 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 lack of knowledge in the relationship between pollutant loads and the water quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

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

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

4.1 TMDL Analytical Approach

The methodology used to determine the TMDL for each impaired segment is the load duration curve. Because loading capacity varies as a function of the flow present in the stream, these TMDLs represent a continuum of desired loads over all flow conditions rather than a fixed, single value. The basic elements of this procedure are documented on the Kansas Department of Health and Environment Web site (KDHE 2003). This method was used to illustrate allowable loading for a wide range of flows. The steps for applying this methodology to develop the TMDLs in this report can be summarized as follows:

1. Develop a flow duration curve.
2. Convert the flow duration curve to load duration curves for each impairment.
3. Plot the observed loads with load duration curves.
4. Calculate the TMDL, MOS, WLA, and LA (see Section 4.2).
5. Calculate the loadings required to meet Arkansas's water quality standards.

4.1.1 Flow Duration Curve

A flow duration curve was developed for the USGS gauge used for these TMDLs. Daily stream flow measurements from the USGS gauge were sorted in increasing order, and the percentile ranking of each flow was calculated. The load duration curve methodology requires that the same flow period be used for both developing the flow duration and calculating observed loads from sampling data. The flows are then plotted against the corresponding percent flow that exceeds a specific flow to create the flow duration curves.

Figure 4-1 is an example of a flow duration curve. The plot shows the flow (e.g., 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 at the high end of the plot (90 to 100 percent) represent low-flow conditions.

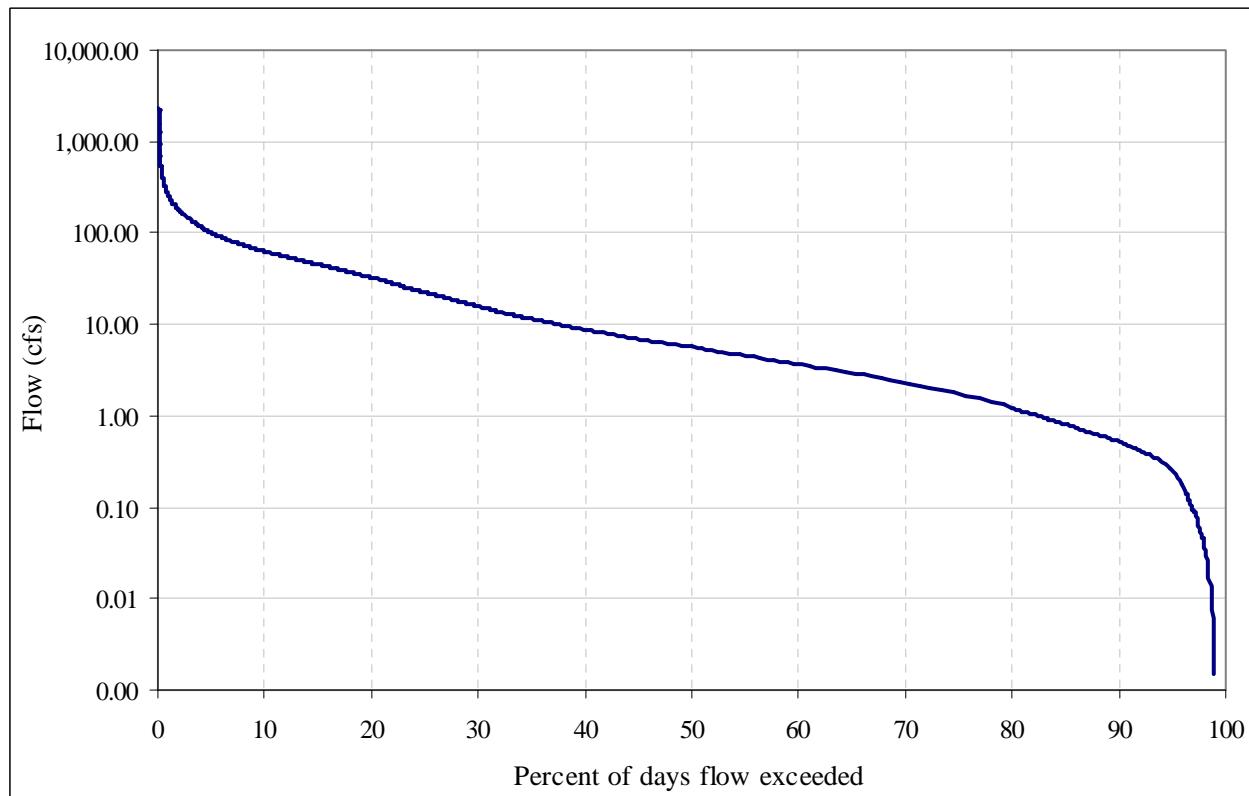


Figure 4-1. Example of a flow duration curve.

There was only one active USGS gauge in the area of concern. Table 4-1 presents the USGS gauge that was used, the period of record used in the TMDL analysis, and the segment(s) represented. For the TMDL calculations, the most recent flow data were used. Data from 1955 through 2006 were used for USGS station 07366200. Flows were area weighted for each stream segment and those flows were used to create a unique flow duration curve for each segment (Appendix E).

Table 4-1. USGS flow gauge and represented segments for the Bayou de L'Outre Basin

Station number	Station name	Drainage area (square miles)	Period of record used in TMDL development	Segments represented
07366200	Little Corney Bayou near Lillie, LA	208	1955–2006	006, 007, 008

4.1.2 Load Duration Curve

For each TMDL parameter (chloride, sulfate, TDS, dissolved copper, dissolved lead, and dissolved zinc), the flows from the flow duration curves were multiplied by the appropriate numeric criterion concentration (Table 2-6) to compute an allowable load duration curve. Each

load duration curve is a plot of mass 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. This approach allows the monitoring data to be placed in relation to their position 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. This approach will allow analysis of load cases in the future for different flow regimes.

4.1.3 Observed Loads

For each sampling station, observed loads were calculated by multiplying the observed concentration of the parameter of concern by the flow on the sampling day. These 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 segment. These plots are shown in the appendices to this report as follows:

- Appendix F: Load Duration Calculations for All TMDLs (CD-ROM)
- Appendix G: Load Duration Curve Summaries and Plots for Chloride
- Appendix H: Load Duration Curve Summaries and Plots for Sulfate
- Appendix I: Load Duration Curve Summaries and Plots for Total Dissolved Solids
- Appendix J: Load Duration Curve Summaries and Plots for Dissolved Copper
- Appendix K: Load Duration Curve Summaries and Plots for Dissolved Lead
- Appendix L: Load Duration Curve Summaries and Plots for Dissolved Zinc

These 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 under which observed water quality concentrations exceed the numeric criterion concentrations. Observed loads plotted below the load duration curve represent conditions under which observed water quality concentrations are less than the numeric criterion concentrations (i.e., do not exceed the water quality standards).

4.2 TMDL

Stream segment 08040202-006 was the only segment with a monitoring station. TMDLs for this segment were determined with load duration curves. Table 4-2 presents the TMDLs and allocations for the segments in this report. TMDLs for the other reaches, which did not have water quality stations, were determined from 08040202-006 and using a ratio of the total drainage area of each reaches. In addition, loadings for 08040202-008 are included in 08040202-007 because 08040202-007 is downstream of 08040202-008; similarly, loadings for 08040202-007 are included in 08040202-006.

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 lack of knowledge in the available data or in the actual effect that controls will have on the loading reductions and receiving water quality. The MOS may be expressed explicitly as unallocated assimilative capacity or implicitly by using conservative assumptions in establishing the TMDL. For a more detailed discussion of the MOS, see section 4.4.

Table 4-2. Summary of TMDLs, MOS, WLAs, and LAs for the Bayou de L'Outre Basin

HUC/segment	Water quality station	Pollutant	Total allowable loading	Explicit MOS (10%)	Σ WLA	Σ LA
			lb/day			
08040202-006	OUA0005	Chloride	145,162	14,516	0	130,645
08040202-006	OUA0005	Dissolved copper	2.44	0.24	0.01	2.19
08040202-006	OUA0005	Dissolved lead	0.41	0.04	0.02	0.34
08040202-006	OUA0006	Sulfate	99,291	9,929	0	89,361
08040202-006	OUA0005	TDS	435,485	43,548	2,517	389,419
08040202-006	OUA0005	Dissolved zinc	22.47	2.25	0.96	19.27
08040202-007		Chloride	34,226	3,423	2,825	27,978
08040202-007		Dissolved copper	0.575	0.057	0	0.517
08040202-007		Dissolved lead	0.096	0.010	0.011	0.075
08040202-007		Sulfate	23,410	2,341	0	21,069
08040202-007		TDS	102,677	10,268	0	92,409
08040202-007		Dissolved zinc	5.298	0.530	0.958	3.811
08040202-008		Chloride	10,174	1,017	5,207	3,950
08040202-008		Dissolved copper	0.171	0.017	0	0.154
08040202-008		Dissolved lead	0.028	0.003	0.002	0.023
08040202-008		Sulfate	6,959	696	6,216	47
08040202-008		TDS	30,523	3,052	24,060	3,410
08040202-008		Dissolved zinc	1.575	0.157	0.958	0.460

Note: Loadings for segment 08040202-008 are included in segment 08040202-007. Loadings for segment 08040202-007 are included in segment 08040202-006.

4.3 Wasteload Allocation

The WLA portion of the TMDL equation is the total loading of a pollutant that is assigned to point sources. The point sources in the Bayou de L'Outre Basin include mechanical rubber goods, petroleum refining, industrial inorganic chemicals, wastewater facilities, and refuse systems.

WLAs are based on the current permit limits and discharge flow rates. If monitoring was optional or required for a pollutant, a WLA was assigned to the facility based on the water quality criterion and facility flow. An example of this is NPDES permit AR0000680. This facility is required to monitor for chloride so the water quality criterion was used to develop a WLA. During the next permit cycle, ADEQ will determine if permit limits are necessary for chloride.

No domestic wastewater facilities with permit limits for chloride, sulfate, or TDS were identified in the Bayou de L'Outre Basin, although it is possible that discharges from such facilities contain these constituents. Permit limits might not be given if a waterbody receiving the discharge is not listed and thus the discharge does not adversely affect water quality in the waterbody, or if the effluent from a facility does not contain a particular pollutant. For impaired waterbodies, permit limits are typically assigned. Permit limit designations are made by ADEQ during the permitting process on a case-by-case basis.

As noted above, because domestic wastewater facilities typically discharge chloride, sulfate, and TDS, facilities in this basin were assigned WLAs. These WLAs were based on facility flow and the median effluent concentrations of domestic wastewater facilities as reported in the Permit Compliance System, a database operated by EPA. These medians—chloride (53 mg/L), sulfate (41 mg/L), TDS (343 mg/L)—meet the water quality criteria for Bayou de L'Outre.

Tables 4-3 and 4-4 list the mineral (chloride, sulfate, TDS) and metal (copper, lead, and zinc) WLAs for each point source in the Bayou de L'Outre Basin. There were no reductions to WLAs except for Permit AR0001171, outfall 4. The facility was originally assigned a concentration equal to the water quality criterion. The loading from this facility was reduced to meet allowable loadings.

Note that Table 4-4 lists the individual copper, lead, and zinc WLAs for each point source in the Bayou de L'Outre Basin. Both dissolved and total WLAs are presented. Federal regulations at Title 40 of the *Code of Federal Regulations* [CFR] Part 130 require permit limits to be expressed as total metals. WLAs for dissolved metals are provided to allow a comparison with the TMDLs in Table 4-2. The total metals values were derived from the dissolved water quality criteria using the translator mechanism described in Attachment V of the *State of Arkansas Continuing Planning Process* (ADEQ 2000).

4.4 Load Allocation

The LA is the portion of the TMDL assigned to natural background loadings, as well as nonpoint sources like urban runoff and agricultural practices. For this TMDL, the LA was calculated by subtracting the WLA and MOS from the total TMDL. LAs were not allocated to separate nonpoint sources because there was a lack of available source characterization data. The LAs are presented in Table 4-2.

Table 4-3. Mineral WLAs for the Bayou de L'Outre Basin

HUC/segment	NPDES permit	Outfall	Facility	Discharge	Chloride	Sulfate	TDS
				mgd	lb/d	lb/d	lb/d
08040202-007	AR0000680	1	Great Lakes South	1.354	2,825		
08040202-008	AR0000647	1	Lion Oil Company-El Dorado Refinery	2.67		1,514	1,915
08040202-008	AR0001171	1	Great Lakes Chemical Corp-Central Plant	0.93	1,397	699	
08040202-008	AR0001171	2	Great Lakes Chemical Corp-Central Plant	0.321	346	670	1,339
08040202-008	AR0001171	4	Great Lakes Chemical Corp-Central Plant	0.45	368	938.9	1,878
08040202-008	AR0033723	1	El Dorado, City of - South WWTP	7	3,096	2,395	18,927
08040202-006	AR0037800	9	Clean Harbors El Dorado, LLC (formerly Teris, LLC)	1.214			2,517

Table 4-4. Dissolved and total metal WLAs for the Bayou de L'Outre Basin

HUC/segment	NPDES permit	Outfall	Facility	Discharge	Dissolved copper	Dissolved lead	Dissolved zinc
				mgd	lb/d	lb/d	lb/d
08040202-006	AR0000574	2	Cooper Standard Automotive: Cooper Tire & Rubber Company	0.224	0.0088		
08040202-008	AR0000647	1	Lion Oil Company-El Dorado Refinery	2.67			0.8524
08040202-008	AR0000647	6	Lion Oil Company-El Dorado Refinery	0.165		0.0011	0.0527
08040202-008	AR0000647	7	Lion Oil Company-El Dorado Refinery	0.165		0.0011	0.0527
08040202-007	AR0000680	1	Great Lakes South	1.354		0.0087	
08040202-006	AR0037800	9	Clean Harbors El Dorado, LLC	1.214		0.01145	
HUC/segment	NPDES permit	Outfall	Facility	Discharge	Total copper	Total lead	Total zinc
				mgd	lb/d	lb/d	lb/d
08040202-006	AR0000574	2	Cooper Standard Automotive: Cooper Tire & Rubber Company	0.224	0.0228		
08040202-008	AR0000647	1	Lion Oil Company-El Dorado Refinery	2.67			2.6293
08040202-008	AR0000647	6	Lion Oil Company-El Dorado Refinery	0.165		0.0054	0.1625
08040202-008	AR0000647	7	Lion Oil Company-El Dorado Refinery	0.165		0.0054	0.1625
08040202-007	AR0000680	1	Great Lakes South	1.354		0.0429	
08040202-006	AR0037800	9	Clean Harbors El Dorado, LLC	1.214		0.0300	

4.5 Margin of Safety

The MOS is the portion of the pollutant loading reserved to account for any lack of knowledge in the data. There are two ways to incorporate the MOS (USEPA 1991). One way is to implicitly incorporate it by using conservative model assumptions to develop the allocations. The other way is to explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. In this analysis, for all pollutants, the MOS is explicit: 10 percent of each targeted TMDL was reserved as the MOS to account for any lack of knowledge in the TMDL. Using 10 percent of the TMDL load provides an additional level of protection to the designated uses of the segments of concern.

4.6 Seasonality and Critical Conditions

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. The sampling results for all pollutants were plotted over time and reviewed for any seasonal patterns (see Section 3.2).

By accounting for critical conditions, the TMDL makes sure that water quality standards are maintained for infrequent occurrences and not only for average conditions.

Because of the way the criteria are written (i.e., including critical and noncritical conditions), the TMDL for a pollutant of concern can be developed by reviewing pollutant loads at all flow conditions within applicable periods of the year and evaluating the percentage of values exceeding the criteria. The load duration curve, which determines the allowable loading at a wide range of flows, was chosen as the approach for these TMDLs (see Section 4.1). Therefore, the TMDLs were calculated at all flows rather than at a single critical flow.

4.7 Future Growth

Compliance with these chloride, sulfate, and TDS TMDLs is based on keeping loadings in the stream below the assimilative capacity of the stream. Allocations between the WLA and LA may be re-evaluated if there is future growth of existing or new point sources discharging to the impaired reaches or their tributaries.

5 FUTURE WATERSHED ACTIVITIES

In accordance with section 106 of the federal Clean Water Act and under its own authority, ADEQ has established a comprehensive program for monitoring the quality of the state's surface waters. ADEQ collects surface water samples at various locations, using appropriate sampling methods and procedures to ensure the quality of the data collected. One of the locations where ADEQ will continue to monitor water quality is Bayou de L'Outre near Junction City, Arkansas (station OUA0005). The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, to develop a long-term database for long-term trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program are used to develop the state's biennial 305(b) report and section 303(d) list of impaired waters, which were most recently published as the *State of Arkansas 2004 Integrated Water Quality Monitoring and Assessment Report* (ADEQ 2005).

6 PUBLIC PARTICIPATION

The federal regulations at 40 CFR 130.7(c)(1)(ii) specify that TMDLs “shall be subject to public review as defined in the State’s CPP.” The draft version of this TMDL was submitted to ADEQ and EPA in August 2007. EPA Region 6 will prepare a notice seeking comments, information, and data from the public concerning this TMDL.

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Appendix A

Summary of Water Quality Data

Table A-1. Summary of chloride, sulfate, and TDS data for the Bayou de L'Outre Basin.....	2
Table A-2. Summary of dissolved copper, lead, and zinc data for the Bayou de L'Outre Basin...	2

Table A-1. Summary of chloride, sulfate, and TDS data for the Bayou de L'Outre Basin

Pollutant	Station number	Station name	Period of record	Number of observations	Minimum	Maximum	Mean	Median	Number of observations above criterion ^a	% of observations above criterion ^a
					mg/L	mg/L	mg/L	mg/L		
Chloride	OUA0005	Bayou de L'Outre near Junction City, AR	9/4/1990–4/23/2007	190	4.95	874	140	126	13	7
Sulfate	OUA0005	Bayou de L'Outre near Junction City, AR	9/4/1990–4/23/2007	192	0.02	686	113	79	14	7
TDS	OUA0005	Bayou de L'Outre near Junction City, AR	9/4/1990–4/23/2007	195	22.8	1530	501	451	27	14

^aThe water quality data were compared to the site-specific chloride, sulfate, and TDS water quality criteria of 250, 263, and 750 mg/L, respectively. These are the criteria for Bayou de L'Outre from the mouth of Hibank Creek downstream to the mouth of Mill Creek.

Table A-2. Summary of dissolved copper, lead, and zinc data for the Bayou de L'Outre Basin

Pollutant (dissolved)	Station number	Station name	Period of record	Number of observations	Minimum	Maximum	Mean	Median	Number of observations above criterion ^a	% of observations above criterion ^a
					µg/L	µg/L	µg/L	µg/L		
Copper	OUA0005	Bayou de L'Outre near Junction City, AR	1/9/95–4/23/07	77	0.25	12	3	3	23	30
Lead	OUA0005	Bayou de L'Outre near Junction City, AR	7/21/98–4/23/07	54	0.10	3	0.73	0.53	19	35
Zinc	OUA0005	Bayou de L'Outre near Junction City, AR	1/9/95–4/23/07	74	0.50	172	34	27	22	30

^aThe water quality data were compared to the chronic water quality criteria for dissolved copper, lead, and zinc, which are 4.2, 0.7, and 38.7 µg/L, respectively.

Appendix B

Water Quality Data by Sampling Location

Table B-1. Chloride, sulfate, and TDS data for the Bayou de L'Outre Basin at station OUA00052	
Table B-2. Dissolved copper, dissolved lead, dissolved zinc, and hardness data for the Bayou de L'Outre Basin at station OUA0005	6

Table B-1. Chloride, sulfate, and TDS data for the Bayou de L'Outre Basin at station OUA0005

Date Collected	Flow	Chloride	Sulfate	TDS
	(cfs)	(mg/L)	(mg/L)	(mg/L)
9/4/1990	2.4	384	165	1064
10/2/1990	6	279		812
10/30/1990	22	386	73	729
11/27/1990	51	366	57	746
1/2/1991	510	75.8	25	225
2/5/1991	81	191	52	483
3/12/1991	89	153	45	402
4/2/1991	705	110	25	316
5/7/1991	1970	29.3	13	139
6/4/1991	58		80	440
7/2/1991	27	103	84	435
8/6/1991	13	253	85	536
9/3/1991	168			378
10/1/1991	29			397
10/29/1991	100			452
11/25/1991	124	121	36.5	354
1/7/1992	98	109	41.3	305
2/4/1992	141	100	46.1	296
3/3/1992	371	68.2	35.4	224
4/7/1992	102	116	51	346
5/5/1992	69	133	46.9	375
6/2/1992	264	118	32.9	319
7/7/1992	24	103	67.2	416
8/4/1992	63	126	61	447
9/1/1992	11	128	76.6	507
9/29/1992	19	142	91.1	513
10/27/1992	32		106	496
12/1/1992	48	120	53.1	358
1/12/1993	520		18.1	220
2/9/1993	72	105	62.3	356
3/9/1993	162	225	46.9	505
4/13/1993	532	91.4	22.9	259
5/18/1993	53	107	58.2	357
6/21/1993	322	49.9	13.2	141
7/26/1993	6.2	327	133	888
8/24/1993	2.5	874		690
9/21/1993	2	149	163	651
10/26/1993	29	183	82	487
11/23/1993	68	119	71.8	366
12/21/1993	77		58.2	
1/18/1994	355		22.6	210
2/15/1994	1420	39.6	16.9	140
3/14/1994	609	53.6	27.3	184
4/18/1994	296	131	23.3	
5/23/1994	38	224	61.3	588
6/28/1994	28	253	70	637

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in Bayou de L'Outre Basin, Arkansas

Date Collected	Flow	Chloride	Sulfate	TDS
	(cfs)	(mg/L)	(mg/L)	(mg/L)
7/19/1994	24	344	63	818
8/16/1994	8	193	101	655
9/27/1994	3.3	156	213	754
10/24/1994	380	109	27.1	299
11/28/1994	77	267	62.1	610
12/19/1994	1560	50.8	13.2	171
1/9/1995	297	125		
2/14/1995	81	126	130	532
3/28/1995	124	213	74.1	582
4/24/1995	1090	62.368	9.8	174
5/23/1995	50	162	75.7	480
6/20/1995	18	127	164	610
7/17/1995	4.8	119	170	588
8/8/1995	21	115.182	204	655
9/19/1995	4	137	193	647
10/17/1995	14	147	230	726
11/13/1995	9.3		215	743
12/18/1995	215	162	82	441
1/30/1996	61	157	79.7	451
2/20/1996	79	142	80.6	447
3/12/1996	45	179	96.9	532
4/23/1996	201	110.259	37.1	341
5/21/1996	5.3	129.3	152.4	637
6/18/1996	31	137	86.2	473
7/16/1996	47	110.888	80	395
8/6/1996	368	107.929	29	337
9/10/1996	16	126	96.8	509
10/1/1996	795	95.6	39.6	274
11/19/1996	75	120.1	77.3	414
12/17/1996	332	105.304	64.6	352
1/28/1997	830	50.994	23.1	175
2/25/1997	603	54.446	28	197
3/11/1997	407	53.619	32.7	
4/15/1997	142	84.756	48.7	284
5/13/1997	55	84.899	82.3	384
6/10/1997	399		39.5	277
7/22/1997	13	95.939	239	663
8/26/1997	27	102.153	81.641	425
9/30/1997	3	136.5	190.2	674
10/28/1997	88	139	67.2	386
11/18/1997	58		41.724	363
12/15/1997	49	128.833	54.288	358
1/20/1998	257	71.96	31.455	227
2/17/1998	560	65.38	17.768	191
3/17/1998	786	26.75	10.26	127
4/14/1998	63	115.371	71.522	401

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in Bayou de L'Outre Basin, Arkansas

Date Collected	Flow	Chloride	Sulfate	TDS
	(cfs)	(mg/L)	(mg/L)	(mg/L)
5/19/1998	22	114	204	667
6/9/1998	26	137	112	517
7/21/1998	0	49.1	124	684
8/11/1998	19	119	175.8	694
9/1/1998	17	121	191	636
9/29/1998	21	130	158	651
11/16/1998	151	142	49.4	380
12/22/1998	392	82.6	25	230
1/26/1999	661	68.6	28.8	216
2/23/1999	99	104	97.5	420
3/23/1999	134	84.2	62.1	324
4/27/1999	61	110.31		508
4/28/1999	62	29.4	31.4	
5/25/1999	30	130	152	584
6/29/1999	655	55.2	22	236
7/27/1999	16	112	301	852
8/17/1999	1.3	153	268	863.5
9/21/1999	0.46	121	190	870
10/19/1999	6.5	160	195	697.5
11/22/1999	26	161.64	216.04	705.5
12/20/1999	26	187	131.24	593.5
1/25/2000	21	146.96	112.48	520
2/29/2000	142	148	62.6	402.5
3/27/2000	88	72.2	27.5	266
4/24/2000	25	111	83.6	448.5
5/30/2000	197	159	28.6	429
6/27/2000	21	127	85.7	432
7/25/2000	1.8	168.45	201.1	690
8/22/2000	0.18	210.48	420.12	1161
9/18/2000	0	8.06	6.68	79
10/17/2000	0.19	177.9	230.5	738
11/7/2000	19	183.4	239.92	716.5
12/19/2000	761	53	32.3	233
1/30/2001	586	33.21	17.65	127
2/27/2001	340	62.7	25.05	
3/26/2001	340	66.4	33.72	227
4/17/2001	711	71.46	15.31	222.5
5/22/2001	86	68.28	32.8	273.5
6/19/2001	23	105.1	95.24	477
8/20/2001	8	215.75	237.8	854.5
9/17/2001	2.4	235	155	713.5
10/23/2001	11	148.95	120.77	486
11/19/2001	26	201.8	151	654
12/11/2001	277	90.9	27.37	265
1/14/2002	69	142.38	62.95	398
2/26/2002	144	109	46.6	328

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in Bayou de L'Outre Basin, Arkansas

Date Collected	Flow	Chloride	Sulfate	TDS
	(cfs)	(mg/L)	(mg/L)	(mg/L)
3/26/2002	390	54.27	26.2	205
4/23/2002	36	139	143	589
5/28/2002	19	102	75.65	365
6/25/2002	14	70.83	170.73	
7/23/2002	22	159	151	607.5
8/20/2002	27	91.26	107.02	443
9/17/2002	7	57.9	3.46	1220
10/15/2002	12	36.4	4.37	602
11/5/2002	84	106	44.1	281
12/3/2002	33	168	143	548
1/21/2003	47	122	107	415
2/25/2003	2290	21.8	9.23	112
3/25/2003	270	197	66.6	386
4/15/2003	72	160.38	131	525
5/20/2003	227	175	116	22.8
6/17/2003	50	124	80.3	377
7/15/2003	33	35.9	4.48	144
8/12/2003	5.1	213	238	920
9/23/2003	4.9	165	158	548
10/14/2003	2.5	192	254	768
11/11/2003	4.4	327	296	836
12/16/2003	50	208	82.6	463
1/20/2004	41	175	59.9	83.5
2/17/2004	886	48.5	18.8	177
3/16/2004	178	73.2	35.6	234
4/13/2004	279	94.2	55.5	314
5/11/2004	37	147	294	805
5/15/2004	534	93.8	238	660
7/20/2004	18	117	312	748
8/17/2004	7.7	204	411	1020
9/21/2004	0.47	241	686	1530
10/19/2004	34	126	156	511
11/30/2004	805	43.3	26.1	177
12/14/2004	453	55	56.3	227
2/22/2005	121	101	99.4	352
3/28/2005	183	79.6	62.4	287
4/26/2005	36	118	183	573
5/23/2005	21	187	210	676
6/21/2005	17	740		1070
7/26/2005	0.56	154	232	717
8/23/2005	0.04			706
9/27/2005	12	169	110	508
10/25/2005	1.1	243	630	1130
11/29/2005	38	200	529	1150
12/27/2005	37	10.8	8.72	84
1/17/2006	136	142	0.02	506

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in Bayou de L'Outre Basin, Arkansas

Date Collected	Flow	Chloride	Sulfate	TDS
	(cfs)	(mg/L)	(mg/L)	(mg/L)
2/14/2006	179	144	68.9	340
4/18/2006	3.2	203	238	796
5/16/2006	5.3	139	188	602
6/27/2006	9.1	198	322	978
7/25/2006	0	249	506	1490
8/14/2006	0	310	378	1250
8/29/2006	0	193	265	928
9/26/2006	0	4.95	8.33	55
10/24/2006	0	23.1		787
11/13/2006	4.8	196	147	578
11/28/2006	5.7	22	250	782
12/5/2006	10	188	230	691
1/2/2007	655	62.8	29.7	204
2/6/2007	45	115	109	375
2/12/2007	50	133	124	414
3/13/2007	7.6	163	175	575
4/3/2007	128	142	55.8	403
4/23/2007	8.1	148	79.7	432

Table B-2. Dissolved copper, dissolved lead, dissolved zinc, and hardness data for the Bayou de L'Outre Basin at station OUA0005

Date Collected	Flow	Copper	Lead	Zinc	Hardness
	(cfs)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
1/9/95	297	0.25		11.5	57
2/14/95	81	0.25		24.6	61.92
3/28/95	124	0.25		11.6	86
4/24/95	1090	5.1		28.6	34.8
5/23/95	50	0.25		13.2	75
6/20/95	18	3.27		19.5	46
7/17/95	4.8	0.25		26.9	47
8/8/95	21	7.4		19.3	35
9/19/95	4	0.25			48
10/17/95	14	0.25		11.9	46
11/13/95	9.3	2.3		26.6	120
12/18/95	215	3.7		116	101
1/30/96	61	0.25		52.3	79
2/20/96	79	2.4		34.2	73
3/12/96	45	0.25		50.7	43
4/23/96	201	3.9		17.3	49
5/21/96	5.3	4.8		32.5	57
6/18/96	31	0.25		28.4	56
7/16/96	47	3.5		26.4	60
9/10/96	16	6.5		35.6	59
11/19/96	75	0.25		30.3	54
1/28/97	830	6.9		18.1	28
3/11/97	407	2.9		45.3	31

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in Bayou de L'Outre Basin, Arkansas

Date Collected	Flow (cfs)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	Hardness (mg/L)
7/21/98	0	5.44	1.13	66.6	24.6
9/1/98	17	4.49	0.58	27.5	43
11/16/98	151	2.74	0.3	35.7	70
1/26/99	661	8.78	1.38	31.8	33
3/23/99	134	3.48	1.36	18.9	43
5/25/99	30	3.81	0.63	8	56
7/27/99	16	8.25	0.74	25.2	41
9/21/99	0.46	8.87	0.59	36.4	38
11/22/99	26	5.8	0.2	12.7	65
1/25/00	21	6.23	0.47	53.4	67
3/27/00	88	3.01	0.97	26.6	39
5/30/00	197	2.1	0.98	39.2	94
7/25/00	1.8	5.39	0.2		36
9/18/00	0	0.92	0.2	3.4	39
12/19/00	761	2.27	0.2	55.4	42
1/30/01	586	2.5	0.61	28.9	19
3/26/01	340	4.61	2.03	38	36
5/22/01	86	3.01	2.78	46.4	35
7/24/01	3.5	2.44	0.2	11.2	55
9/17/01	2.4	6.4	0.2	54.4	71
11/19/01	26	7.32	0.2	12.5	
3/26/02	390	2.84	1.51		32
5/28/02	19	4.34	1.98	43.7	51
7/23/02	22	6.13	0.45	49	61
9/17/02	7	6.91	0.2	26.1	61
11/5/02	84	2.8	0.53	68.6	51
1/21/03	47	11.7	2.59	63.8	63
3/25/03	270	2.64	2.24	38.4	45
5/20/03	227	3.19	1.54	40.4	70
7/15/03	33	3.22	0.99	54	46
9/23/03	4.9	4.52	0.61	172	55
11/11/03	4.4	2.81	0.2	96.5	64
1/20/04	41	1.81	0.56	72.5	72
3/16/04	178	2.86	1.58	12.3	37
5/11/04	37	4.2	1.29	12.8	64
7/20/04	18	3.65	0.91	25.8	66
9/21/04	0.47	5.83	0.2	27.2	70
11/30/04	805	2.88	0.52	47.8	
3/28/05	183	0.78	0.87	21.3	41
5/23/05	21	1.44	0.44	18.9	65
7/26/05	0.56	1.04	0.31	20.8	58
9/27/05	12	2.08	0.22	55.9	91
11/29/05	38	1.92	0.15	46.2	103
1/17/06	136	0.25	0.2	0.5	(BDL)
5/16/06	5.3	1.61	0.22	20.9	77
7/25/06	0	1.16	0.39	9.29	64

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in Bayou de L'Outre Basin, Arkansas

Date Collected	Flow	Copper	Lead	Zinc	Hardness
	(cfs)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
8/14/06	0	7.53	0.2	0.5	78
9/26/06	0	2.34	0.2	4.43	21
11/13/06	4.8	0.84	0.2	13.4	96
11/28/06	5.7	1.58	0.1	14.4	86
1/2/07	655	2.53	0.57	31.7	33
2/12/07	50	2.11	0.36	23.3	52
3/13/07	7.6	2.39	0.77	27.2	71
4/23/07	8.1	0.25	0.51	12.5	68

Appendix C

Chloride, Sulfate, and TDS Figures for the Bayou de L'Outre Basin

Figure C-1. Time series chloride observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	2
Figure C-2. Seasonal chloride observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	3
Figure C-3. Chloride observations versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	4
Figure C-4. Time series sulfate observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	5
Figure C-5. Seasonal sulfate observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	6
Figure C-6. Sulfate versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	7
Figure C-7. Time series TDS observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	8
Figure C-8. Seasonal TDS observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	9
Figure C-9. TDS versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	10

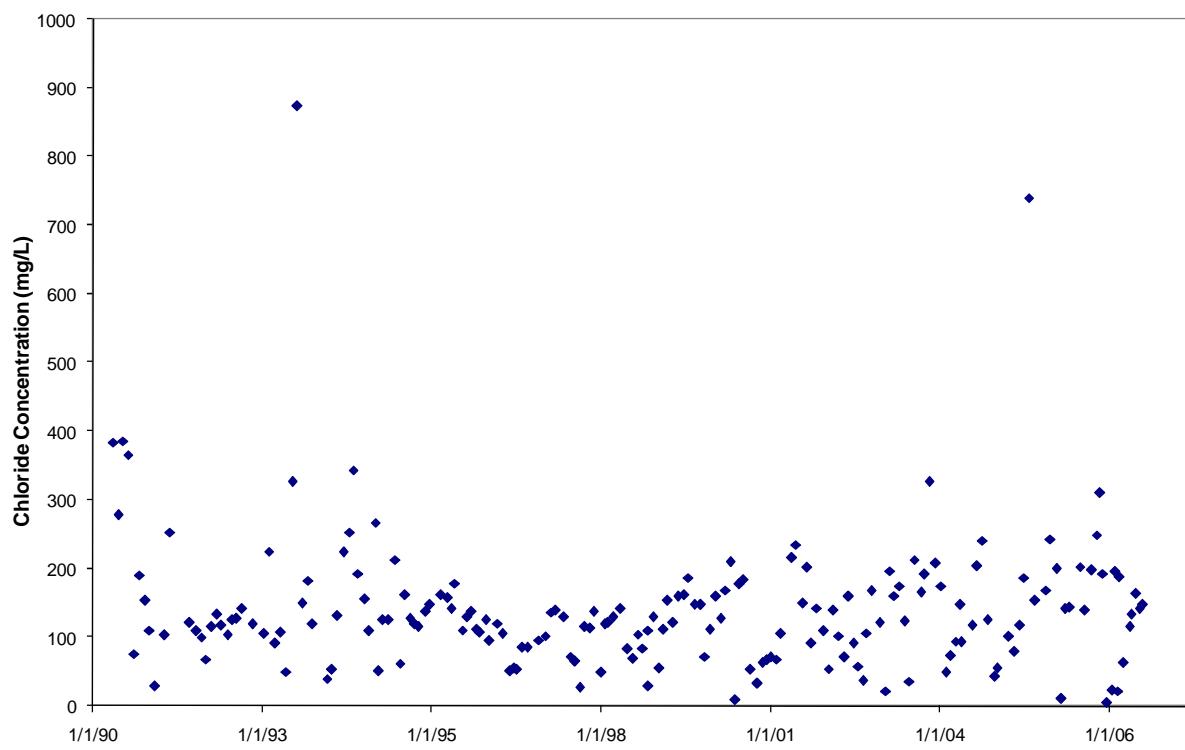


Figure C-1. Time series chloride observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

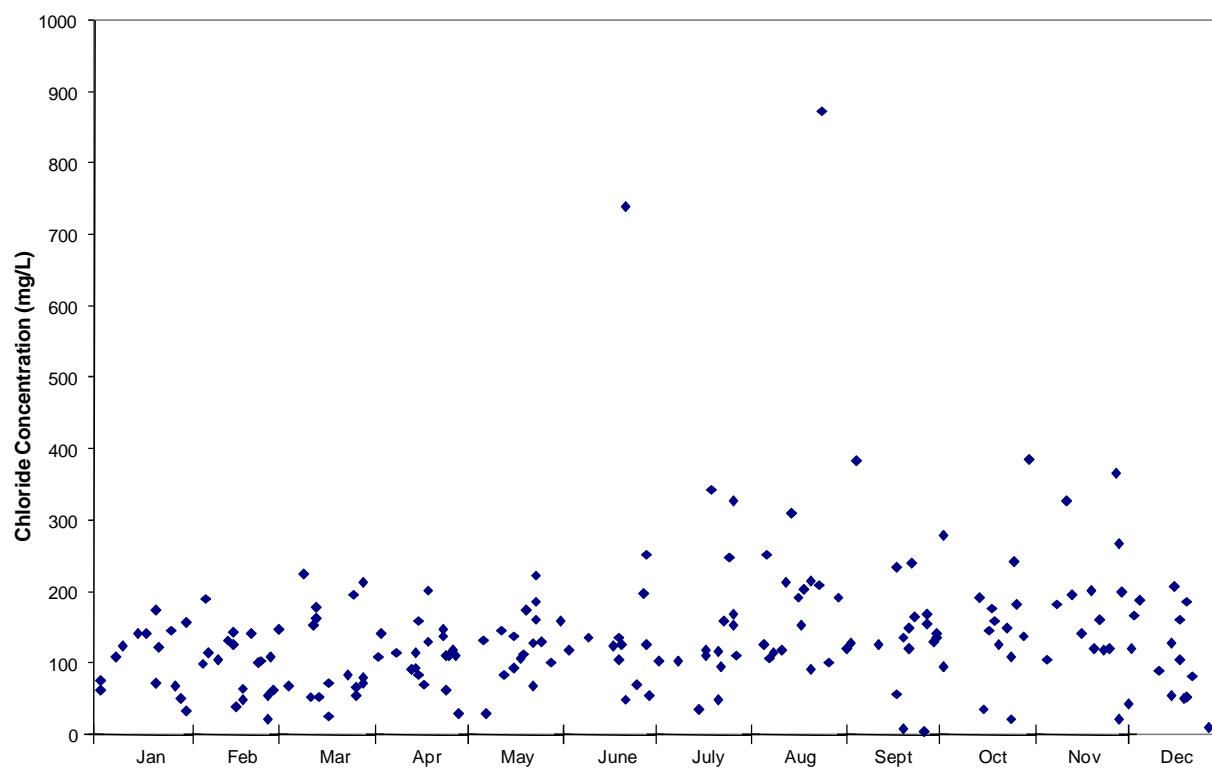


Figure C-2. Seasonal chloride observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

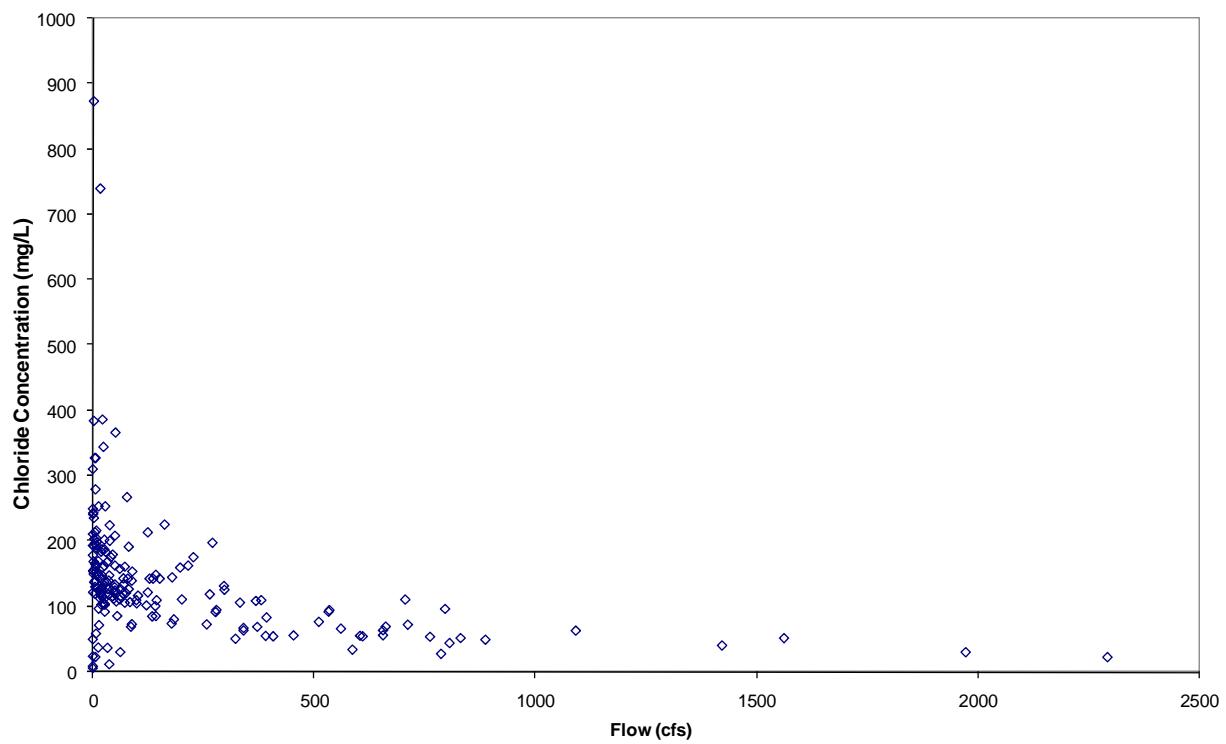


Figure C-3. Chloride observations versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

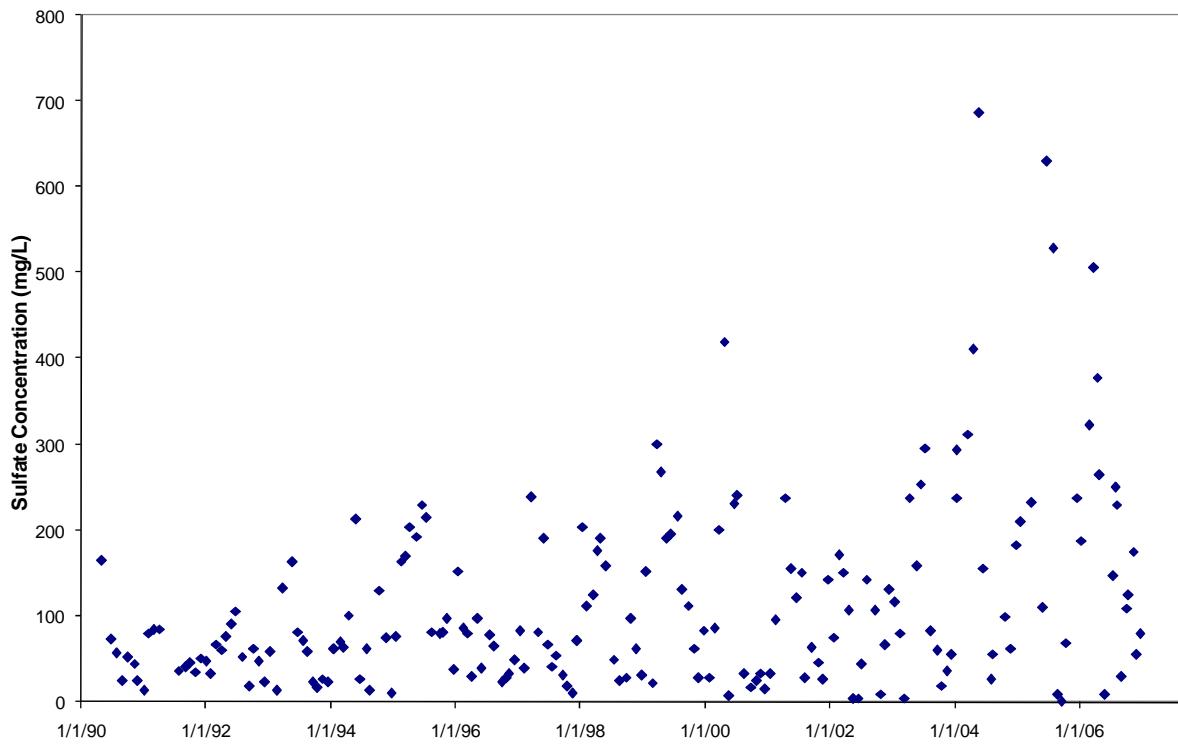


Figure C-4. Time series sulfate observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

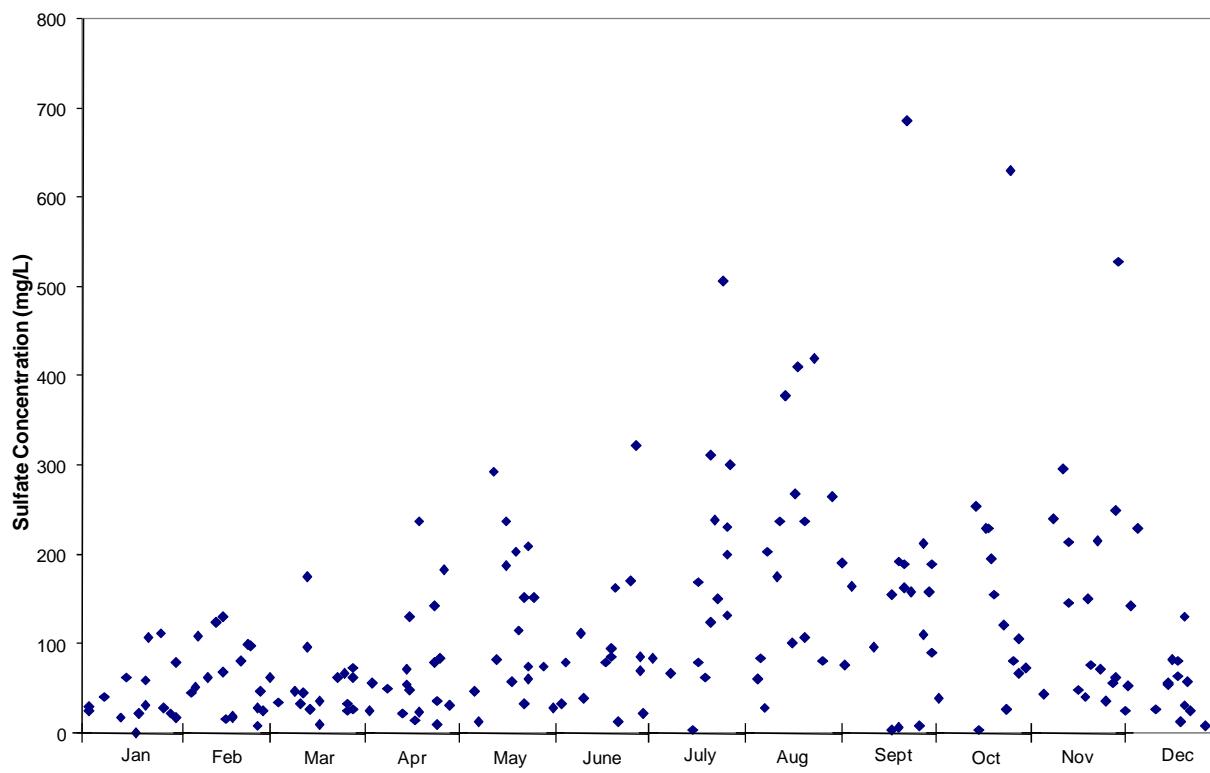


Figure C-5. Seasonal sulfate observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

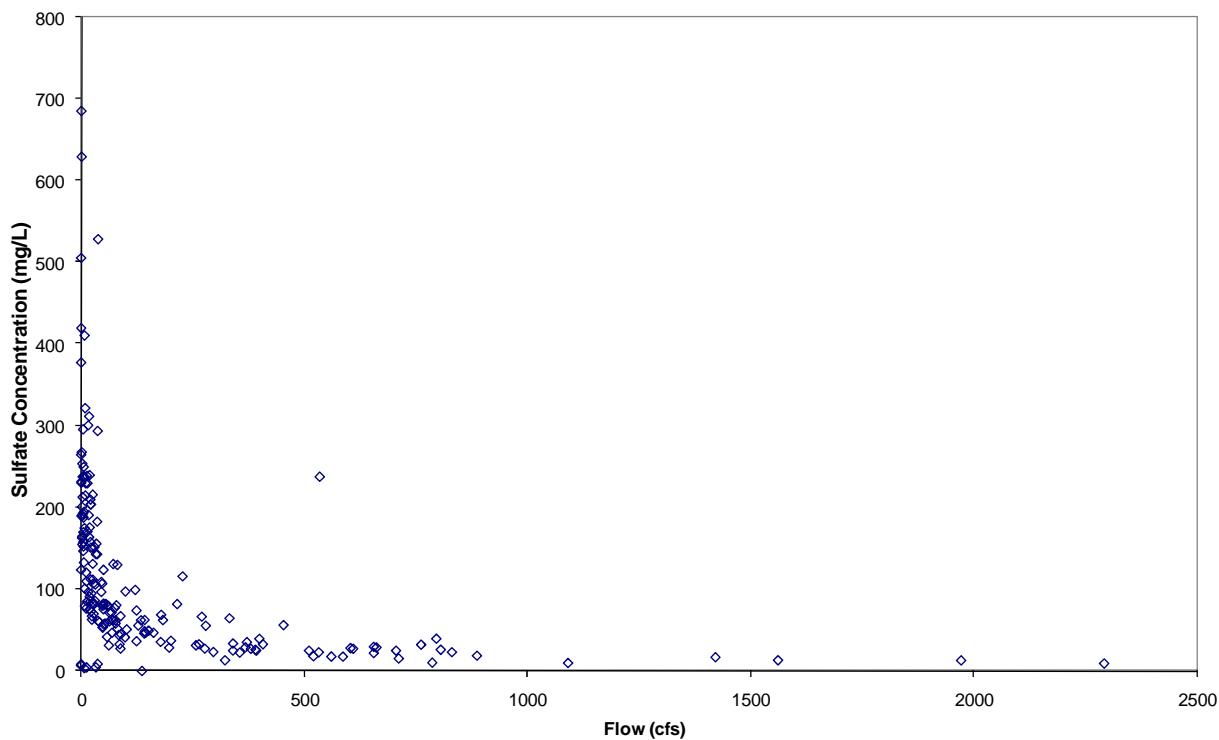


Figure C-6. Sulfate versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

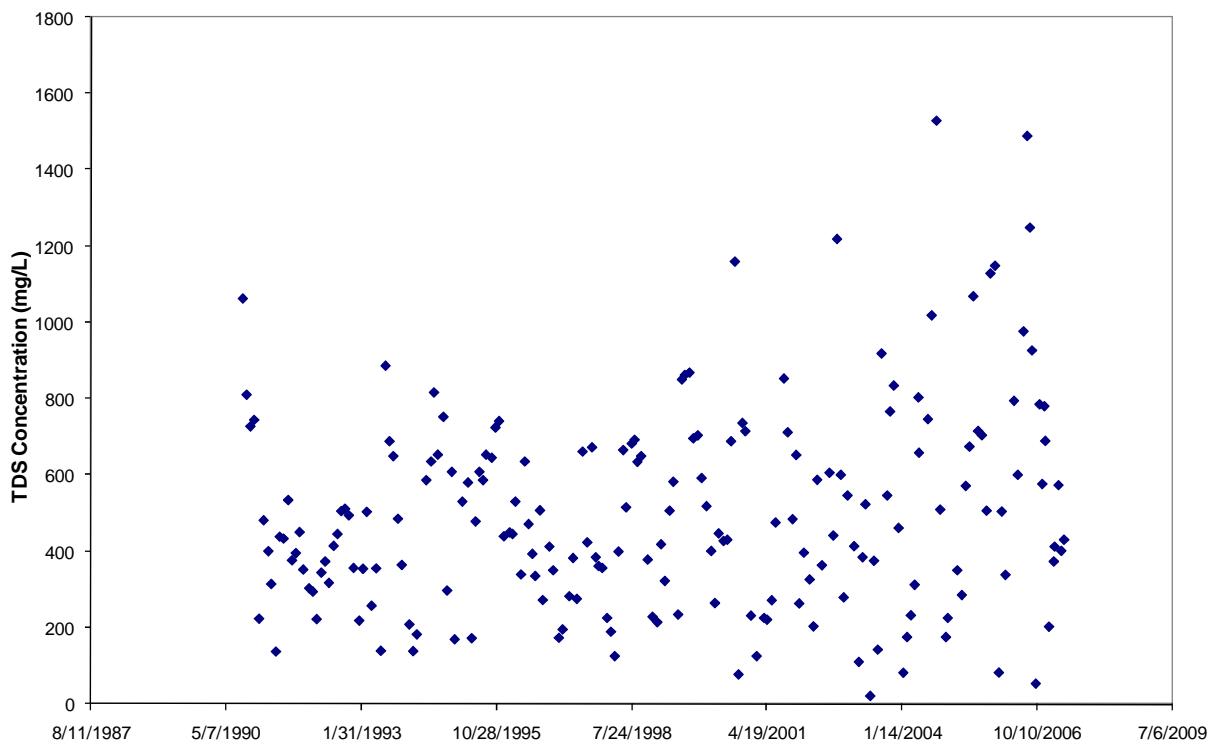


Figure C-7. Time series TDS observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

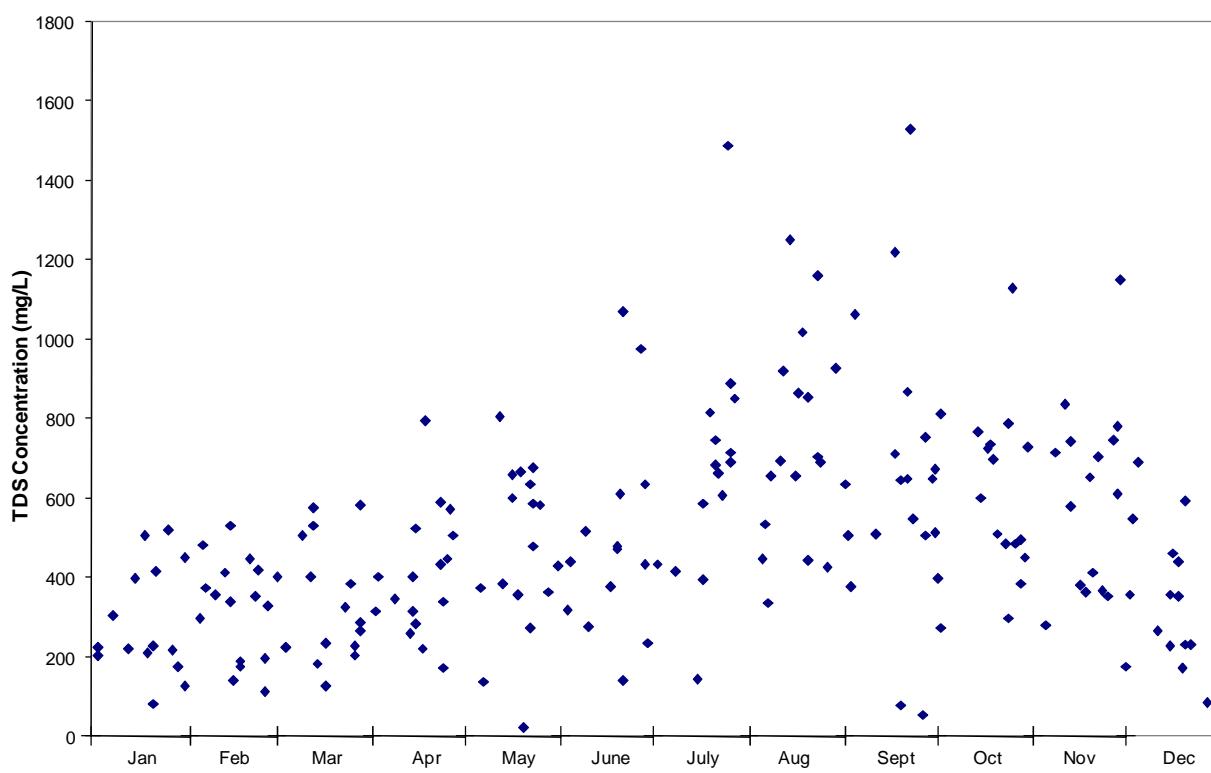


Figure C-8. Seasonal TDS observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

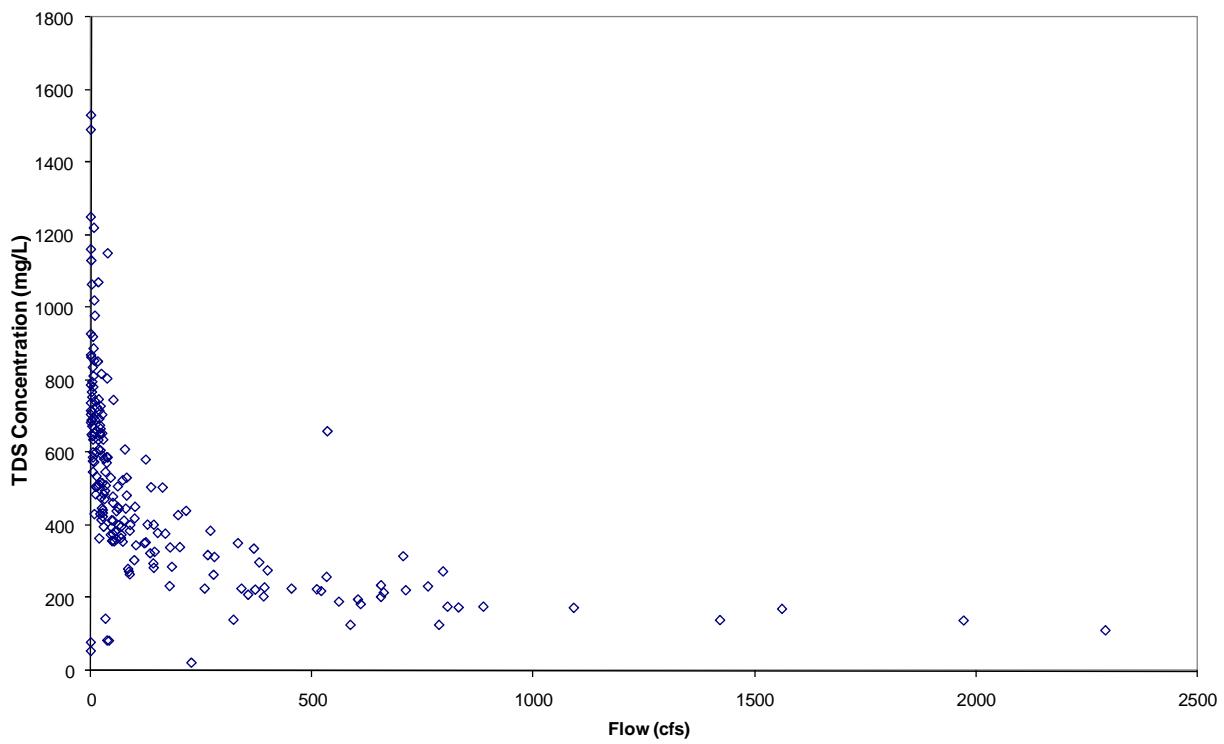


Figure C-9. TDS versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

Appendix D

Dissolved Copper, Lead, and Zinc Figures for the Bayou de L'Outre Basin

Figure D-1. Time series dissolved copper observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).....	2
Figure D-2. Seasonal dissolved copper observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005)	3
Figure D-3. Dissolved copper versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	4
Figure D-4. Time series dissolved lead observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	5
Figure D-5. Seasonal dissolved lead observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	6
Figure D-6. Dissolved lead versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).....	7
Figure D-7. Time series dissolved zinc observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	8
Figure D-8. Seasonal dissolved zinc observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).	9
Figure D-9. Dissolved zinc versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).....	10

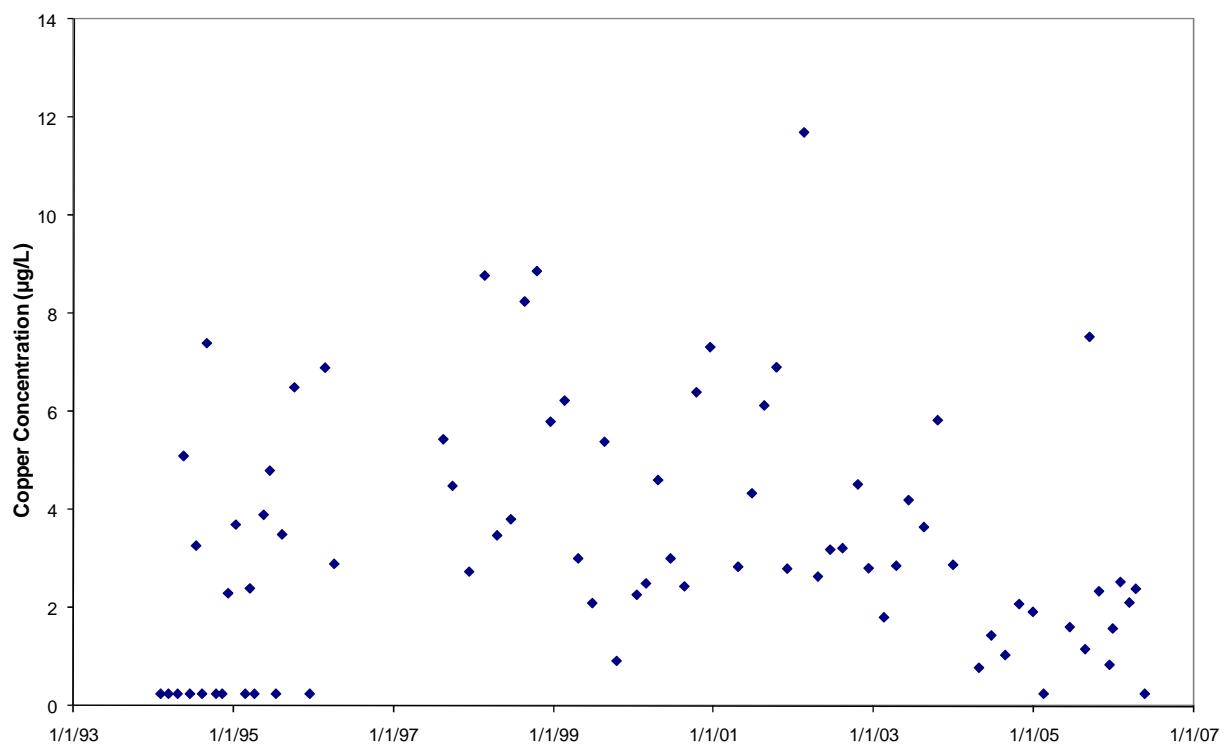


Figure D-1. Time series dissolved copper observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

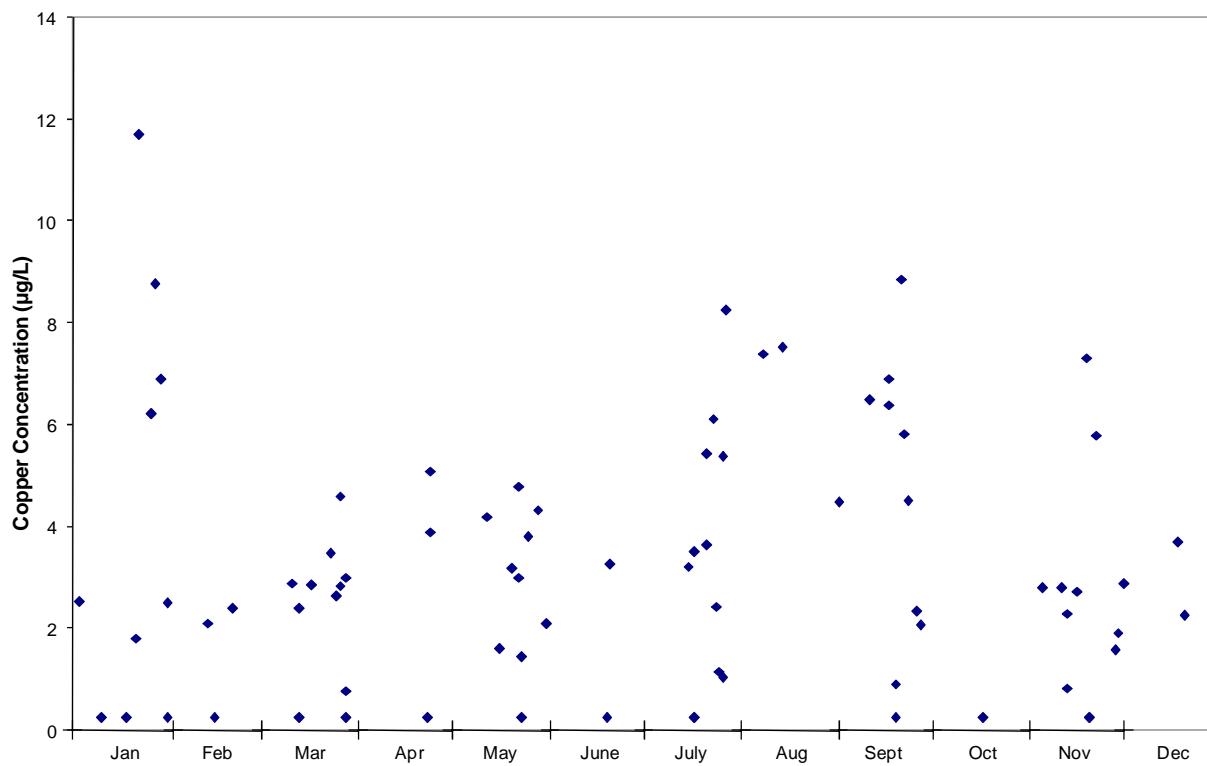


Figure D-2. Seasonal dissolved copper observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

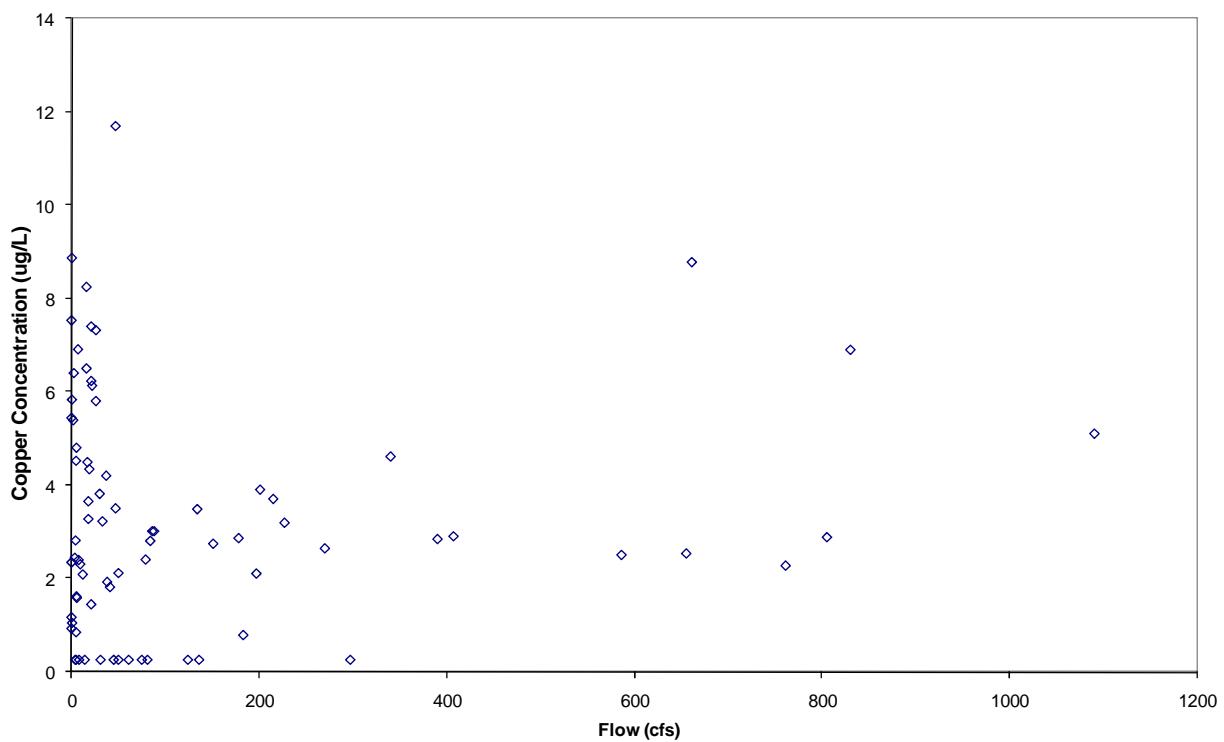


Figure D-3. Dissolved copper versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

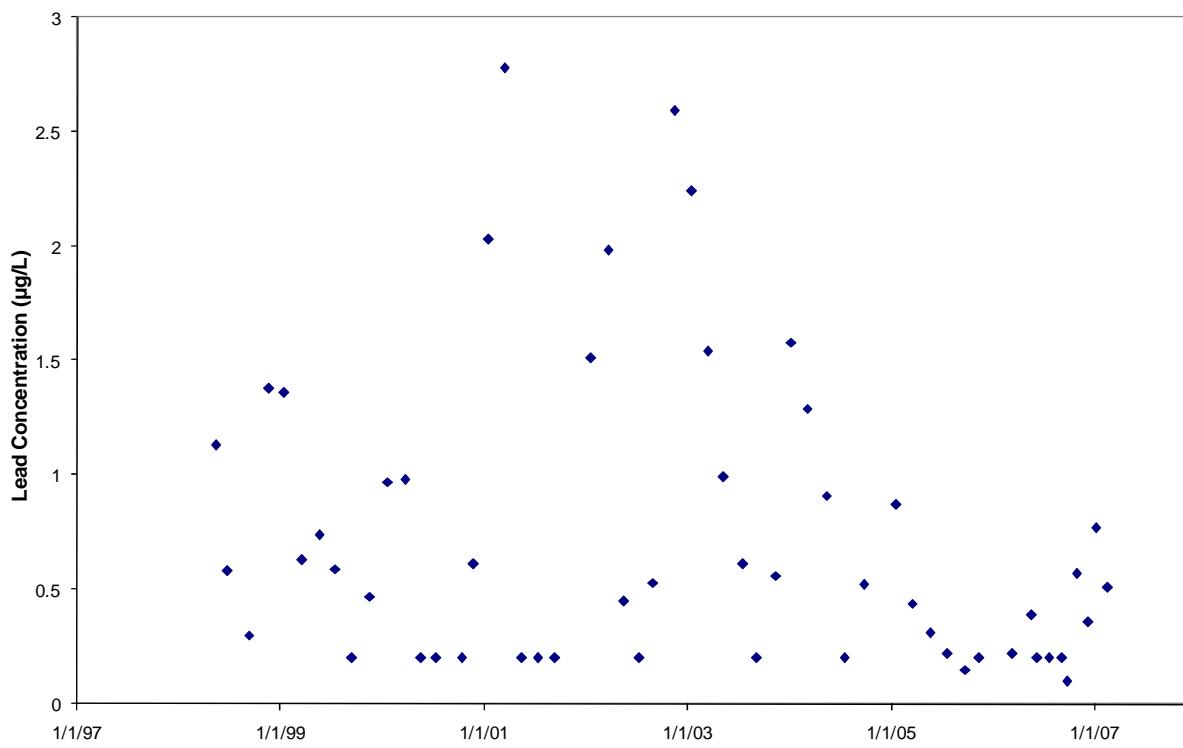


Figure D-4. Time series dissolved lead observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

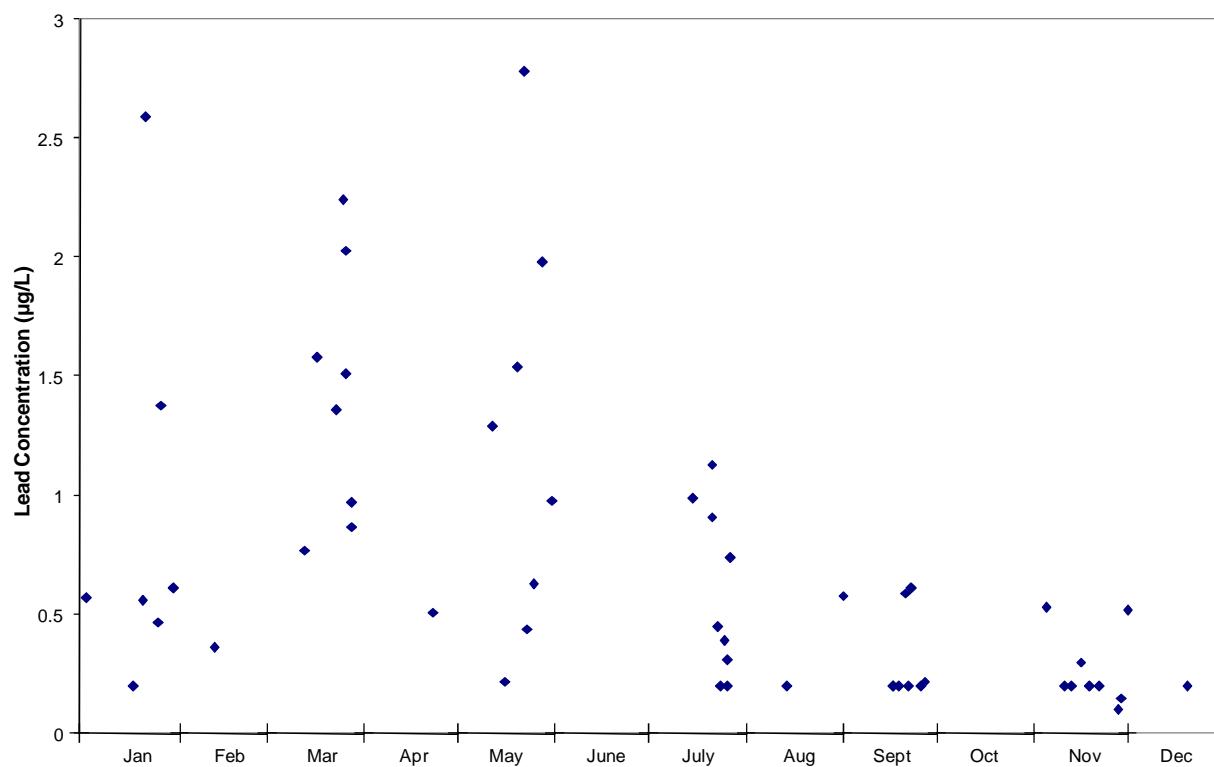


Figure D-5. Seasonal dissolved lead observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

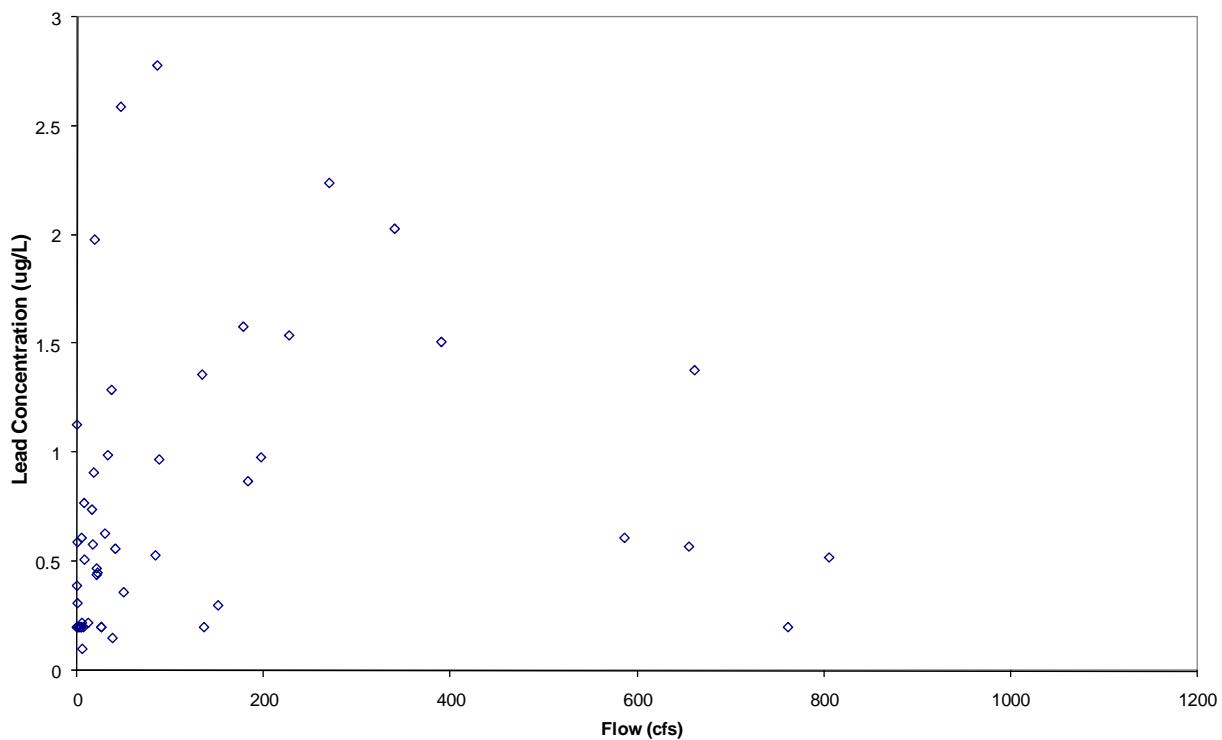


Figure D-6. Dissolved lead versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

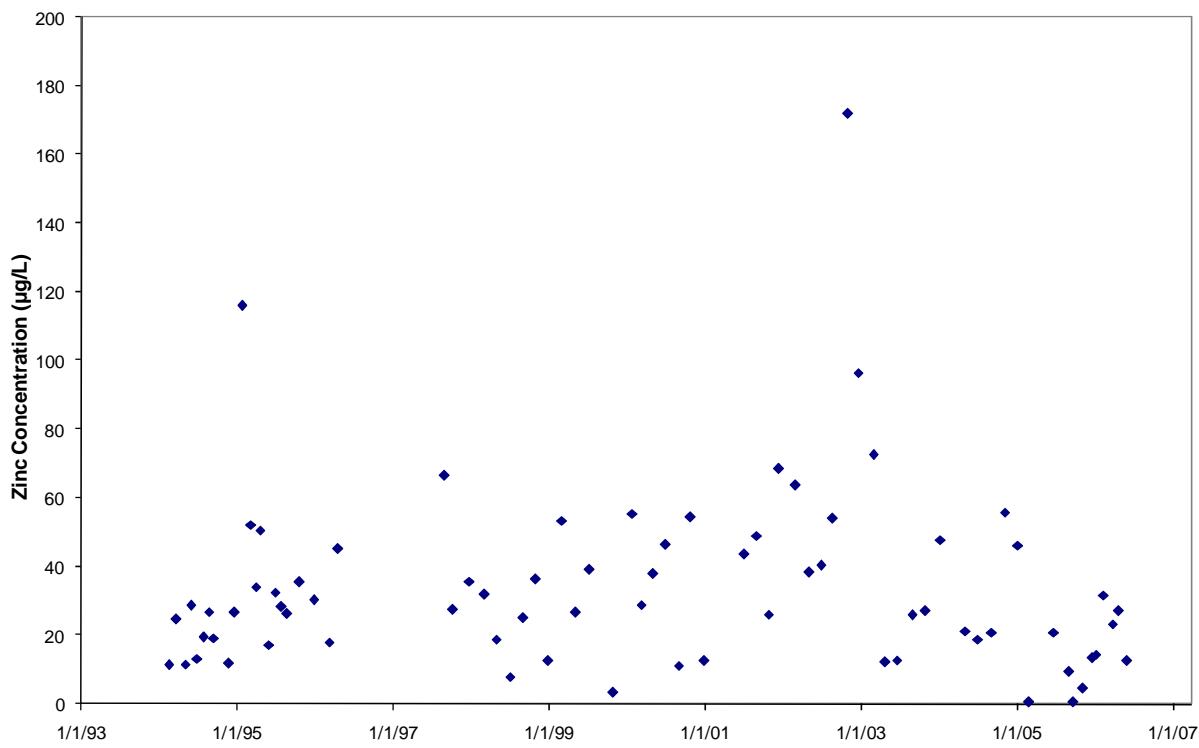


Figure D-7. Time series dissolved zinc observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

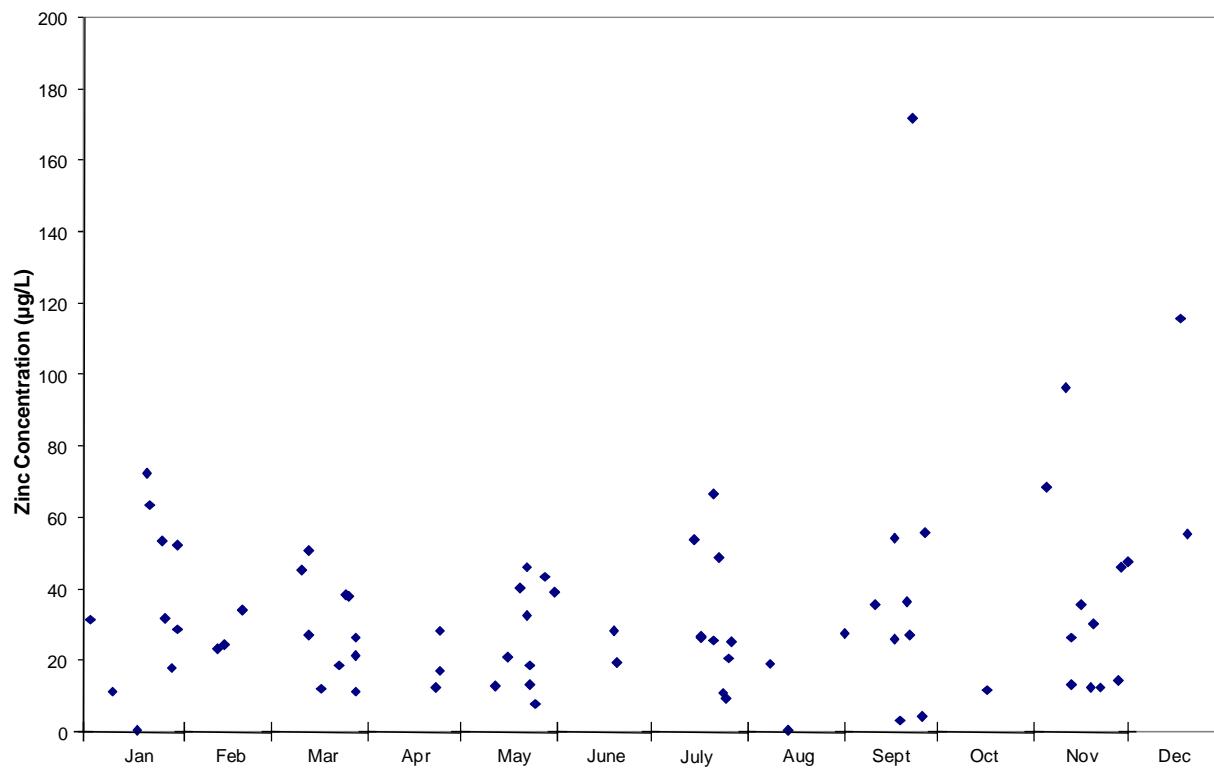


Figure D-8. Seasonal dissolved zinc observations at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

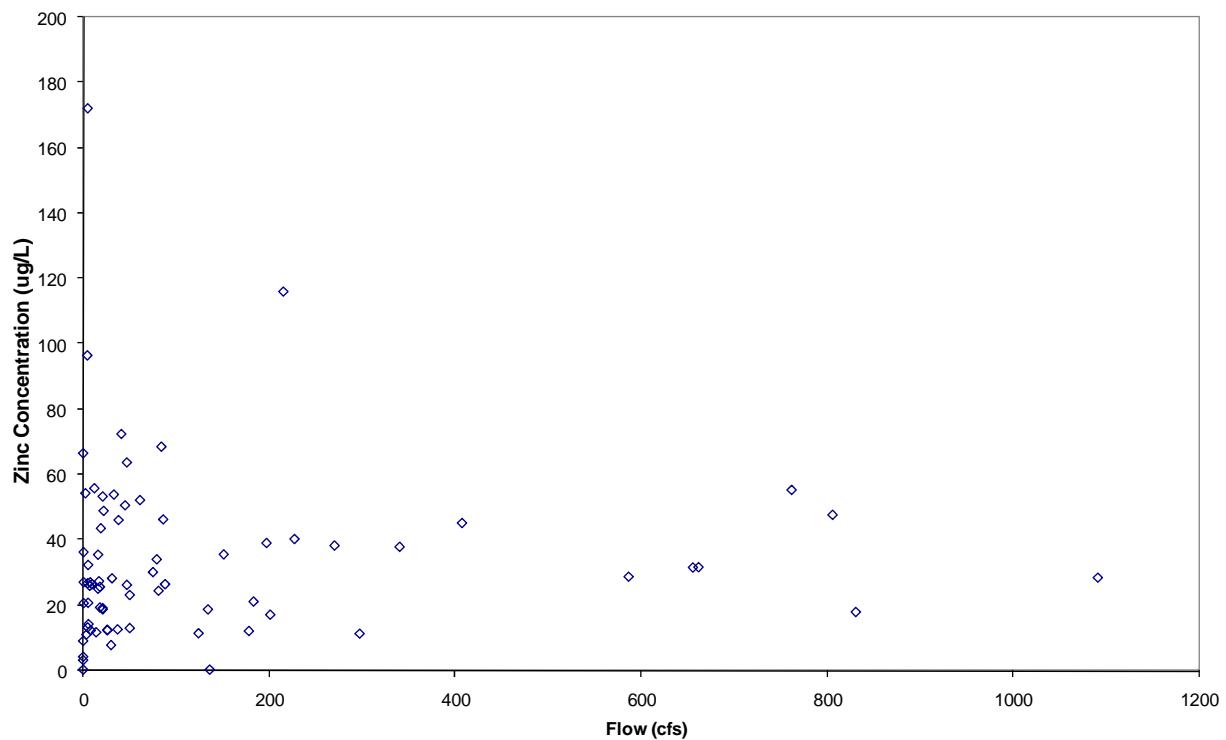


Figure D-9. Dissolved zinc versus flow at Bayou de L'Outre (stream segment 006) near Junction City, Arkansas (station OUA0005).

Appendix E

Flow Duration Curves for the Bayou de L'Outre Basin

- Figure E-1. Flow duration curve for segment 08040202-006 in the Bayou de L'Outre Basin. 2
Figure E-2. Flow duration curve for segment 08040202-007 in the Bayou de L'Outre Basin. 2
Figure E-3. Flow duration curve for segment 08040202-008 in the Bayou de L'Outre Basin. 3

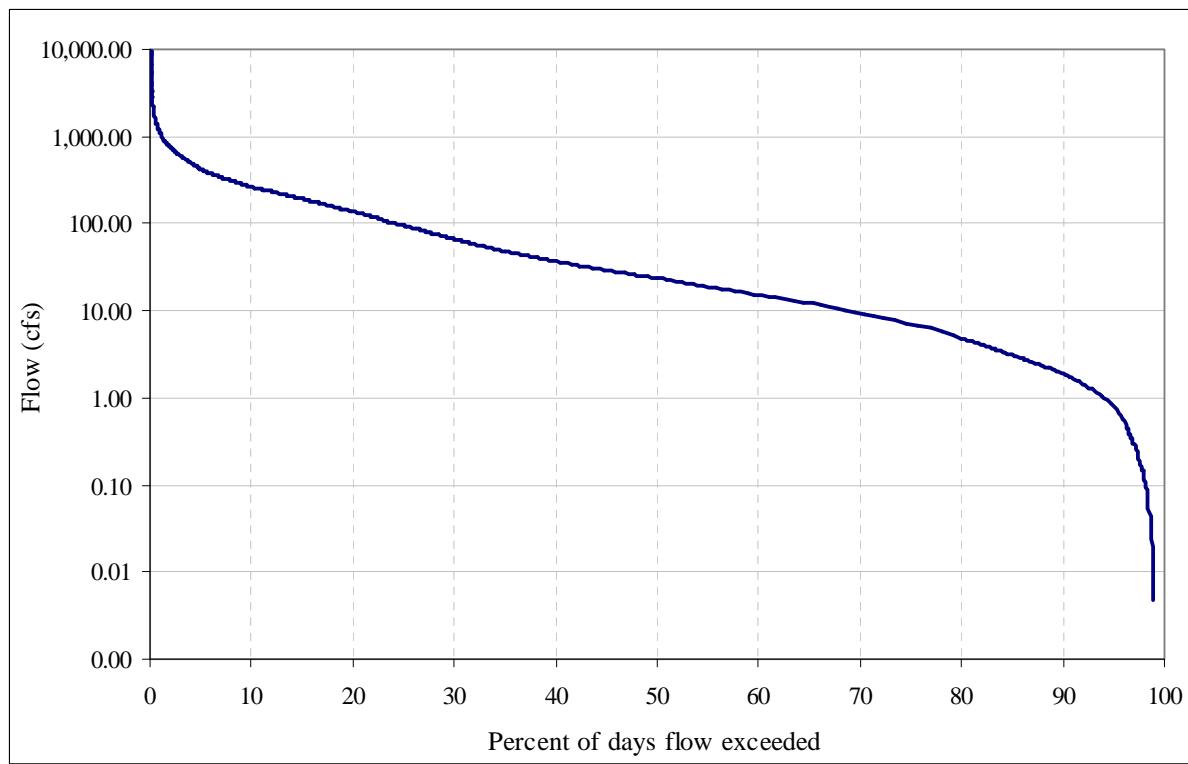


Figure E-1. Flow duration curve for segment 08040202-006 in the Bayou de L'Outre Basin.

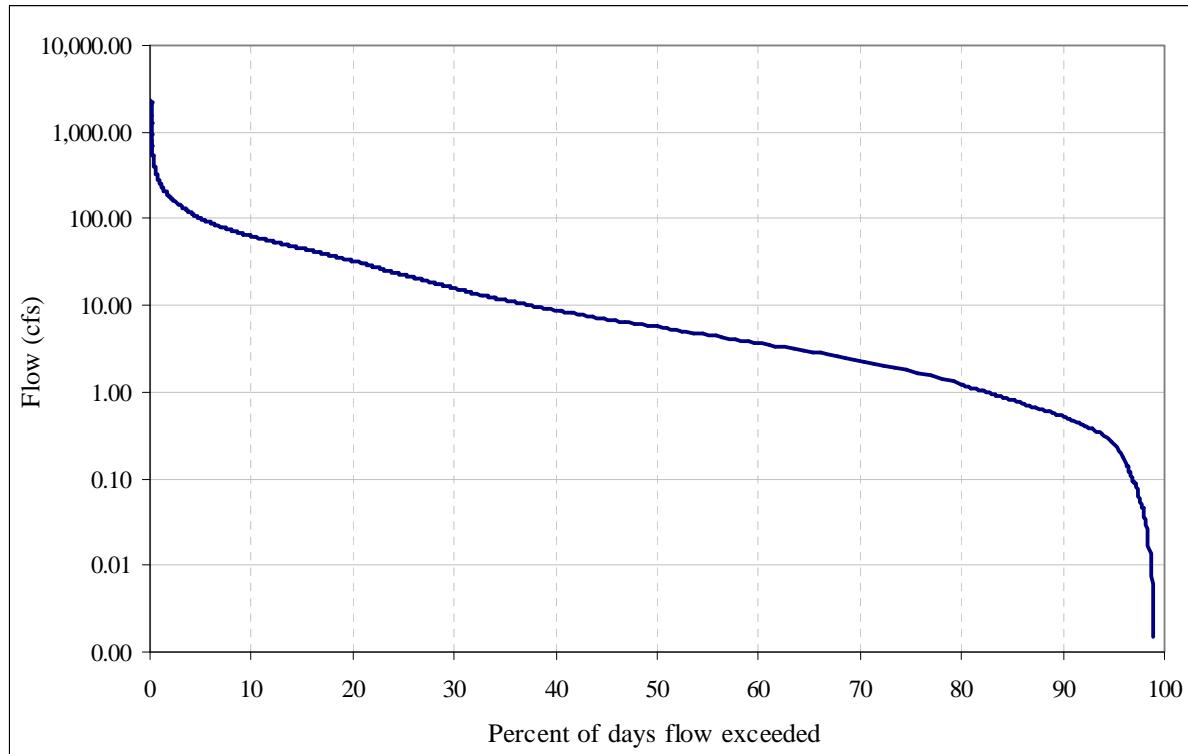


Figure E-2. Flow duration curve for segment 08040202-007 in the Bayou de L'Outre Basin.

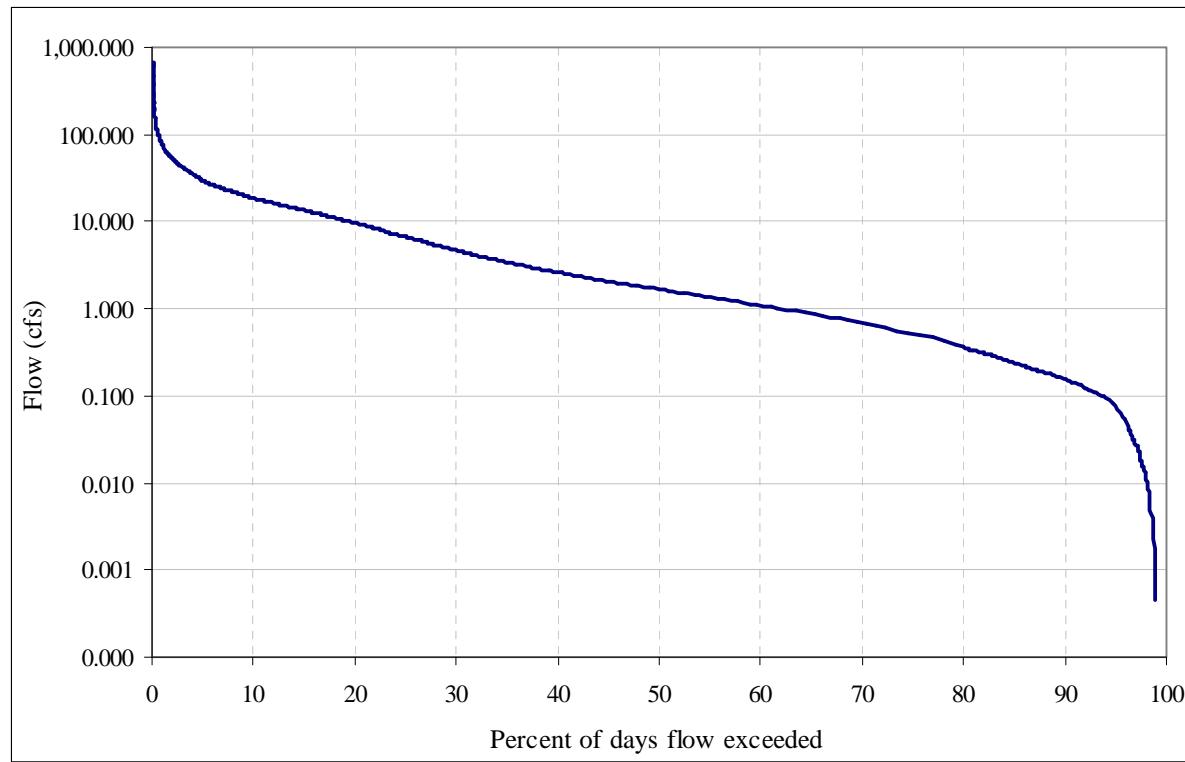


Figure E-3. Flow duration curve for segment 08040202-008 in the Bayou de L'Outre Basin.

Appendix F

Load Duration Curve Calculations for All TMDLs

(CD-ROM)

This appendix contains extremely large files, which are included only on a CD-ROM. To obtain a copy of this appendix, please contact EPA.

Appendix G

Load Duration Curve Summaries and Plots for Chloride

Figure G-1. Chloride load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)	2
Figure G-2. Chloride load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)....	6
Figure G-3. Chloride load duration curve for Bayou De L'Outre (HUC/reach 08040202-008)....	7
Table G-1. Allowable Chloride load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)	2
Table G-2. Existing load for Chloride for for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)	3
Table G-3. Allowable Chloride load for Bayou De L'Outre (HUC/reach 08040202-007).....	6
Table G-4. Allowable Chloride load for Bayou De L'Outre (HUC/reach 08040202-008).....	7

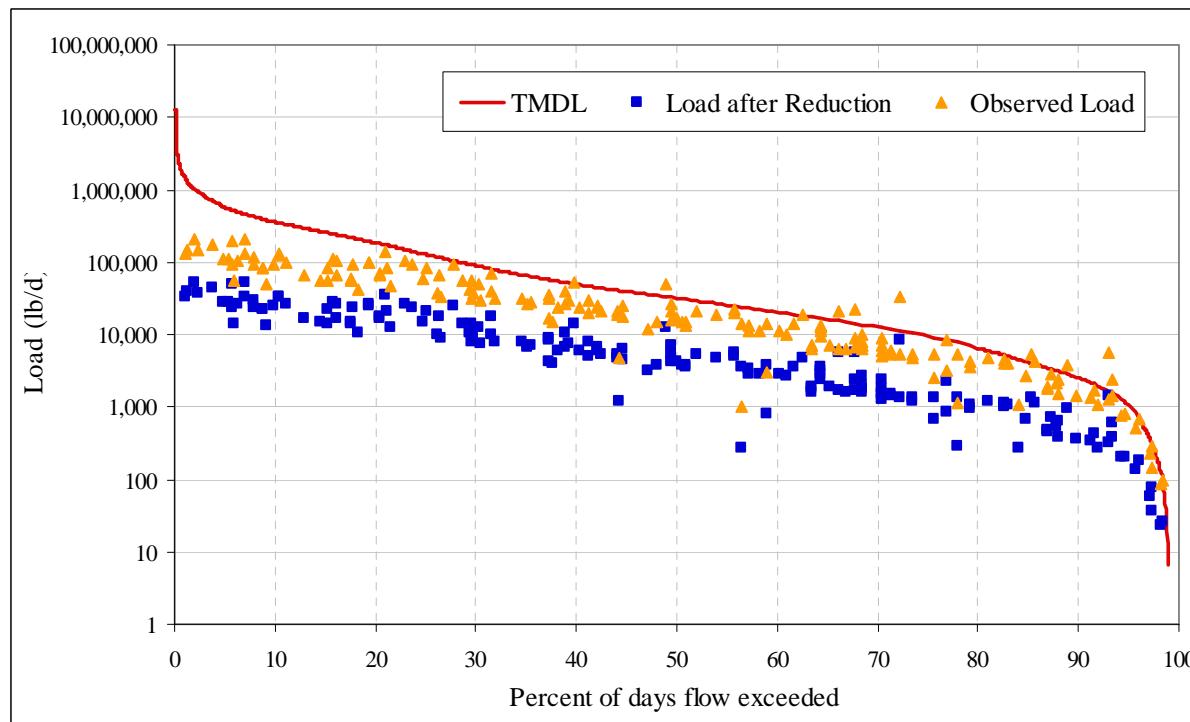


Figure G-1. Chloride load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Table G-1. Allowable Chloride load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

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 (lb/day)	Area under TMDL curve (lb/day)
						145,161.6
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	3461.805	0.00	4668050.7468	0.00E+00
4/26/1958	8060	0.100	3886.093	0.00	5240179.5292	0.00E+00
4/6/1997	8210	0.100	3958.415	0.00	5337701.4807	0.00E+00
4/15/1991	8840	0.100	4262.167	0.00	5747293.6772	0.00E+00
4/29/1958	11000	0.100	5303.602	0.00	7151609.7793	0.00E+00
4/28/1991	11400	0.100	5496.460	0.00	7411668.3167	0.00E+00
4/30/1991	13800	0.100	6653.609	0.00	8972019.5413	0.00E+00
4/27/1958	18200	0.100	8775.050	0.00	11832663.4530	0.00E+00
6/9/1974	19100	0.100	9208.981	0.00	12417795.1622	0.00E+00
4/29/1991	19300	0.100	9305.410	0.10	12547824.4309	1.25E+04
4/28/1958	20000	0.000	9642.912	0.00	13002926.8714	0.00E+00

Table G-2. Existing load for Chloride for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
8/24/1993	874	1.205	93.1	5.682E+03	1.463E+03	1.463E+03	Yes
6/21/2005	740	8.196	72.3	3.272E+04	8.422E+03	9.947E+03	Yes
10/30/1990	386	10.607	67.7	2.208E+04	5.685E+03	1.287E+04	Yes
9/4/1990	384	1.157	93.3	2.397E+03	6.170E+02	1.404E+03	Yes
11/27/1990	366	24.589	49	4.854E+04	1.250E+04	2.984E+04	Yes
7/19/1994	344	11.571	66.1	2.147E+04	5.527E+03	1.404E+04	Yes
7/26/1993	327	2.989	85.3	5.272E+03	1.357E+03	3.628E+03	Yes
11/11/2003	327	2.121	88.9	3.742E+03	9.633E+02	2.575E+03	Yes
8/14/2006	310	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/2/1990	279	2.893	85.7	4.353E+03	1.121E+03	3.511E+03	Yes
11/28/1994	267	37.125	39.8	5.347E+04	1.376E+04	4.506E+04	Yes
8/6/1991	253	6.268	76.9	8.553E+03	2.202E+03	7.607E+03	Yes
6/28/1994	253	13.500	62.6	1.842E+04	4.743E+03	1.638E+04	Yes
7/25/2006	249	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/25/2005	243	0.530	96.1	6.951E+02	1.790E+02	6.436E+02	Yes
9/21/2004	241	0.227	97.4	2.946E+02	7.583E+01	2.750E+02	Yes
9/17/2001	235	1.157	93.3	1.467E+03	3.776E+02	1.404E+03	Yes
3/9/1993	225	78.108	27.7	9.479E+04	2.440E+04	9.479E+04	Yes
5/23/1994	224	18.322	55.8	2.214E+04	5.699E+03	2.224E+04	Yes
8/20/2001	215.75	3.857	82.7	4.489E+03	1.156E+03	4.681E+03	Yes
3/28/1995	213	59.786	31.5	6.869E+04	1.768E+04	7.256E+04	Yes
8/12/2003	213	2.459	87.3	2.825E+03	7.273E+02	2.984E+03	Yes
8/22/2000	210.48	0.087	98.3	9.853E+01	2.536E+01	1.053E+02	Yes
12/16/2003	208	24.107	49.5	2.705E+04	6.963E+03	2.926E+04	Yes
8/17/2004	204	3.713	83	4.085E+03	1.052E+03	4.506E+03	Yes
4/18/2006	203	1.543	91.5	1.689E+03	4.349E+02	1.872E+03	Yes
11/19/2001	201.8	12.536	64.4	1.364E+04	3.513E+03	1.521E+04	Yes
11/29/2005	200	18.322	55.8	1.976E+04	5.088E+03	2.224E+04	Yes
6/27/2006	198	4.388	81	4.686E+03	1.206E+03	5.325E+03	Yes
3/25/2003	197	130.179	20.9	1.383E+05	3.561E+04	1.580E+05	Yes
11/13/2006	196	2.314	88	2.447E+03	6.299E+02	2.809E+03	Yes
8/16/1994	193	3.857	82.7	4.015E+03	1.034E+03	4.681E+03	Yes
8/29/2006	193	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/14/2003	192	1.205	93.1	1.248E+03	3.214E+02	1.463E+03	Yes
2/5/1991	191	39.054	38.8	4.023E+04	1.036E+04	4.740E+04	Yes
12/20/1999	187	12.536	64.4	1.264E+04	3.255E+03	1.521E+04	Yes
5/23/2005	187	10.125	68.5	1.021E+04	2.629E+03	1.229E+04	Yes
11/7/2000	183.4	9.161	70.4	9.062E+03	2.333E+03	1.112E+04	Yes
10/26/1993	183	13.982	61.7	1.380E+04	3.553E+03	1.697E+04	Yes
3/12/1996	179	21.697	51.9	2.095E+04	5.393E+03	2.633E+04	Yes
10/17/2000	177.9	0.092	98.2	8.790E+01	2.263E+01	1.112E+02	Yes
5/20/2003	175	109.447	23	1.033E+05	2.660E+04	1.328E+05	Yes
1/20/2004	175	19.768	54	1.866E+04	4.804E+03	2.399E+04	Yes
9/27/2005	169	5.786	78	5.274E+03	1.358E+03	7.022E+03	Yes
7/25/2000	168.45	0.868	94.7	7.885E+02	2.030E+02	1.053E+03	Yes
12/3/2002	168	15.911	58.9	1.442E+04	3.712E+03	1.931E+04	Yes
9/23/2003	165	2.363	87.8	2.103E+03	5.413E+02	2.867E+03	Yes
5/23/1995	162	24.107	49.5	2.106E+04	5.423E+03	2.926E+04	Yes
12/18/1995	162	103.661	23.6	9.058E+04	2.332E+04	1.258E+05	Yes
11/22/1999	161.64	12.536	64.4	1.093E+04	2.814E+03	1.521E+04	Yes
4/15/2003	160.38	34.714	41.2	3.003E+04	7.731E+03	4.213E+04	Yes
10/19/1999	160	3.134	84.8	2.705E+03	6.963E+02	3.803E+03	Yes
5/30/2000	159	94.983	25	8.146E+04	2.097E+04	1.153E+05	Yes
7/23/2002	159	10.607	67.7	9.097E+03	2.342E+03	1.287E+04	Yes
1/30/1996	157	29.411	44.7	2.491E+04	6.412E+03	3.569E+04	Yes
9/27/1994	156	1.591	91.3	1.339E+03	3.447E+02	1.931E+03	Yes
7/26/2005	154	0.270	97.1	2.243E+02	5.774E+01	3.277E+02	Yes
3/12/1991	153	42.911	37.2	3.541E+04	9.116E+03	5.208E+04	Yes
8/17/1999	153	0.627	95.7	5.173E+02	1.332E+02	7.607E+02	Yes
9/21/1993	149	0.964	94.3	7.750E+02	1.995E+02	1.170E+03	Yes
10/23/2001	148.95	5.304	79.2	4.261E+03	1.097E+03	6.436E+03	Yes
2/29/2000	148	68.465	29.6	5.465E+04	1.407E+04	8.309E+04	Yes
10/17/1995	147	6.750	75.7	5.352E+03	1.378E+03	8.192E+03	Yes
5/11/2004	147	17.839	56.4	1.414E+04	3.641E+03	2.165E+04	Yes

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in the Bayou de L'Outre Basin, Arkansas

Table G-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
1/25/2000	146.96	10.125	68.5	8.026E+03	2.066E+03	1.229E+04	Yes
2/14/2006	144	86.304	26.3	6.703E+04	1.726E+04	1.047E+05	Yes
1/14/2002	142.38	33.268	42.1	2.555E+04	6.577E+03	4.037E+04	Yes
9/29/1992	142	9.161	70.4	7.016E+03	1.806E+03	1.112E+04	Yes
2/20/1996	142	38.090	39.3	2.917E+04	7.510E+03	4.623E+04	Yes
11/16/1998	142	72.804	28.7	5.576E+04	1.436E+04	8.835E+04	Yes
1/17/2006	142	65.572	30.2	5.022E+04	1.293E+04	7.958E+04	Yes
10/28/1997	139	42.429	37.3	3.181E+04	8.189E+03	5.149E+04	Yes
4/23/2002	139	17.357	57.1	1.301E+04	3.350E+03	2.106E+04	Yes
5/16/2006	139	2.555	86.9	1.916E+03	4.932E+02	3.101E+03	Yes
9/19/1995	137	1.929	89.8	1.425E+03	3.669E+02	2.341E+03	Yes
6/18/1996	137	14.947	60.3	1.104E+04	2.843E+03	1.814E+04	Yes
6/9/1998	137	12.536	64.4	9.263E+03	2.385E+03	1.521E+04	Yes
9/30/1997	136.5	1.446	91.9	1.065E+03	2.742E+02	1.755E+03	Yes
5/5/1992	133	33.268	42.1	2.387E+04	6.144E+03	4.037E+04	Yes
4/18/1994	131	142.715	19.4	1.008E+05	2.596E+04	1.732E+05	Yes
9/29/1998	130	10.125	68.5	7.100E+03	1.828E+03	1.229E+04	Yes
5/25/1999	130	14.464	61	1.014E+04	2.611E+03	1.755E+04	Yes
5/21/1996	129.3	2.555	86.9	1.782E+03	4.588E+02	3.101E+03	Yes
12/15/1997	128.833	23.625	50	1.642E+04	4.226E+03	2.867E+04	Yes
9/1/1992	128	5.304	79.2	3.662E+03	9.426E+02	6.436E+03	Yes
6/20/1995	127	8.679	71.4	5.945E+03	1.530E+03	1.053E+04	Yes
6/27/2000	127	10.125	68.5	6.936E+03	1.786E+03	1.229E+04	Yes
8/4/1992	126	30.375	44	2.064E+04	5.314E+03	3.686E+04	Yes
2/14/1995	126	39.054	38.8	2.654E+04	6.833E+03	4.740E+04	Yes
9/10/1996	126	7.714	73.5	5.243E+03	1.350E+03	9.362E+03	Yes
10/19/2004	126	16.393	58.3	1.114E+04	2.868E+03	1.989E+04	Yes
1/9/1995	125	143.197	19.4	9.655E+04	2.485E+04	1.738E+05	Yes
6/17/2003	124	24.107	49.5	1.612E+04	4.151E+03	2.926E+04	Yes
1/21/2003	122	22.661	50.9	1.491E+04	3.839E+03	2.750E+04	Yes
11/25/1991	121	59.786	31.5	3.902E+04	1.004E+04	7.256E+04	Yes
9/1/1998	121	8.196	72.3	5.349E+03	1.377E+03	9.947E+03	Yes
9/21/1999	121	0.222	97.4	1.447E+02	3.726E+01	2.692E+02	Yes
11/19/1996	120.1	36.161	40.4	2.342E+04	6.030E+03	4.388E+04	Yes
12/1/1992	120	23.143	50.5	1.498E+04	3.856E+03	2.809E+04	Yes
11/23/1993	119	32.786	42.4	2.104E+04	5.417E+03	3.979E+04	Yes
7/17/1995	119	2.314	88	1.485E+03	3.824E+02	2.809E+03	Yes
8/11/1998	119	9.161	70.4	5.880E+03	1.514E+03	1.112E+04	Yes
6/2/1992	118	127.286	21.2	8.101E+04	2.086E+04	1.545E+05	Yes
4/26/2005	118	17.357	57.1	1.105E+04	2.844E+03	2.106E+04	Yes
7/20/2004	117	8.679	71.4	5.477E+03	1.410E+03	1.053E+04	Yes
4/7/1992	116	49.179	34.6	3.077E+04	7.921E+03	5.968E+04	Yes
4/14/1998	115.371	30.375	44	1.890E+04	4.866E+03	3.686E+04	Yes
8/8/1995	115.182	10.125	68.5	6.290E+03	1.619E+03	1.229E+04	Yes
5/19/1998	114	10.607	67.7	6.522E+03	1.679E+03	1.287E+04	Yes
7/27/1999	112	7.714	73.5	4.660E+03	1.200E+03	9.362E+03	Yes
4/24/2000	111	12.054	65.3	7.217E+03	1.858E+03	1.463E+04	Yes
7/16/1996	110.888	22.661	50.9	1.355E+04	3.489E+03	2.750E+04	Yes
4/27/1999	110.31	29.411	44.7	1.750E+04	4.505E+03	3.569E+04	Yes
4/23/1996	110.259	96.911	24.7	5.763E+04	1.484E+04	1.176E+05	Yes
4/2/1991	110	339.913	7	2.017E+05	5.192E+04	4.125E+05	Yes
1/7/1992	109	47.250	35.4	2.778E+04	7.151E+03	5.734E+04	Yes
10/24/1994	109	183.215	15.8	1.077E+05	2.773E+04	2.224E+05	Yes
2/26/2002	109	69.429	29.4	4.082E+04	1.051E+04	8.426E+04	Yes
8/6/1996	107.929	177.430	16.2	1.033E+05	2.659E+04	2.153E+05	Yes
5/18/1993	107	25.554	48	1.475E+04	3.797E+03	3.101E+04	Yes
11/5/2002	106	40.500	38.2	2.316E+04	5.961E+03	4.915E+04	Yes
12/17/1996	105.304	160.072	17.7	9.092E+04	2.341E+04	1.943E+05	Yes
6/19/2001	105.1	11.089	66.9	6.286E+03	1.618E+03	1.346E+04	Yes
2/9/1993	105	34.714	41.2	1.966E+04	5.061E+03	4.213E+04	Yes
2/23/1999	104	47.732	35.2	2.678E+04	6.893E+03	5.793E+04	Yes
7/2/1991	103	13.018	63.5	7.232E+03	1.862E+03	1.580E+04	Yes
7/7/1992	103	11.571	66.1	6.429E+03	1.655E+03	1.404E+04	Yes
8/26/1997	102.153	13.018	63.5	7.173E+03	1.847E+03	1.580E+04	Yes

Table G-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
5/28/2002	102	9.161	70.4	5.040E+03	1.297E+03	1.112E+04	Yes
2/22/2005	101	58.340	31.9	3.178E+04	8.182E+03	7.080E+04	Yes
2/4/1992	100	67.983	29.7	3.667E+04	9.440E+03	8.250E+04	Yes
7/22/1997	95.939	6.268	76.9	3.243E+03	8.350E+02	7.607E+03	Yes
10/1/1996	95.6	383.306	5.8	1.976E+05	5.088E+04	4.652E+05	Yes
4/13/2004	94.2	134.519	20.4	6.835E+04	1.760E+04	1.633E+05	Yes
5/15/2004	93.8	257.466	10.4	1.303E+05	3.353E+04	3.125E+05	Yes
4/13/1993	91.4	256.501	10.4	1.265E+05	3.255E+04	3.113E+05	Yes
8/20/2002	91.26	13.018	63.5	6.408E+03	1.650E+03	1.580E+04	Yes
12/11/2001	90.9	133.554	20.5	6.548E+04	1.686E+04	1.621E+05	Yes
5/13/1997	84.899	26.518	47.2	1.214E+04	3.126E+03	3.218E+04	Yes
4/15/1997	84.756	68.465	29.6	3.130E+04	8.058E+03	8.309E+04	Yes
3/23/1999	84.2	64.608	30.5	2.934E+04	7.554E+03	7.841E+04	Yes
12/22/1998	82.6	189.001	15.2	8.420E+04	2.168E+04	2.294E+05	Yes
3/28/2005	79.6	88.233	26.1	3.788E+04	9.752E+03	1.071E+05	Yes
1/2/1991	75.8	245.894	11.2	1.005E+05	2.588E+04	2.984E+05	Yes
3/16/2004	73.2	85.822	26.5	3.388E+04	8.723E+03	1.042E+05	Yes
3/27/2000	72.2	42.429	37.3	1.652E+04	4.254E+03	5.149E+04	Yes
1/20/1998	71.96	123.911	21.5	4.809E+04	1.238E+04	1.504E+05	Yes
4/17/2001	71.46	342.806	6.9	1.321E+05	3.402E+04	4.160E+05	Yes
6/25/2002	70.83	6.750	75.7	2.579E+03	6.639E+02	8.192E+03	Yes
1/26/1999	68.6	318.698	7.8	1.179E+05	3.036E+04	3.868E+05	Yes
5/22/2001	68.28	41.465	37.7	1.527E+04	3.931E+03	5.032E+04	Yes
3/3/1992	68.2	178.876	16.1	6.580E+04	1.694E+04	2.171E+05	Yes
3/26/2001	66.4	163.930	17.5	5.871E+04	1.511E+04	1.989E+05	Yes
2/17/1998	65.38	270.002	9.8	9.521E+04	2.451E+04	3.277E+05	Yes
2/27/2001	62.7	163.930	17.5	5.544E+04	1.427E+04	1.989E+05	Yes
4/24/1995	62.368	525.539	3.7	1.768E+05	4.551E+04	6.378E+05	Yes
9/17/2002	57.9	3.375	84.1	1.054E+03	2.713E+02	4.096E+03	Yes
6/29/1999	55.2	315.805	7.9	9.403E+04	2.421E+04	3.833E+05	Yes
12/14/2004	55	218.412	12.9	6.479E+04	1.668E+04	2.651E+05	Yes
2/25/1997	54.446	290.734	8.8	8.538E+04	2.198E+04	3.528E+05	Yes
3/26/2002	54.27	188.037	15.3	5.504E+04	1.417E+04	2.282E+05	Yes
3/11/1997	53.619	196.233	14.6	5.675E+04	1.461E+04	2.381E+05	Yes
3/14/1994	53.6	293.627	8.7	8.489E+04	2.185E+04	3.563E+05	Yes
12/19/2000	53	366.913	6.3	1.049E+05	2.700E+04	4.453E+05	Yes
1/28/1997	50.994	400.181	5.4	1.101E+05	2.834E+04	4.857E+05	Yes
12/19/1994	50.8	752.147	2	2.061E+05	5.306E+04	9.128E+05	Yes
6/21/1993	49.9	155.251	18.2	4.179E+04	1.076E+04	1.884E+05	Yes
7/21/1998	49.1	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
2/17/2004	48.5	427.181	4.9	1.117E+05	2.877E+04	5.184E+05	Yes
11/30/2004	43.3	388.127	5.7	9.065E+04	2.334E+04	4.710E+05	Yes
2/15/1994	39.6	684.647	2.4	1.462E+05	3.765E+04	8.309E+05	Yes
10/15/2002	36.4	5.786	78	1.136E+03	2.924E+02	7.022E+03	Yes
7/15/2003	35.9	15.911	58.9	3.081E+03	7.931E+02	1.931E+04	Yes
1/30/2001	33.21	282.537	9.1	5.061E+04	1.303E+04	3.429E+05	Yes
4/28/1999	29.4	29.893	44.3	4.740E+03	1.220E+03	3.628E+04	Yes
5/7/1991	29.3	949.827	1.3	1.501E+05	3.864E+04	1.153E+06	Yes
3/17/1998	26.75	378.966	6	5.468E+04	1.408E+04	4.599E+05	Yes
10/24/2006	23.1	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
2/25/2003	21.8	1104.113	1	1.298E+05	3.342E+04	1.340E+06	Yes
12/27/2005	10.8	17.839	56.4	1.039E+03	2.675E+02	2.165E+04	Yes
9/18/2000	8.06	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/26/2006	4.95	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes

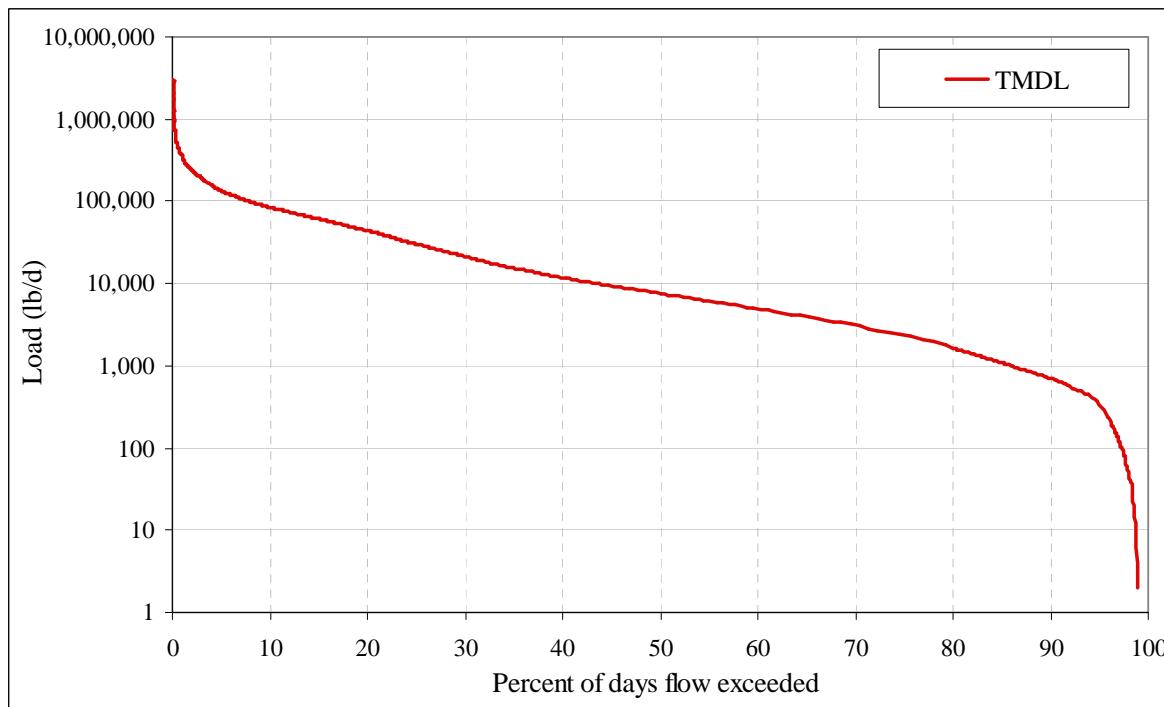


Figure G-2. Chloride load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)

Table G-3. Allowable Chloride load for Bayou De L'Outre (HUC/reach 08040202-007)

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 (lb/day)	Area under TMDL curve (lb/day)
						34,325.9
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	816.287	0.00	1100716.7994	0.00E+00
4/26/1958	8060	0.100	916.323	0.00	1235610.7995	0.00E+00
4/6/1997	8210	0.100	933.375	0.00	1258604.0950	0.00E+00
4/15/1991	8840	0.100	1004.992	0.00	1355175.9360	0.00E+00
4/29/1958	11000	0.100	1250.537	0.00	1686279.3908	0.00E+00
4/28/1991	11400	0.100	1296.008	0.00	1747594.8453	0.00E+00
4/30/1991	13800	0.100	1568.836	0.00	2115487.5729	0.00E+00
4/27/1958	18200	0.100	2069.020	0.00	2789957.5734	0.00E+00
6/9/1974	19100	0.100	2171.330	0.00	2927917.3462	0.00E+00
4/29/1991	19300	0.100	2194.066	0.10	2958575.0735	2.96E+03
4/28/1958	20000	0.000	2273.641	0.00	3065877.1190	0.00E+00

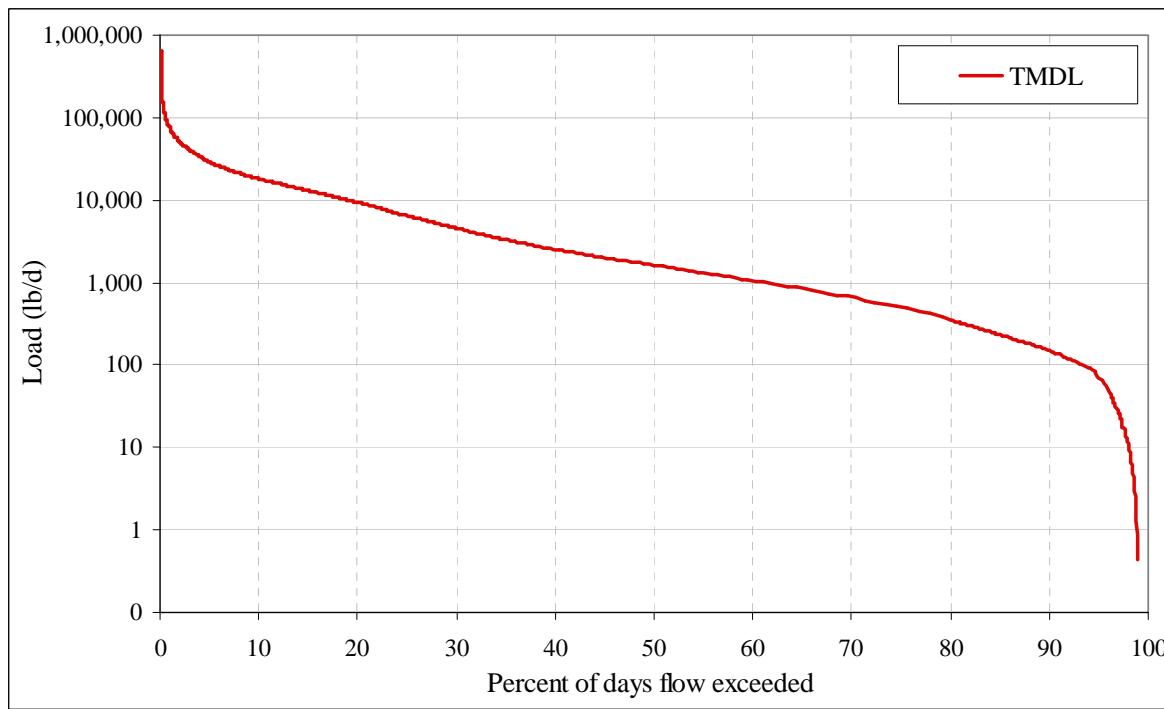


Figure G-3. Chloride load duration curve for Bayou De L'Outre (HUC/reach 08040202-008)

Table G-4. Allowable Chloride load for Bayou De L'Outre (HUC/reach 08040202-008)

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 (lb/day)	Area under TMDL curve (lb/day)
						7,346.9
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	242.657	0.00	235591.2357	0.00E+00
4/26/1958	8060	0.100	272.395	0.00	264463.1891	0.00E+00
4/6/1997	8210	0.100	277.464	0.00	269384.5448	0.00E+00
4/15/1991	8840	0.100	298.754	0.00	290054.2388	0.00E+00
4/29/1958	11000	0.100	371.747	0.00	360921.7608	0.00E+00
4/28/1991	11400	0.100	385.264	0.00	374045.3760	0.00E+00
4/30/1991	13800	0.100	466.368	0.00	452787.0672	0.00E+00
4/27/1958	18200	0.100	615.057	0.00	597146.8343	0.00E+00
6/9/1974	19100	0.100	645.471	0.00	626674.9685	0.00E+00
4/29/1991	19300	0.100	652.230	0.10	633236.7761	6.33E+02
4/28/1958	20000	0.000	675.885	0.00	656203.1027	0.00E+00

Appendix H

Load Duration Curve Summaries and Plots for Sulfate

Figure H-1. Sulfate load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Figure H-2. Sulfate load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-007).....	6
Figure H-3. Sulfate load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-008).....	6
Table H-1. Allowable Sulfate load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Table H-2. Existing load for Sulfate for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	3
Table H-3. Allowable Sulfate load for Bayou De L'Outre (HUC/reach 08040202-007)	6
Table H-4. Allowable Sulfate load for Bayou De L'Outre (HUC/reach 08040202-008)	7

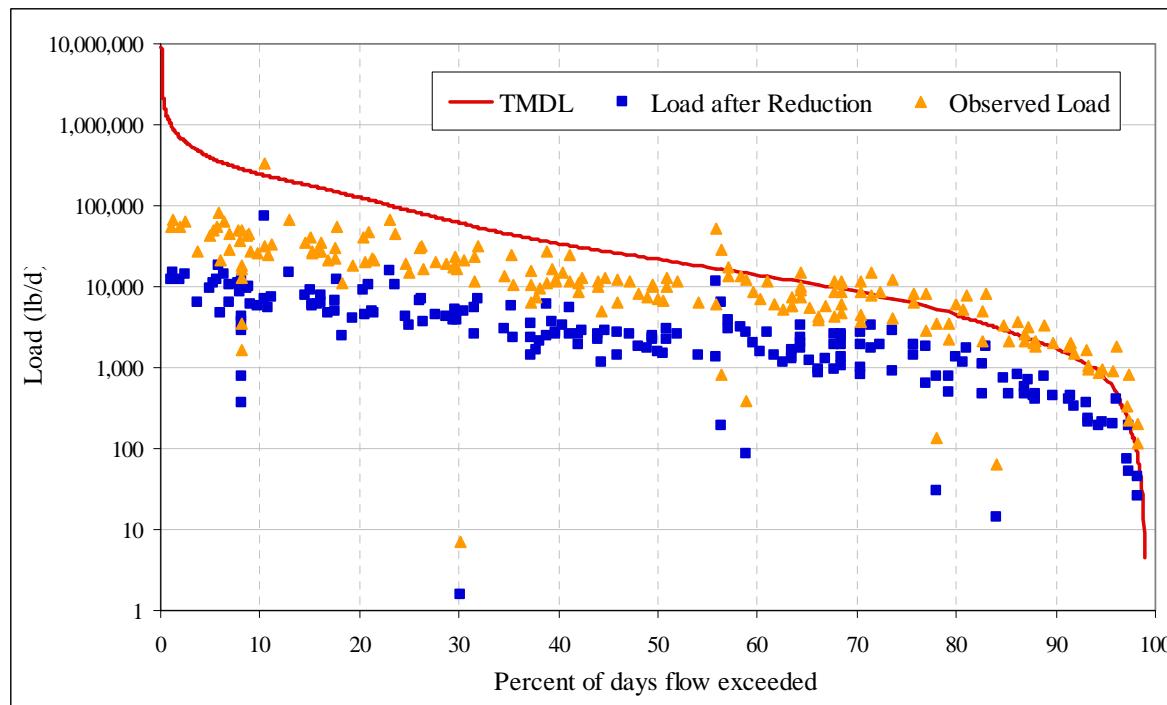


Figure H-1. Sulfate load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Table H-1. Allowable Sulfate load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

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 (lb/day)	Area under TMDL curve (lb/day)
						99,290.5
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most of the cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	3461.805	0.00	3192946.7108	0.00E+00
4/26/1958	8060	0.100	3886.093	0.00	3584282.7980	0.00E+00
4/6/1997	8210	0.100	3958.415	0.00	3650987.8128	0.00E+00
4/15/1991	8840	0.100	4262.167	0.00	3931148.8752	0.00E+00
4/29/1958	11000	0.100	5303.602	0.00	4891701.0890	0.00E+00
4/28/1991	11400	0.100	5496.460	0.00	5069581.1286	0.00E+00
4/30/1991	13800	0.100	6653.609	0.00	6136861.3662	0.00E+00
4/27/1958	18200	0.100	8775.050	0.00	8093541.8018	0.00E+00
6/9/1974	19100	0.100	9208.981	0.00	8493771.8909	0.00E+00
4/29/1991	19300	0.100	9305.410	0.10	8582711.9107	8.58E+03
4/28/1958	20000	0.000	9642.912	0.00	8894001.9800	0.00E+00

Table H-2. Existing load for Sulfate for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
9/21/2004	686	0.227	97.4	8.385E+02	1.881E+02	1.881E+02	Yes
10/25/2005	630	0.530	96.1	1.802E+03	4.043E+02	4.403E+02	Yes
11/29/2005	529	18.322	55.8	5.228E+04	1.173E+04	1.521E+04	Yes
7/25/2006	506	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
8/22/2000	420.12	0.087	98.3	1.967E+02	4.412E+01	7.204E+01	Yes
8/17/2004	411	3.713	83	8.230E+03	1.846E+03	3.082E+03	Yes
8/14/2006	378	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
6/27/2006	322	4.388	81	7.620E+03	1.710E+03	3.642E+03	Yes
7/20/2004	312	8.679	71.4	1.460E+04	3.277E+03	7.204E+03	Yes
7/27/1999	301	7.714	73.5	1.252E+04	2.810E+03	6.404E+03	Yes
11/11/2003	296	2.121	88.9	3.387E+03	7.599E+02	1.761E+03	Yes
5/11/2004	294	17.839	56.4	2.829E+04	6.347E+03	1.481E+04	Yes
8/17/1999	268	0.627	95.7	9.060E+02	2.033E+02	5.203E+02	Yes
8/29/2006	265	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/14/2003	254	1.205	93.1	1.651E+03	3.705E+02	1.001E+03	Yes
11/28/2006	250	2.748	86.2	3.706E+03	8.314E+02	2.281E+03	Yes
11/7/2000	239.92	9.161	70.4	1.185E+04	2.660E+03	7.604E+03	Yes
7/22/1997	239	6.268	76.9	8.080E+03	1.813E+03	5.203E+03	Yes
8/12/2003	238	2.459	87.3	3.157E+03	7.082E+02	2.041E+03	Yes
5/15/2004	238	257.466	10.4	3.305E+05	7.415E+04	2.137E+05	Yes
4/18/2006	238	1.543	91.5	1.981E+03	4.443E+02	1.281E+03	Yes
8/20/2001	237.8	3.857	82.7	4.947E+03	1.110E+03	3.202E+03	Yes
7/26/2005	232	0.270	97.1	3.379E+02	7.580E+01	2.241E+02	Yes
10/17/2000	230.5	0.092	98.2	1.139E+02	2.555E+01	7.604E+01	Yes
10/17/1995	230	6.750	75.7	8.374E+03	1.879E+03	5.603E+03	Yes
12/5/2006	230	4.821	80	5.981E+03	1.342E+03	4.002E+03	Yes
11/22/1999	216.04	12.536	64.4	1.461E+04	3.277E+03	1.041E+04	Yes
11/13/1995	215	4.484	80.7	5.200E+03	1.167E+03	3.722E+03	Yes
9/27/1994	213	1.591	91.3	1.828E+03	4.101E+02	1.321E+03	Yes
5/23/2005	210	10.125	68.5	1.147E+04	2.573E+03	8.405E+03	Yes
8/8/1995	204	10.125	68.5	1.114E+04	2.499E+03	8.405E+03	Yes
5/19/1998	204	10.607	67.7	1.167E+04	2.618E+03	8.805E+03	Yes
7/25/2000	201.1	0.868	94.7	9.414E+02	2.112E+02	7.204E+02	Yes
10/19/1999	195	3.134	84.8	3.296E+03	7.395E+02	2.601E+03	Yes
9/19/1995	193	1.929	89.8	2.008E+03	4.504E+02	1.601E+03	Yes
9/1/1998	191	8.196	72.3	8.444E+03	1.894E+03	6.804E+03	Yes
9/30/1997	190.2	1.446	91.9	1.484E+03	3.329E+02	1.201E+03	Yes
9/21/1999	190	0.222	97.4	2.273E+02	5.099E+01	1.841E+02	Yes
5/16/2006	188	2.555	86.9	2.591E+03	5.813E+02	2.121E+03	Yes
4/26/2005	183	17.357	57.1	1.713E+04	3.844E+03	1.441E+04	Yes
8/11/1998	175.8	9.161	70.4	8.686E+03	1.949E+03	7.604E+03	Yes
3/13/2007	175	3.664	8.1	3.459E+03	7.760E+02	3.042E+03	Yes
6/25/2002	170.73	6.750	75.7	6.216E+03	1.395E+03	5.603E+03	Yes
7/17/1995	170	2.314	88	2.122E+03	4.761E+02	1.921E+03	Yes
9/4/1990	165	1.157	93.3	1.030E+03	2.310E+02	9.606E+02	Yes
6/20/1995	164	8.679	71.4	7.677E+03	1.722E+03	7.204E+03	Yes
9/21/1993	163	0.964	94.3	8.478E+02	1.902E+02	8.005E+02	Yes
9/29/1998	158	10.125	68.5	8.629E+03	1.936E+03	8.405E+03	Yes
9/23/2003	158	2.363	87.8	2.013E+03	4.517E+02	1.961E+03	Yes
10/19/2004	156	16.393	58.3	1.379E+04	3.094E+03	1.361E+04	Yes
9/17/2001	155	1.157	93.3	9.674E+02	2.170E+02	9.606E+02	Yes
5/21/1996	152.4	2.555	86.9	2.101E+03	4.712E+02	2.121E+03	Yes
5/25/1999	152	14.464	61	1.186E+04	2.660E+03	1.201E+04	Yes
11/19/2001	151	12.536	64.4	1.021E+04	2.291E+03	1.041E+04	Yes
7/23/2002	151	10.607	67.7	8.639E+03	1.938E+03	8.805E+03	Yes
11/13/2006	147	2.314	88	1.835E+03	4.117E+02	1.921E+03	Yes
4/23/2002	143	17.357	57.1	1.339E+04	3.003E+03	1.441E+04	Yes
12/3/2002	143	15.911	58.9	1.227E+04	2.753E+03	1.321E+04	Yes
7/26/1993	133	2.989	85.3	2.144E+03	4.811E+02	2.481E+03	Yes
12/20/1999	131.24	12.536	64.4	8.874E+03	1.991E+03	1.041E+04	Yes
4/15/2003	131	34.714	41.2	2.453E+04	5.503E+03	2.882E+04	Yes
2/14/1995	130	39.054	38.8	2.738E+04	6.143E+03	3.242E+04	Yes
7/21/1998	124	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
2/12/2007	124	24.107	8.1	1.612E+04	3.617E+03	2.001E+04	Yes

Table H-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
10/23/2001	120.77	5.304	79.2	3.455E+03	7.751E+02	4.403E+03	Yes
5/20/2003	116	109.447	23	6.848E+04	1.536E+04	9.085E+04	Yes
1/25/2000	112.48	10.125	68.5	6.143E+03	1.378E+03	8.405E+03	Yes
6/9/1998	112	12.536	64.4	7.573E+03	1.699E+03	1.041E+04	Yes
9/27/2005	110	5.786	78	3.433E+03	7.701E+02	4.803E+03	Yes
2/6/2007	109	21.697	8.1	1.276E+04	2.862E+03	1.801E+04	Yes
8/20/2002	107.02	13.018	63.5	7.514E+03	1.686E+03	1.081E+04	Yes
1/21/2003	107	22.661	50.9	1.308E+04	2.934E+03	1.881E+04	Yes
10/27/1992	106	15.429	59.5	8.821E+03	1.979E+03	1.281E+04	Yes
8/16/1994	101	3.857	82.7	2.101E+03	4.714E+02	3.202E+03	Yes
2/22/2005	99.4	58.340	31.9	3.128E+04	7.017E+03	4.843E+04	Yes
2/23/1999	97.5	47.732	35.2	2.510E+04	5.632E+03	3.962E+04	Yes
3/12/1996	96.9	21.697	51.9	1.134E+04	2.544E+03	1.801E+04	Yes
9/10/1996	96.8	7.714	73.5	4.028E+03	9.036E+02	6.404E+03	Yes
6/19/2001	95.24	11.089	66.9	5.697E+03	1.278E+03	9.205E+03	Yes
9/29/1992	91.1	9.161	70.4	4.501E+03	1.010E+03	7.604E+03	Yes
6/18/1996	86.2	14.947	60.3	6.949E+03	1.559E+03	1.241E+04	Yes
6/27/2000	85.7	10.125	68.5	4.680E+03	1.050E+03	8.405E+03	Yes
8/6/1991	85	6.268	76.9	2.874E+03	6.447E+02	5.203E+03	Yes
7/2/1991	84	13.018	63.5	5.898E+03	1.323E+03	1.081E+04	Yes
4/24/2000	83.6	12.054	65.3	5.435E+03	1.219E+03	1.001E+04	Yes
12/16/2003	82.6	24.107	49.5	1.074E+04	2.410E+03	2.001E+04	Yes
5/13/1997	82.3	26.518	47.2	1.177E+04	2.641E+03	2.201E+04	Yes
10/26/1993	82	13.982	61.7	6.184E+03	1.387E+03	1.161E+04	Yes
12/18/1995	82	103.661	23.6	4.585E+04	1.029E+04	8.605E+04	Yes
8/26/1997	81.641	13.018	63.5	5.732E+03	1.286E+03	1.081E+04	Yes
2/20/1996	80.6	38.090	39.3	1.656E+04	3.715E+03	3.162E+04	Yes
6/17/2003	80.3	24.107	49.5	1.044E+04	2.342E+03	2.001E+04	Yes
6/4/1991	80	27.964	45.9	1.207E+04	2.707E+03	2.321E+04	Yes
7/16/1996	80	22.661	50.9	9.778E+03	2.194E+03	1.881E+04	Yes
1/30/1996	79.7	29.411	44.7	1.264E+04	2.836E+03	2.441E+04	Yes
4/23/2007	79.7	3.905	8.1	1.679E+03	3.766E+02	3.242E+03	Yes
11/19/1996	77.3	36.161	40.4	1.508E+04	3.382E+03	3.002E+04	Yes
9/1/1992	76.6	5.304	79.2	2.191E+03	4.916E+02	4.403E+03	Yes
5/23/1995	75.7	24.107	49.5	9.843E+03	2.208E+03	2.001E+04	Yes
5/28/2002	75.65	9.161	70.4	3.738E+03	8.386E+02	7.604E+03	Yes
3/28/1995	74.1	59.786	31.5	2.390E+04	5.361E+03	4.963E+04	Yes
10/30/1990	73	10.607	67.7	4.177E+03	9.370E+02	8.805E+03	Yes
11/23/1993	71.8	32.786	42.4	1.270E+04	2.849E+03	2.722E+04	Yes
4/14/1998	71.522	30.375	44	1.172E+04	2.629E+03	2.521E+04	Yes
6/28/1994	70	13.500	62.6	5.097E+03	1.144E+03	1.121E+04	Yes
2/14/2006	68.9	86.304	26.3	3.207E+04	7.195E+03	7.164E+04	Yes
7/7/1992	67.2	11.571	66.1	4.194E+03	9.409E+02	9.606E+03	Yes
10/28/1997	67.2	42.429	37.3	1.538E+04	3.450E+03	3.522E+04	Yes
3/25/2003	66.6	130.179	20.9	4.676E+04	1.049E+04	1.081E+05	Yes
12/17/1996	64.6	160.072	17.7	5.578E+04	1.251E+04	1.329E+05	Yes
7/19/1994	63	11.571	66.1	3.932E+03	8.821E+02	9.606E+03	Yes
1/14/2002	62.95	33.268	42.1	1.130E+04	2.534E+03	2.762E+04	Yes
2/29/2000	62.6	68.465	29.6	2.312E+04	5.186E+03	5.683E+04	Yes
3/28/2005	62.4	88.233	26.1	2.970E+04	6.662E+03	7.324E+04	Yes
2/9/1993	62.3	34.714	41.2	1.167E+04	2.617E+03	2.882E+04	Yes
11/28/1994	62.1	37.125	39.8	1.244E+04	2.790E+03	3.082E+04	Yes
3/23/1999	62.1	64.608	30.5	2.164E+04	4.855E+03	5.363E+04	Yes
5/23/1994	61.3	18.322	55.8	6.058E+03	1.359E+03	1.521E+04	Yes
8/4/1992	61	30.375	44	9.994E+03	2.242E+03	2.521E+04	Yes
1/20/2004	59.9	19.768	54	6.387E+03	1.433E+03	1.641E+04	Yes
5/18/1993	58.2	25.554	48	8.022E+03	1.800E+03	2.121E+04	Yes
12/21/1993	58.2	37.125	39.8	1.165E+04	2.615E+03	3.082E+04	Yes
11/27/1990	57	24.589	49	7.560E+03	1.696E+03	2.041E+04	Yes
12/14/2004	56.3	218.412	12.9	6.633E+04	1.488E+04	1.813E+05	Yes
4/3/2007	55.8	61.715	8.1	1.857E+04	4.167E+03	5.123E+04	Yes
4/13/2004	55.5	134.519	20.4	4.027E+04	9.034E+03	1.117E+05	Yes
12/15/1997	54.288	23.625	50	6.918E+03	1.552E+03	1.961E+04	Yes
12/1/1992	53.1	23.143	50.5	6.628E+03	1.487E+03	1.921E+04	Yes

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in the Bayou de L'Outre Basin, Arkansas

Table H-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
2/5/1991	52	39.054	38.8	1.095E+04	2.457E+03	3.242E+04	Yes
4/7/1992	51	49.179	34.6	1.353E+04	3.035E+03	4.082E+04	Yes
11/16/1998	49.4	72.804	28.7	1.940E+04	4.352E+03	6.043E+04	Yes
4/15/1997	48.7	68.465	29.6	1.798E+04	4.035E+03	5.683E+04	Yes
5/5/1992	46.9	33.268	42.1	8.416E+03	1.888E+03	2.762E+04	Yes
3/9/1993	46.9	78.108	27.7	1.976E+04	4.433E+03	6.484E+04	Yes
2/26/2002	46.6	69.429	29.4	1.745E+04	3.915E+03	5.763E+04	Yes
2/4/1992	46.1	67.983	29.7	1.690E+04	3.792E+03	5.643E+04	Yes
3/12/1991	45	42.911	37.2	1.042E+04	2.337E+03	3.562E+04	Yes
11/5/2002	44.1	40.500	38.2	9.634E+03	2.161E+03	3.362E+04	Yes
11/18/1997	41.724	27.964	45.9	6.293E+03	1.412E+03	2.321E+04	Yes
1/7/1992	41.3	47.250	35.4	1.053E+04	2.361E+03	3.922E+04	Yes
10/1/1996	39.6	383.306	5.8	8.187E+04	1.837E+04	3.182E+05	Yes
6/10/1997	39.5	192.376	15	4.099E+04	9.195E+03	1.597E+05	Yes
4/23/1996	37.1	96.911	24.7	1.939E+04	4.351E+03	8.045E+04	Yes
11/25/1991	36.5	59.786	31.5	1.177E+04	2.641E+03	4.963E+04	Yes
3/16/2004	35.6	85.822	26.5	1.648E+04	3.697E+03	7.124E+04	Yes
3/3/1992	35.4	178.876	16.1	3.415E+04	7.662E+03	1.485E+05	Yes
3/26/2001	33.72	163.930	17.5	2.982E+04	6.689E+03	1.361E+05	Yes
6/2/1992	32.9	127.286	21.2	2.259E+04	5.067E+03	1.057E+05	Yes
5/22/2001	32.8	41.465	37.7	7.336E+03	1.646E+03	3.442E+04	Yes
3/11/1997	32.7	196.233	14.6	3.461E+04	7.765E+03	1.629E+05	Yes
12/19/2000	32.3	366.913	6.3	6.392E+04	1.434E+04	3.046E+05	Yes
1/20/1998	31.455	123.911	21.5	2.102E+04	4.716E+03	1.029E+05	Yes
4/28/1999	31.4	29.893	44.3	5.063E+03	1.136E+03	2.481E+04	Yes
1/2/2007	29.7	315.805	8.1	5.059E+04	1.135E+04	2.622E+05	Yes
8/6/1996	29	177.430	16.2	2.775E+04	6.226E+03	1.473E+05	Yes
1/26/1999	28.8	318.698	7.8	4.951E+04	1.111E+04	2.646E+05	Yes
5/30/2000	28.6	94.983	25	1.465E+04	3.287E+03	7.885E+04	Yes
2/25/1997	28	290.734	8.8	4.391E+04	9.851E+03	2.413E+05	Yes
3/27/2000	27.5	42.429	37.3	6.293E+03	1.412E+03	3.522E+04	Yes
12/11/2001	27.37	133.554	20.5	1.972E+04	4.423E+03	1.109E+05	Yes
3/14/1994	27.3	293.627	8.7	4.324E+04	9.700E+03	2.437E+05	Yes
10/24/1994	27.1	183.215	15.8	2.678E+04	6.008E+03	1.521E+05	Yes
3/26/2002	26.2	188.037	15.3	2.657E+04	5.961E+03	1.561E+05	Yes
11/30/2004	26.1	388.127	5.7	5.464E+04	1.226E+04	3.222E+05	Yes
2/27/2001	25.05	163.930	17.5	2.215E+04	4.969E+03	1.361E+05	Yes
1/2/1991	25	245.894	11.2	3.316E+04	7.439E+03	2.041E+05	Yes
4/2/1991	25	339.913	7	4.584E+04	1.028E+04	2.822E+05	Yes
12/22/1998	25	189.001	15.2	2.549E+04	5.718E+03	1.569E+05	Yes
4/18/1994	23.3	142.715	19.4	1.794E+04	4.024E+03	1.185E+05	Yes
1/28/1997	23.1	400.181	5.4	4.986E+04	1.119E+04	3.322E+05	Yes
4/13/1993	22.9	256.501	10.4	3.168E+04	7.108E+03	2.129E+05	Yes
1/18/1994	22.6	171.162	16.8	2.086E+04	4.681E+03	1.421E+05	Yes
6/29/1999	22	315.805	7.9	3.747E+04	8.407E+03	2.622E+05	Yes
2/17/2004	18.8	427.181	4.9	4.332E+04	9.718E+03	3.546E+05	Yes
1/12/1993	18.1	250.716	10.8	2.448E+04	5.491E+03	2.081E+05	Yes
2/17/1998	17.768	270.002	9.8	2.588E+04	5.805E+03	2.241E+05	Yes
1/30/2001	17.65	282.537	9.1	2.690E+04	6.034E+03	2.345E+05	Yes
2/15/1994	16.9	684.647	2.4	6.241E+04	1.400E+04	5.683E+05	Yes
4/17/2001	15.31	342.806	6.9	2.831E+04	6.351E+03	2.846E+05	Yes
6/21/1993	13.2	155.251	18.2	1.105E+04	2.480E+03	1.289E+05	Yes
12/19/1994	13.2	752.147	2	5.355E+04	1.201E+04	6.244E+05	Yes
5/7/1991	13	949.827	1.3	6.660E+04	1.494E+04	7.885E+05	Yes
3/17/1998	10.26	378.966	6	2.097E+04	4.705E+03	3.146E+05	Yes
4/24/1995	9.8	525.539	3.7	2.778E+04	6.232E+03	4.363E+05	Yes
2/25/2003	9.23	1104.113	1	5.497E+04	1.233E+04	9.165E+05	Yes
12/27/2005	8.72	17.839	56.4	8.391E+02	1.882E+02	1.481E+04	Yes
9/26/2006	8.33	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/18/2000	6.68	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
7/15/2003	4.48	15.911	58.9	3.845E+02	8.625E+01	1.321E+04	Yes
10/15/2002	4.37	5.786	78	1.364E+02	3.059E+01	4.803E+03	Yes
9/17/2002	3.46	3.375	84.1	6.299E+01	1.413E+01	2.802E+03	Yes
1/17/2006	0.02	65.572	30.2	7.074E+00	1.587E+00	5.443E+04	Yes

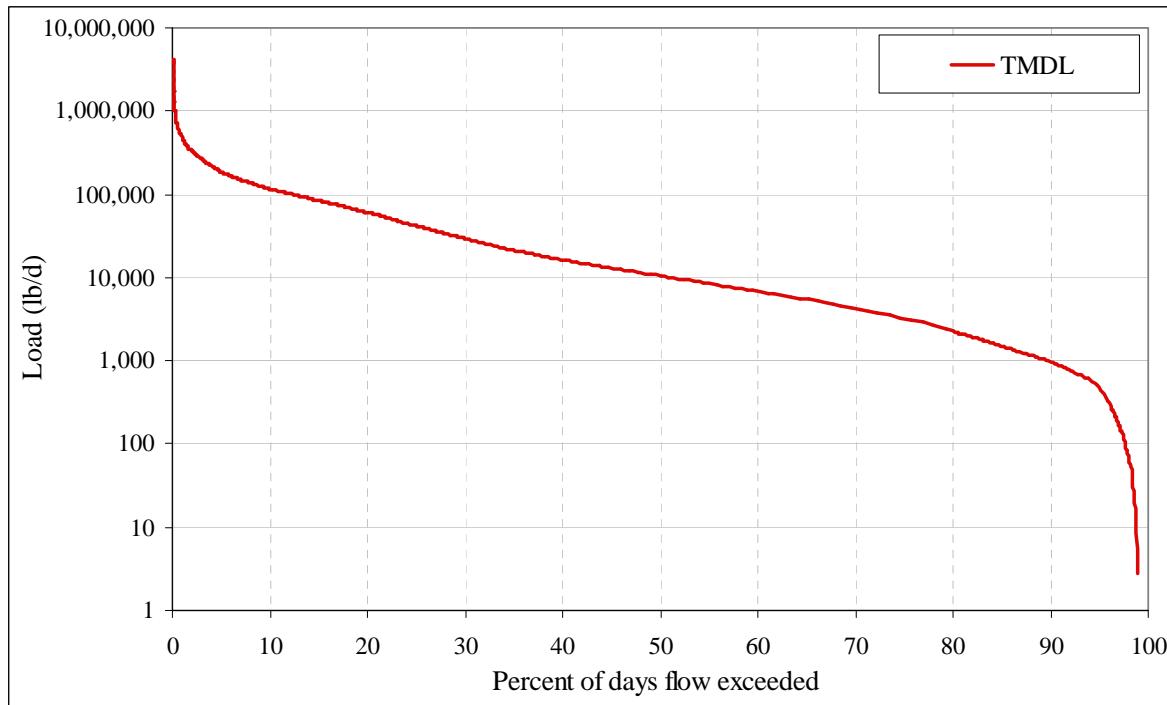


Figure H-2. Sulfate load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)

Table H-3. Allowable Sulfate load for Bayou De L'Outre (HUC/reach 08040202-007)

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 (lb/day)	Area under TMDL curve (lb/day)
						47,369.8
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	816.287	0.00	1518989.1832	0.00E+00
4/26/1958	8060	0.100	916.323	0.00	1705142.9034	0.00E+00
4/6/1997	8210	0.100	933.375	0.00	1736873.6511	0.00E+00
4/15/1991	8840	0.100	1004.992	0.00	1870142.7917	0.00E+00
4/29/1958	11000	0.100	1250.537	0.00	2327065.5592	0.00E+00
4/28/1991	11400	0.100	1296.008	0.00	2411680.8866	0.00E+00
4/30/1991	13800	0.100	1568.836	0.00	2919372.8506	0.00E+00
4/27/1958	18200	0.100	2069.020	0.00	3850141.4512	0.00E+00
6/9/1974	19100	0.100	2171.330	0.00	4040525.9377	0.00E+00
4/29/1991	19300	0.100	2194.066	0.10	4082833.6014	4.08E+03
4/28/1958	20000	0.000	2273.641	0.00	4230910.4242	0.00E+00

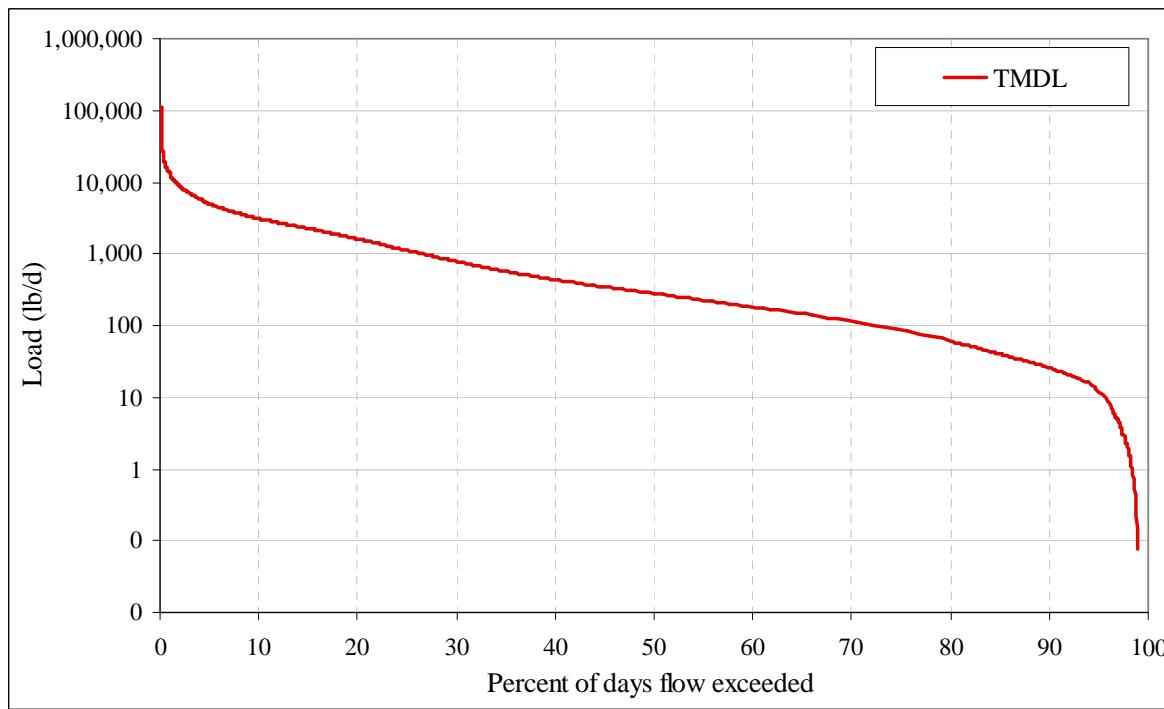


Figure H-3. Sulfate load duration curve for Bayou De L'Outre (HUC/reach 08040202-008)

Table H-4. Allowable Sulfate load for Bayou De L'Outre (HUC/reach 08040202-008)

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 (lb/day)	Area under TMDL curve (lb/day)
						1,265.3
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	242.657	0.00	40574.0461	0.00E+00
4/26/1958	8060	0.100	272.395	0.00	45546.4381	0.00E+00
4/6/1997	8210	0.100	277.464	0.00	46394.0049	0.00E+00
4/15/1991	8840	0.100	298.754	0.00	49953.7856	0.00E+00
4/29/1958	11000	0.100	371.747	0.00	62158.7477	0.00E+00
4/28/1991	11400	0.100	385.264	0.00	64418.9259	0.00E+00
4/30/1991	13800	0.100	466.368	0.00	77979.9949	0.00E+00
4/27/1958	18200	0.100	615.057	0.00	102841.9548	0.00E+00
6/9/1974	19100	0.100	645.471	0.00	107927.3557	0.00E+00
4/29/1991	19300	0.100	652.230	0.10	109057.4448	1.09E+02
4/28/1958	20000	0.000	675.885	0.00	113012.7566	0.00E+00

Appendix I

Load Duration Curve Summaries and Plots for TDS

Figure I-1. TDS load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Figure I-2. TDS load duration curve for Bayou De L'Outre (HUC/reach 08040202-007).....	6
Figure I-3. TDS load duration curve for Bayou De L'Outre (HUC/reach 08040202-008).....	7
Table I-1. Allowable TDS load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Table I-2. Existing load for TDS for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	3
Table I-3. Allowable TDS load for Bayou De L'Outre (HUC/reach 08040202-007).....	6
Table I-4. Allowable TDS load for Bayou De L'Outre (HUC/reach 08040202-008).....	7

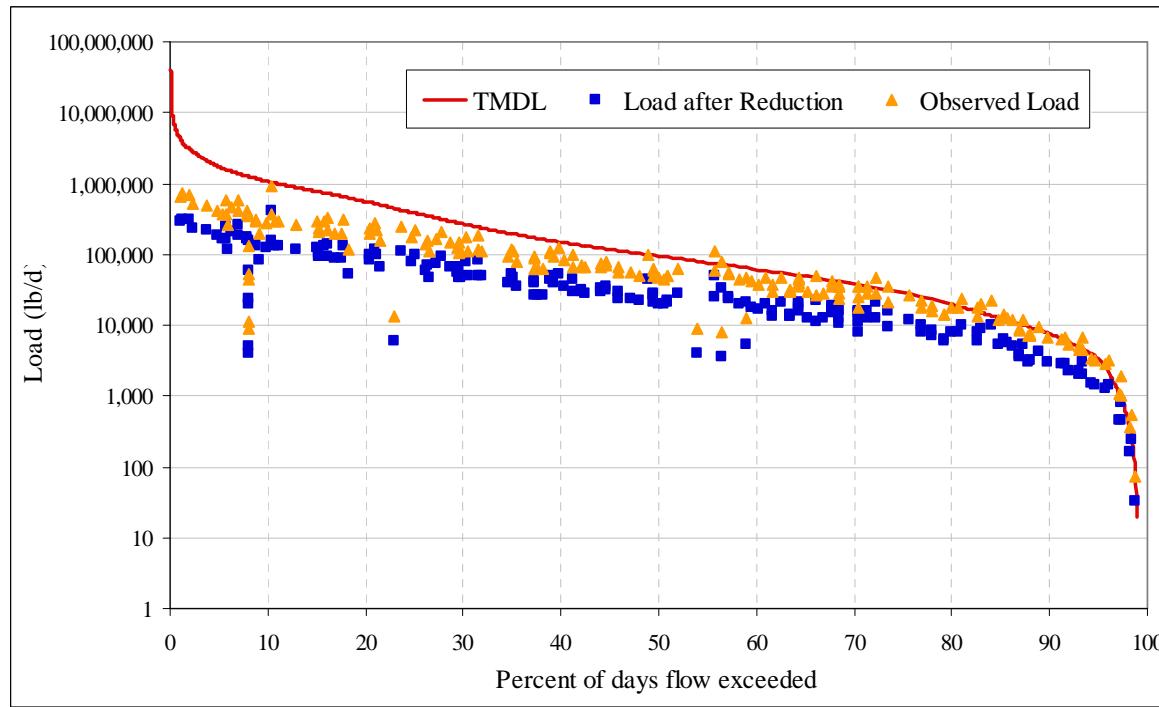


Figure I-1. TDS load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Table I-1. Allowable TDS load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

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 (lb/day)	Area under TMDL curve (lb/day)
						435,484.7
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	3461.805	0.00	14004152.2405	0.00E+00
4/26/1958	8060	0.100	3886.093	0.00	15720538.5875	0.00E+00
4/6/1997	8210	0.100	3958.415	0.00	16013104.4421	0.00E+00
4/15/1991	8840	0.100	4262.167	0.00	17241881.0315	0.00E+00
4/29/1958	11000	0.100	5303.602	0.00	21454829.3378	0.00E+00
4/28/1991	11400	0.100	5496.460	0.00	22235004.9501	0.00E+00
4/30/1991	13800	0.100	6653.609	0.00	26916058.6238	0.00E+00
4/27/1958	18200	0.100	8775.050	0.00	35497990.3589	0.00E+00
6/9/1974	19100	0.100	9208.981	0.00	37253385.4865	0.00E+00
4/29/1991	19300	0.100	9305.410	0.10	37643473.2927	3.76E+04
4/28/1958	20000	0.000	9642.912	0.00	39008780.6142	0.00E+00

Table I-2. Existing load for TDS for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
9/21/2004	1530	0.227	97.4	1.870E+03	8.250E+02	8.250E+02	Yes
7/25/2006	1490	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
8/14/2006	1250	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/17/2002	1220	3.375	84.1	2.221E+04	9.798E+03	1.229E+04	Yes
8/22/2000	1161	0.087	98.3	5.435E+02	2.398E+02	3.160E+02	Yes
11/29/2005	1150	18.322	55.8	1.136E+05	5.014E+04	6.671E+04	Yes
10/25/2005	1130	0.530	96.1	3.233E+03	1.426E+03	1.931E+03	Yes
6/21/2005	1070	8.196	72.3	4.730E+04	2.087E+04	2.984E+04	Yes
9/4/1990	1064	1.157	93.3	6.641E+03	2.930E+03	4.213E+03	Yes
8/17/2004	1020	3.713	83	2.042E+04	9.011E+03	1.352E+04	Yes
6/27/2006	978	4.388	81	2.314E+04	1.021E+04	1.597E+04	Yes
8/29/2006	928	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
8/12/2003	920	2.459	87.3	1.220E+04	5.383E+03	8.953E+03	Yes
7/26/1993	888	2.989	85.3	1.432E+04	6.317E+03	1.088E+04	Yes
9/21/1999	870	0.222	97.4	1.041E+03	4.592E+02	8.075E+02	Yes
8/17/1999	863.5	0.627	95.7	2.919E+03	1.288E+03	2.282E+03	Yes
8/20/2001	854.5	3.857	82.7	1.778E+04	7.843E+03	1.404E+04	Yes
7/27/1999	852	7.714	73.5	3.545E+04	1.564E+04	2.809E+04	Yes
11/11/2003	836	2.121	88.9	9.566E+03	4.220E+03	7.724E+03	Yes
7/19/1994	818	11.571	66.1	5.105E+04	2.252E+04	4.213E+04	Yes
10/2/1990	812	2.893	85.7	1.267E+04	5.590E+03	1.053E+04	Yes
5/11/2004	805	17.839	56.4	7.746E+04	3.417E+04	6.495E+04	Yes
4/18/2006	796	1.543	91.5	6.624E+03	2.922E+03	5.617E+03	Yes
10/24/2006	787	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
11/28/2006	782	2.748	86.2	1.159E+04	5.114E+03	1.001E+04	Yes
10/14/2003	768	1.205	93.1	4.993E+03	2.203E+03	4.388E+03	Yes
9/27/1994	754	1.591	91.3	6.471E+03	2.855E+03	5.793E+03	Yes
7/20/2004	748	8.679	71.4	3.501E+04	1.545E+04	3.160E+04	Yes
11/27/1990	746	24.589	49	9.894E+04	4.365E+04	8.953E+04	Yes
11/13/1995	743	4.484	80.7	1.797E+04	7.928E+03	1.633E+04	Yes
10/17/2000	738	0.092	98.2	3.647E+02	1.609E+02	3.335E+02	Yes
10/30/1990	729	10.607	67.7	4.171E+04	1.840E+04	3.862E+04	Yes
10/17/1995	726	6.750	75.7	2.643E+04	1.166E+04	2.458E+04	Yes
7/26/2005	717	0.270	97.1	1.044E+03	4.607E+02	9.830E+02	Yes
11/7/2000	716.5	9.161	70.4	3.540E+04	1.562E+04	3.335E+04	Yes
9/17/2001	713.5	1.157	93.3	4.453E+03	1.965E+03	4.213E+03	Yes
8/23/2005	706	0.019	98.8	7.344E+01	3.240E+01	7.022E+01	Yes
11/22/1999	705.5	12.536	64.4	4.770E+04	2.105E+04	4.564E+04	Yes
10/19/1999	697.5	3.134	84.8	1.179E+04	5.202E+03	1.141E+04	Yes
8/11/1998	694	9.161	70.4	3.429E+04	1.513E+04	3.335E+04	Yes
12/5/2006	691	4.821	80	1.797E+04	7.928E+03	1.755E+04	Yes
8/24/1993	690	1.205	93.1	4.486E+03	1.979E+03	4.388E+03	Yes
7/25/2000	690	0.868	94.7	3.230E+03	1.425E+03	3.160E+03	Yes
7/21/1998	684	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
5/23/2005	676	10.125	68.5	3.692E+04	1.629E+04	3.686E+04	Yes
9/30/1997	674	1.446	91.9	5.258E+03	2.320E+03	5.266E+03	Yes
5/19/1998	667	10.607	67.7	3.816E+04	1.684E+04	3.862E+04	Yes
7/22/1997	663	6.268	76.9	2.241E+04	9.889E+03	2.282E+04	Yes
5/15/2004	660	257.466	10.4	9.166E+05	4.044E+05	9.374E+05	Yes
8/16/1994	655	3.857	82.7	1.363E+04	6.012E+03	1.404E+04	Yes
8/8/1995	655	10.125	68.5	3.577E+04	1.578E+04	3.686E+04	Yes
11/19/2001	654	12.536	64.4	4.422E+04	1.951E+04	4.564E+04	Yes
9/21/1993	651	0.964	94.3	3.386E+03	1.494E+03	3.511E+03	Yes
9/29/1998	651	10.125	68.5	3.555E+04	1.568E+04	3.686E+04	Yes
9/19/1995	647	1.929	89.8	6.730E+03	2.969E+03	7.022E+03	Yes
6/28/1994	637	13.500	62.6	4.638E+04	2.046E+04	4.915E+04	Yes
5/21/1996	637	2.555	86.9	8.780E+03	3.873E+03	9.304E+03	Yes
9/1/1998	636	8.196	72.3	2.812E+04	1.240E+04	2.984E+04	Yes
11/28/1994	610	37.125	39.8	1.221E+05	5.389E+04	1.352E+05	Yes
6/20/1995	610	8.679	71.4	2.855E+04	1.260E+04	3.160E+04	Yes
7/23/2002	607.5	10.607	67.7	3.476E+04	1.533E+04	3.862E+04	Yes
10/15/2002	602	5.786	78	1.879E+04	8.288E+03	2.106E+04	Yes
5/16/2006	602	2.555	86.9	8.297E+03	3.661E+03	9.304E+03	Yes
12/20/1999	593.5	12.536	64.4	4.013E+04	1.770E+04	4.564E+04	Yes
4/23/2002	589	17.357	57.1	5.514E+04	2.433E+04	6.319E+04	Yes
5/23/1994	588	18.322	55.8	5.811E+04	2.564E+04	6.671E+04	Yes
7/17/1995	588	2.314	88	7.340E+03	3.238E+03	8.426E+03	Yes

Table I-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
5/25/1999	584	14.464	61	4.556E+04	2.010E+04	5.266E+04	Yes
3/28/1995	582	59.786	31.5	1.877E+05	8.280E+04	2.177E+05	Yes
11/13/2006	578	2.314	88	7.215E+03	3.183E+03	8.426E+03	Yes
3/13/2007	575	3.664	8.1	1.136E+04	5.014E+03	1.334E+04	Yes
4/26/2005	573	17.357	57.1	5.364E+04	2.367E+04	6.319E+04	Yes
12/3/2002	548	15.911	58.9	4.703E+04	2.075E+04	5.793E+04	Yes
9/23/2003	548	2.363	87.8	6.983E+03	3.081E+03	8.601E+03	Yes
8/6/1991	536	6.268	76.9	1.812E+04	7.995E+03	2.282E+04	Yes
2/14/1995	532	39.054	38.8	1.121E+05	4.944E+04	1.422E+05	Yes
3/12/1996	532	21.697	51.9	6.226E+04	2.747E+04	7.899E+04	Yes
4/15/2003	525	34.714	41.2	9.830E+04	4.337E+04	1.264E+05	Yes
1/25/2000	520	10.125	68.5	2.840E+04	1.253E+04	3.686E+04	Yes
6/9/1998	517	12.536	64.4	3.496E+04	1.542E+04	4.564E+04	Yes
9/29/1992	513	9.161	70.4	2.535E+04	1.118E+04	3.335E+04	Yes
10/19/2004	511	16.393	58.3	4.518E+04	1.993E+04	5.968E+04	Yes
9/10/1996	509	7.714	73.5	2.118E+04	9.344E+03	2.809E+04	Yes
4/27/1999	508	29.411	44.7	8.059E+04	3.555E+04	1.071E+05	Yes
9/27/2005	508	5.786	78	1.585E+04	6.994E+03	2.106E+04	Yes
9/1/1992	507	5.304	79.2	1.450E+04	6.399E+03	1.931E+04	Yes
1/17/2006	506	65.572	30.2	1.790E+05	7.895E+04	2.387E+05	Yes
3/9/1993	505	78.108	27.7	2.128E+05	9.386E+04	2.844E+05	Yes
10/27/1992	496	15.429	59.5	4.128E+04	1.821E+04	5.617E+04	Yes
10/26/1993	487	13.982	61.7	3.673E+04	1.620E+04	5.091E+04	Yes
10/23/2001	486	5.304	79.2	1.390E+04	6.134E+03	1.931E+04	Yes
2/5/1991	483	39.054	38.8	1.017E+05	4.489E+04	1.422E+05	Yes
5/23/1995	480	24.107	49.5	6.241E+04	2.754E+04	8.777E+04	Yes
6/19/2001	477	11.089	66.9	2.853E+04	1.259E+04	4.037E+04	Yes
6/18/1996	473	14.947	60.3	3.813E+04	1.682E+04	5.442E+04	Yes
12/16/2003	463	24.107	49.5	6.020E+04	2.656E+04	8.777E+04	Yes
10/29/1991	452	48.215	35	1.175E+05	5.186E+04	1.755E+05	Yes
1/30/1996	451	29.411	44.7	7.154E+04	3.156E+04	1.071E+05	Yes
4/24/2000	448.5	12.054	65.3	2.916E+04	1.286E+04	4.388E+04	Yes
8/4/1992	447	30.375	44	7.324E+04	3.231E+04	1.106E+05	Yes
2/20/1996	447	38.090	39.3	9.183E+04	4.052E+04	1.387E+05	Yes
8/20/2002	443	13.018	63.5	3.111E+04	1.372E+04	4.740E+04	Yes
12/18/1995	441	103.661	23.6	2.466E+05	1.088E+05	3.774E+05	Yes
6/4/1991	440	27.964	45.9	6.637E+04	2.928E+04	1.018E+05	Yes
7/2/1991	435	13.018	63.5	3.054E+04	1.348E+04	4.740E+04	Yes
6/27/2000	432	10.125	68.5	2.359E+04	1.041E+04	3.686E+04	Yes
4/23/2007	432	3.905	8.1	9.100E+03	4.015E+03	1.422E+04	Yes
5/30/2000	429	94.983	25	2.198E+05	9.696E+04	3.458E+05	Yes
8/26/1997	425	13.018	63.5	2.984E+04	1.317E+04	4.740E+04	Yes
2/23/1999	420	47.732	35.2	1.081E+05	4.771E+04	1.738E+05	Yes
7/7/1992	416	11.571	66.1	2.596E+04	1.145E+04	4.213E+04	Yes
1/21/2003	415	22.661	50.9	5.072E+04	2.238E+04	8.250E+04	Yes
11/19/1996	414	36.161	40.4	8.075E+04	3.562E+04	1.317E+05	Yes
2/12/2007	414	24.107	8.1	5.383E+04	2.375E+04	8.777E+04	Yes
4/3/2007	403	61.715	8.1	1.341E+05	5.918E+04	2.247E+05	Yes
2/29/2000	402.5	68.465	29.6	1.486E+05	6.557E+04	2.493E+05	Yes
3/12/1991	402	42.911	37.2	9.304E+04	4.105E+04	1.562E+05	Yes
4/14/1998	401	30.375	44	6.570E+04	2.898E+04	1.106E+05	Yes
1/14/2002	398	33.268	42.1	7.142E+04	3.151E+04	1.211E+05	Yes
10/1/1991	397	13.982	61.7	2.994E+04	1.321E+04	5.091E+04	Yes
7/16/1996	395	22.661	50.9	4.828E+04	2.130E+04	8.250E+04	Yes
10/28/1997	386	42.429	37.3	8.834E+04	3.897E+04	1.545E+05	Yes
3/25/2003	386	130.179	20.9	2.710E+05	1.196E+05	4.740E+05	Yes
5/13/1997	384	26.518	47.2	5.492E+04	2.423E+04	9.655E+04	Yes
11/16/1998	380	72.804	28.7	1.492E+05	6.583E+04	2.651E+05	Yes
9/3/1991	378	81.000	27.2	1.651E+05	7.286E+04	2.949E+05	Yes
6/17/2003	377	24.107	49.5	4.902E+04	2.163E+04	8.777E+04	Yes
5/5/1992	375	33.268	42.1	6.729E+04	2.969E+04	1.211E+05	Yes
2/6/2007	375	21.697	8.1	4.388E+04	1.936E+04	7.899E+04	Yes
11/23/1993	366	32.786	42.4	6.472E+04	2.855E+04	1.194E+05	Yes
5/28/2002	365	9.161	70.4	1.804E+04	7.957E+03	3.335E+04	Yes

Table I-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
11/18/1997	363	27.964	45.9	5.475E+04	2.416E+04	1.018E+05	Yes
12/1/1992	358	23.143	50.5	4.469E+04	1.972E+04	8.426E+04	Yes
12/15/1997	358	23.625	50	4.562E+04	2.013E+04	8.601E+04	Yes
5/18/1993	357	25.554	48	4.921E+04	2.171E+04	9.304E+04	Yes
2/9/1993	356	34.714	41.2	6.666E+04	2.941E+04	1.264E+05	Yes
11/25/1991	354	59.786	31.5	1.142E+05	5.036E+04	2.177E+05	Yes
12/17/1996	352	160.072	17.7	3.039E+05	1.341E+05	5.828E+05	Yes
2/22/2005	352	58.340	31.9	1.108E+05	4.887E+04	2.124E+05	Yes
4/7/1992	346	49.179	34.6	9.178E+04	4.049E+04	1.791E+05	Yes
4/23/1996	341	96.911	24.7	1.782E+05	7.864E+04	3.528E+05	Yes
2/14/2006	340	86.304	26.3	1.583E+05	6.983E+04	3.142E+05	Yes
8/6/1996	337	177.430	16.2	3.225E+05	1.423E+05	6.460E+05	Yes
2/26/2002	328	69.429	29.4	1.228E+05	5.419E+04	2.528E+05	Yes
3/23/1999	324	64.608	30.5	1.129E+05	4.981E+04	2.352E+05	Yes
6/2/1992	319	127.286	21.2	2.190E+05	9.662E+04	4.634E+05	Yes
4/2/1991	316	339.913	7	5.794E+05	2.556E+05	1.238E+06	Yes
4/13/2004	314	134.519	20.4	2.278E+05	1.005E+05	4.898E+05	Yes
1/7/1992	305	47.250	35.4	7.773E+04	3.429E+04	1.720E+05	Yes
10/24/1994	299	183.215	15.8	2.955E+05	1.304E+05	6.671E+05	Yes
2/4/1992	296	67.983	29.7	1.085E+05	4.788E+04	2.475E+05	Yes
3/28/2005	287	88.233	26.1	1.366E+05	6.026E+04	3.212E+05	Yes
4/15/1997	284	68.465	29.6	1.049E+05	4.627E+04	2.493E+05	Yes
11/5/2002	281	40.500	38.2	6.138E+04	2.708E+04	1.475E+05	Yes
6/10/1997	277	192.376	15	2.874E+05	1.268E+05	7.004E+05	Yes
10/1/1996	274	383.306	5.8	5.665E+05	2.499E+05	1.396E+06	Yes
5/22/2001	273.5	41.465	37.7	6.117E+04	2.699E+04	1.510E+05	Yes
3/27/2000	266	42.429	37.3	6.087E+04	2.686E+04	1.545E+05	Yes
12/11/2001	265	133.554	20.5	1.909E+05	8.422E+04	4.862E+05	Yes
4/13/1993	259	256.501	10.4	3.583E+05	1.581E+05	9.339E+05	Yes
6/29/1999	236	315.805	7.9	4.020E+05	1.774E+05	1.150E+06	Yes
3/16/2004	234	85.822	26.5	1.083E+05	4.779E+04	3.125E+05	Yes
12/19/2000	233	366.913	6.3	4.611E+05	2.034E+05	1.336E+06	Yes
12/22/1998	230	189.001	15.2	2.345E+05	1.034E+05	6.881E+05	Yes
1/20/1998	227	123.911	21.5	1.517E+05	6.693E+04	4.511E+05	Yes
3/26/2001	227	163.930	17.5	2.007E+05	8.855E+04	5.968E+05	Yes
12/14/2004	227	218.412	12.9	2.674E+05	1.180E+05	7.952E+05	Yes
1/2/1991	225	245.894	11.2	2.984E+05	1.317E+05	8.953E+05	Yes
3/3/1992	224	178.876	16.1	2.161E+05	9.535E+04	6.513E+05	Yes
4/17/2001	222.5	342.806	6.9	4.114E+05	1.815E+05	1.248E+06	Yes
1/12/1993	220	250.716	10.8	2.975E+05	1.313E+05	9.128E+05	Yes
1/26/1999	216	318.698	7.8	3.713E+05	1.638E+05	1.160E+06	Yes
1/18/1994	210	171.162	16.8	1.939E+05	8.553E+04	6.232E+05	Yes
3/26/2002	205	188.037	15.3	2.079E+05	9.173E+04	6.846E+05	Yes
1/2/2007	204	315.805	8.1	3.475E+05	1.533E+05	1.150E+06	Yes
2/25/1997	197	290.734	8.8	3.089E+05	1.363E+05	1.059E+06	Yes
2/17/1998	191	270.002	9.8	2.782E+05	1.227E+05	9.830E+05	Yes
3/14/1994	184	293.627	8.7	2.914E+05	1.286E+05	1.069E+06	Yes
2/17/2004	177	427.181	4.9	4.078E+05	1.799E+05	1.555E+06	Yes
11/30/2004	177	388.127	5.7	3.705E+05	1.635E+05	1.413E+06	Yes
1/28/1997	175	400.181	5.4	3.777E+05	1.666E+05	1.457E+06	Yes
4/24/1995	174	525.539	3.7	4.932E+05	2.176E+05	1.913E+06	Yes
12/19/1994	171	752.147	2	6.937E+05	3.061E+05	2.738E+06	Yes
7/15/2003	144	15.911	58.9	1.236E+04	5.452E+03	5.793E+04	Yes
6/21/1993	141	155.251	18.2	1.181E+05	5.209E+04	5.652E+05	Yes
2/15/1994	140	684.647	2.4	5.170E+05	2.281E+05	2.493E+06	Yes
5/7/1991	139	949.827	1.3	7.121E+05	3.142E+05	3.458E+06	Yes
3/17/1998	127	378.966	6	2.596E+05	1.145E+05	1.380E+06	Yes
1/30/2001	127	282.537	9.1	1.935E+05	8.539E+04	1.029E+06	Yes
2/25/2003	112	1104.113	1	6.670E+05	2.943E+05	4.020E+06	Yes
12/27/2005	84	17.839	56.4	8.083E+03	3.566E+03	6.495E+04	Yes
1/20/2004	83.5	19.768	54	8.903E+03	3.928E+03	7.197E+04	Yes
9/18/2000	79	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/26/2006	55	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
5/20/2003	22.8	109.447	23	1.346E+04	5.938E+03	3.985E+05	Yes

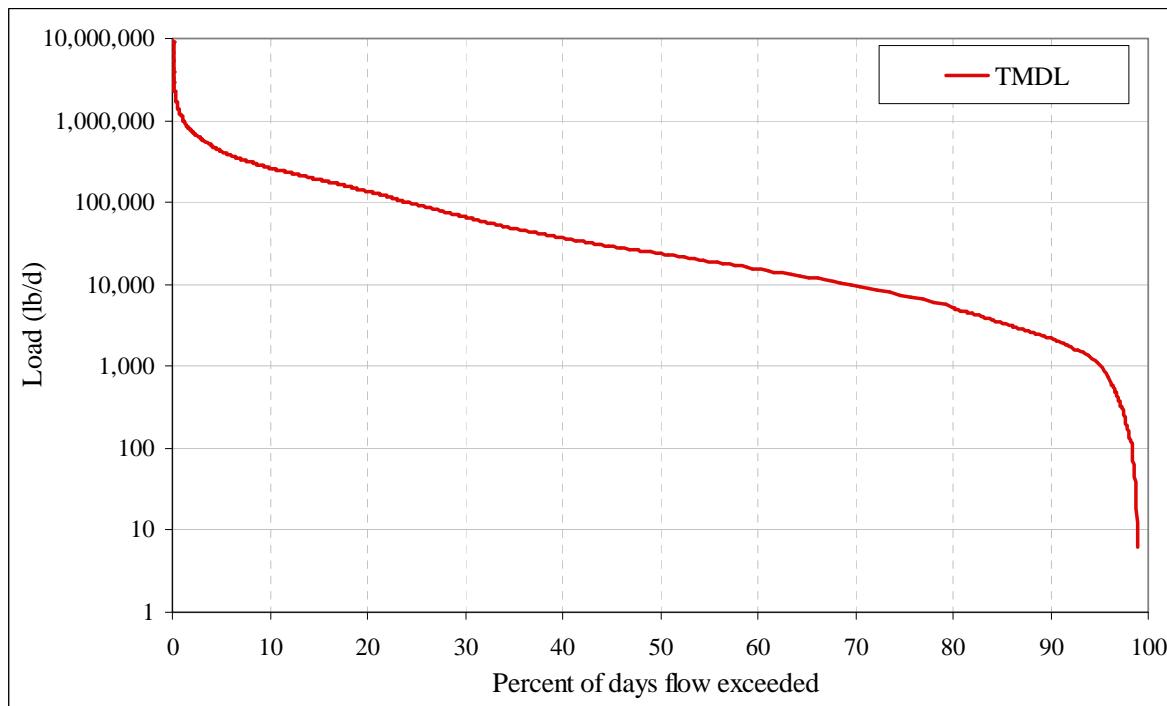


Figure I-2. TDS load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)

Table I-3. Allowable TDS load for Bayou De L'Outre (HUC/reach 08040202-007)

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 (lb/day)	Area under TMDL curve (lb/day)
						107,096.9
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	816.287	0.00	3434236.4142	0.00E+00
4/26/1958	8060	0.100	916.323	0.00	3855105.6945	0.00E+00
4/6/1997	8210	0.100	933.375	0.00	3926844.7764	0.00E+00
4/15/1991	8840	0.100	1004.992	0.00	4228148.9203	0.00E+00
4/29/1958	11000	0.100	1250.537	0.00	5261191.6992	0.00E+00
4/28/1991	11400	0.100	1296.008	0.00	5452495.9175	0.00E+00
4/30/1991	13800	0.100	1568.836	0.00	6600321.2274	0.00E+00
4/27/1958	18200	0.100	2069.020	0.00	8704667.6289	0.00E+00
6/9/1974	19100	0.100	2171.330	0.00	9135102.1201	0.00E+00
4/29/1991	19300	0.100	2194.066	0.10	9230754.2293	9.23E+03
4/28/1958	20000	0.000	2273.641	0.00	9565536.6113	0.00E+00

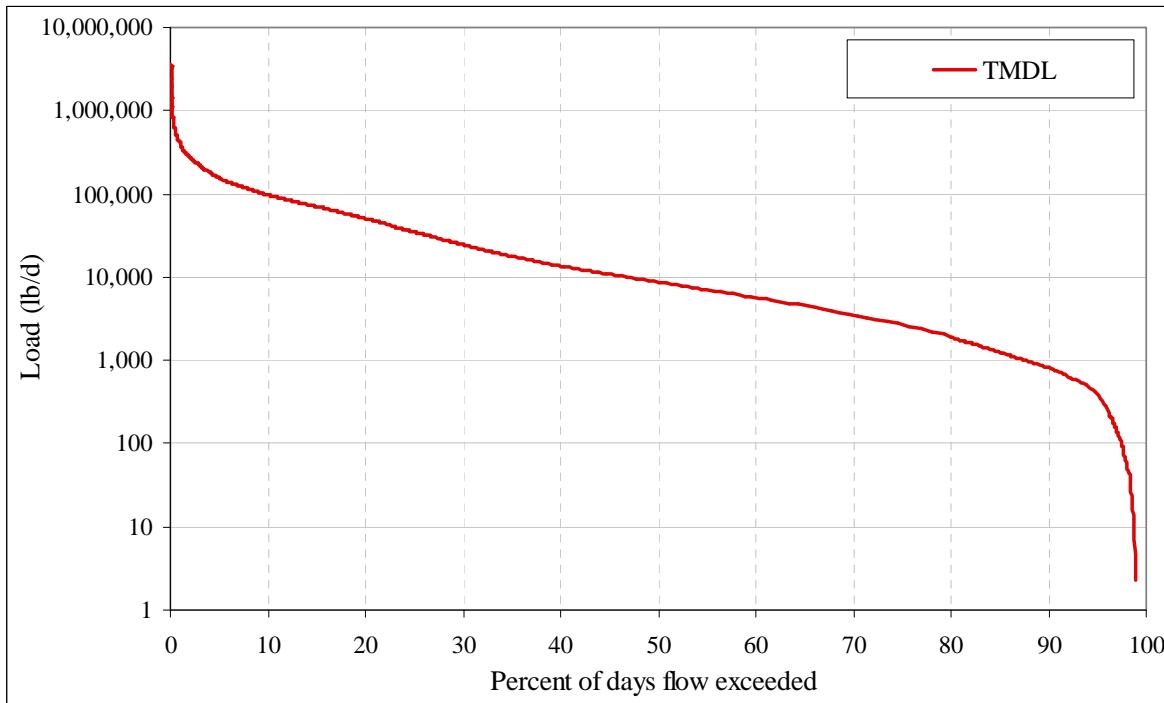


Figure I-3. TDS load duration curve for Bayou De L'Outre (HUC/reach 08040202-008)

Table I-4. Allowable TDS load for Bayou De L'Outre (HUC/reach 08040202-008)

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 (lb/day)	Area under TMDL curve (lb/day)
						39,591.8
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	242.657	0.00	1269574.9924	0.00E+00
4/26/1958	8060	0.100	272.395	0.00	1425162.7414	0.00E+00
4/6/1997	8210	0.100	277.464	0.00	1451683.3804	0.00E+00
4/15/1991	8840	0.100	298.754	0.00	1563070.0644	0.00E+00
4/29/1958	11000	0.100	371.747	0.00	1944967.2666	0.00E+00
4/28/1991	11400	0.100	385.264	0.00	2015688.9707	0.00E+00
4/30/1991	13800	0.100	466.368	0.00	2440019.1953	0.00E+00
4/27/1958	18200	0.100	615.057	0.00	3217957.9404	0.00E+00
6/9/1974	19100	0.100	645.471	0.00	3377081.7747	0.00E+00
4/29/1991	19300	0.100	652.230	0.10	3412442.6267	3.41E+03
4/28/1958	20000	0.000	675.885	0.00	3536205.6089	0.00E+00

Appendix J

Load Duration Curve Summaries and Plots for Copper

Figure J-1. Copper load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Figure J-2. Copper load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)	7
Figure J-3. Copper load duration curve for Bayou De L'Outre (HUC/reach 08040202-008)	8
Table J-1. Allowable copper load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Table J-2. Existing load for copper for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	3
Table J-3. Allowable copper load for Bayou De L'Outre (HUC/reach 08040202-007)	7
Table J-4. Allowable copper load for Bayou De L'Outre (HUC/reach 08040202-008)	8

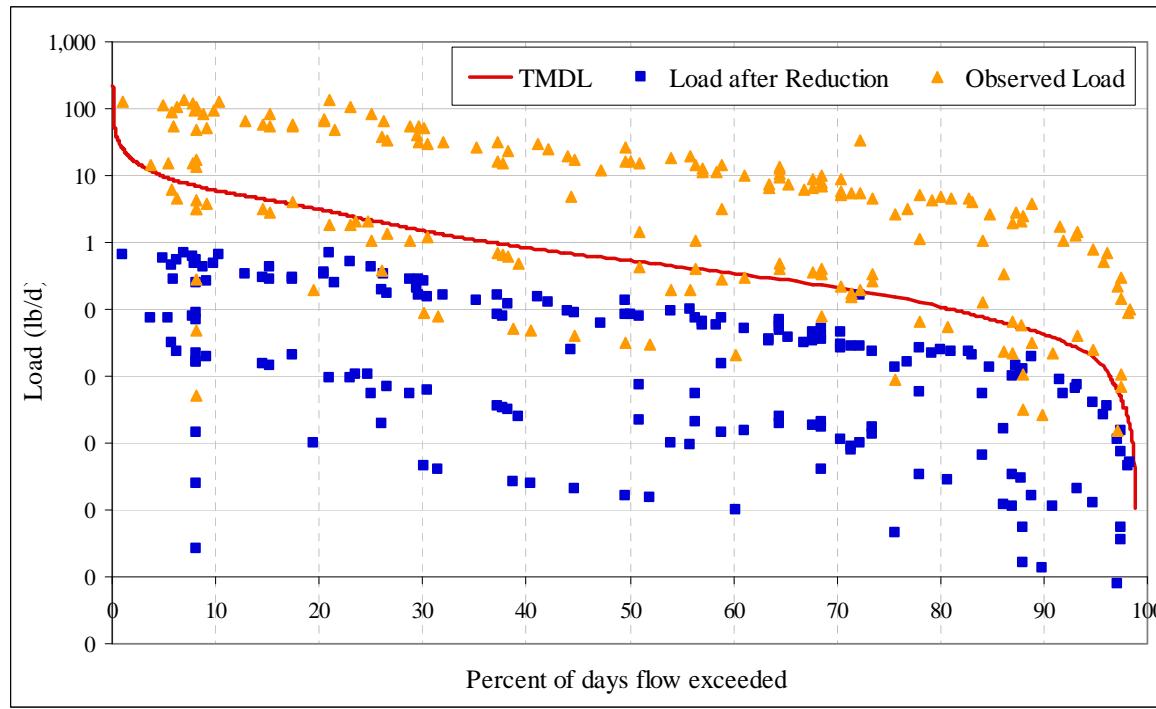


Figure J-1. Copper load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Table J-1. Allowable copper load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

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 (lb/day)	Area under TMDL curve (lb/day)
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	3461.805	0.00	78.4233	0.00E+00
4/26/1958	8060	0.100	3886.093	0.00	88.0350	0.00E+00
4/6/1997	8210	0.100	3958.415	0.00	89.6734	0.00E+00
4/15/1991	8840	0.100	4262.167	0.00	96.5545	0.00E+00
4/29/1958	11000	0.100	5303.602	0.00	120.1470	0.00E+00
4/28/1991	11400	0.100	5496.460	0.00	124.5160	0.00E+00
4/30/1991	13800	0.100	6653.609	0.00	150.7299	0.00E+00
4/27/1958	18200	0.100	8775.050	0.00	198.7887	0.00E+00
6/9/1974	19100	0.100	9208.981	0.00	208.6190	0.00E+00
4/29/1991	19300	0.100	9305.410	0.10	210.8035	2.11E-01
4/28/1958	20000	0.000	9642.912	0.00	218.4492	0.00E+00

Table J-2. Existing load for copper for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
6/21/2005	0.74	8.196	72.3	3.272E+01	1.671E-01	1.671E-01	Yes
11/11/2003	0.327	2.121	88.9	3.742E+00	1.911E-02	4.325E-02	Yes
8/14/2006	0.31	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
7/25/2006	0.249	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/25/2005	0.243	0.530	96.1	6.951E-01	3.551E-03	1.081E-02	Yes
9/21/2004	0.241	0.227	97.4	2.946E-01	1.505E-03	4.620E-03	Yes
9/17/2001	0.235	1.157	93.3	1.467E+00	7.492E-03	2.359E-02	Yes
8/20/2001	0.21575	3.857	82.7	4.489E+00	2.293E-02	7.864E-02	Yes
8/12/2003	0.213	2.459	87.3	2.825E+00	1.443E-02	5.013E-02	Yes
8/22/2000	0.21048	0.087	98.3	9.853E-02	5.033E-04	1.769E-03	Yes
12/16/2003	0.208	24.107	49.5	2.705E+01	1.382E-01	4.915E-01	Yes
8/17/2004	0.204	3.713	83	4.085E+00	2.087E-02	7.569E-02	Yes
4/18/2006	0.203	1.543	91.5	1.689E+00	8.629E-03	3.146E-02	Yes
11/19/2001	0.2018	12.536	64.4	1.364E+01	6.970E-02	2.556E-01	Yes
11/29/2005	0.2	18.322	55.8	1.976E+01	1.010E-01	3.735E-01	Yes
6/27/2006	0.198	4.388	81	4.686E+00	2.394E-02	8.945E-02	Yes
3/25/2003	0.197	130.179	20.9	1.383E+02	7.066E-01	2.654E+00	Yes
11/13/2006	0.196	2.314	88	2.447E+00	1.250E-02	4.719E-02	Yes
8/29/2006	0.193	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/14/2003	0.192	1.205	93.1	1.248E+00	6.376E-03	2.458E-02	Yes
12/5/2006	0.188	4.821	80	4.889E+00	2.497E-02	9.830E-02	Yes
12/20/1999	0.187	12.536	64.4	1.264E+01	6.459E-02	2.556E-01	Yes
5/23/2005	0.187	10.125	68.5	1.021E+01	5.217E-02	2.064E-01	Yes
11/7/2000	0.1834	9.161	70.4	9.062E+00	4.629E-02	1.868E-01	Yes
10/17/2000	0.1779	0.092	98.2	8.790E-02	4.490E-04	1.868E-03	Yes
5/20/2003	0.175	109.447	23	1.033E+02	5.277E-01	2.231E+00	Yes
1/20/2004	0.175	19.768	54	1.866E+01	9.531E-02	4.030E-01	Yes
9/27/2005	0.169	5.786	78	5.274E+00	2.694E-02	1.180E-01	Yes
7/25/2000	0.16845	0.868	94.7	7.885E-01	4.028E-03	1.769E-02	Yes
12/3/2002	0.168	15.911	58.9	1.442E+01	7.365E-02	3.244E-01	Yes
9/23/2003	0.165	2.363	87.8	2.103E+00	1.074E-02	4.817E-02	Yes
3/13/2007	0.163	3.664	8.1	3.222E+00	1.646E-02	7.471E-02	Yes
11/22/1999	0.16164	12.536	64.4	1.093E+01	5.583E-02	2.556E-01	Yes
4/15/2003	0.16038	34.714	41.2	3.003E+01	1.534E-01	7.078E-01	Yes
10/19/1999	0.16	3.134	84.8	2.705E+00	1.382E-02	6.390E-02	Yes
5/30/2000	0.159	94.983	25	8.146E+01	4.161E-01	1.937E+00	Yes
7/23/2002	0.159	10.607	67.7	9.097E+00	4.647E-02	2.163E-01	Yes
7/26/2005	0.154	0.270	97.1	2.243E-01	1.146E-03	5.505E-03	Yes
8/17/1999	0.153	0.627	95.7	5.173E-01	2.642E-03	1.278E-02	Yes
10/23/2001	0.14895	5.304	79.2	4.261E+00	2.177E-02	1.081E-01	Yes
2/29/2000	0.148	68.465	29.6	5.465E+01	2.792E-01	1.396E+00	Yes
4/23/2007	0.148	3.905	8.1	3.118E+00	1.592E-02	7.962E-02	Yes
5/11/2004	0.147	17.839	56.4	1.414E+01	7.225E-02	3.637E-01	Yes
1/25/2000	0.14696	10.125	68.5	8.026E+00	4.100E-02	2.064E-01	Yes
2/14/2006	0.144	86.304	26.3	6.703E+01	3.424E-01	1.760E+00	Yes
1/14/2002	0.14238	33.268	42.1	2.555E+01	1.305E-01	6.783E-01	Yes
11/16/1998	0.142	72.804	28.7	5.576E+01	2.848E-01	1.484E+00	Yes
1/17/2006	0.142	65.572	30.2	5.022E+01	2.565E-01	1.337E+00	Yes
4/3/2007	0.142	61.715	8.1	4.727E+01	2.415E-01	1.258E+00	Yes
10/28/1997	0.139	42.429	37.3	3.181E+01	1.625E-01	8.651E-01	Yes
4/23/2002	0.139	17.357	57.1	1.301E+01	6.647E-02	3.539E-01	Yes
5/16/2006	0.139	2.555	86.9	1.916E+00	9.786E-03	5.210E-02	Yes
6/9/1998	0.137	12.536	64.4	9.263E+00	4.732E-02	2.556E-01	Yes
9/30/1997	0.1365	1.446	91.9	1.065E+00	5.440E-03	2.949E-02	Yes
2/12/2007	0.133	24.107	8.1	1.729E+01	8.834E-02	4.915E-01	Yes
9/29/1998	0.13	10.125	68.5	7.100E+00	3.627E-02	2.064E-01	Yes
5/25/1999	0.13	14.464	61	1.014E+01	5.181E-02	2.949E-01	Yes
12/15/1997	0.128833	23.625	50	1.642E+01	8.386E-02	4.817E-01	Yes
6/27/2000	0.127	10.125	68.5	6.936E+00	3.543E-02	2.064E-01	Yes
10/19/2004	0.126	16.393	58.3	1.114E+01	5.691E-02	3.342E-01	Yes
6/17/2003	0.124	24.107	49.5	1.612E+01	8.236E-02	4.915E-01	Yes
1/21/2003	0.122	22.661	50.9	1.491E+01	7.617E-02	4.620E-01	Yes
9/1/1998	0.121	8.196	72.3	5.349E+00	2.733E-02	1.671E-01	Yes
9/21/1999	0.121	0.222	97.4	1.447E-01	7.394E-04	4.522E-03	Yes

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in the Bayou de L'Outre Basin, Arkansas

Table J-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
8/11/1998	0.119	9.161	70.4	5.880E+00	3.004E-02	1.868E-01	Yes
4/26/2005	0.118	17.357	57.1	1.105E+01	5.643E-02	3.539E-01	Yes
7/20/2004	0.117	8.679	71.4	5.477E+00	2.798E-02	1.769E-01	Yes
4/14/1998	0.115371	30.375	44	1.890E+01	9.655E-02	6.193E-01	Yes
2/6/2007	0.115	21.697	8.1	1.346E+01	6.875E-02	4.424E-01	Yes
5/19/1998	0.114	10.607	67.7	6.522E+00	3.332E-02	2.163E-01	Yes
7/27/1999	0.112	7.714	73.5	4.660E+00	2.381E-02	1.573E-01	Yes
4/24/2000	0.111	12.054	65.3	7.217E+00	3.686E-02	2.458E-01	Yes
4/27/1999	0.11031	29.411	44.7	1.750E+01	8.939E-02	5.996E-01	Yes
2/26/2002	0.109	69.429	29.4	4.082E+01	2.085E-01	1.416E+00	Yes
11/5/2002	0.106	40.500	38.2	2.316E+01	1.183E-01	8.257E-01	Yes
6/19/2001	0.1051	11.089	66.9	6.286E+00	3.211E-02	2.261E-01	Yes
2/23/1999	0.104	47.732	35.2	2.678E+01	1.368E-01	9.732E-01	Yes
8/26/1997	0.102153	13.018	63.5	7.173E+00	3.664E-02	2.654E-01	Yes
5/28/2002	0.102	9.161	70.4	5.040E+00	2.574E-02	1.868E-01	Yes
2/22/2005	0.101	58.340	31.9	3.178E+01	1.623E-01	1.189E+00	Yes
7/22/1997	0.095939	6.268	76.9	3.243E+00	1.657E-02	1.278E-01	Yes
4/13/2004	0.0942	134.519	20.4	6.835E+01	3.491E-01	2.743E+00	Yes
5/15/2004	0.0938	257.466	10.4	1.303E+02	6.654E-01	5.249E+00	Yes
8/20/2002	0.09126	13.018	63.5	6.408E+00	3.273E-02	2.654E-01	Yes
12/11/2001	0.0909	133.554	20.5	6.548E+01	3.345E-01	2.723E+00	Yes
5/13/1997	0.084899	26.518	47.2	1.214E+01	6.203E-02	5.407E-01	Yes
4/15/1997	0.084756	68.465	29.6	3.130E+01	1.599E-01	1.396E+00	Yes
3/23/1999	0.0842	64.608	30.5	2.934E+01	1.499E-01	1.317E+00	Yes
12/22/1998	0.0826	189.001	15.2	8.420E+01	4.301E-01	3.853E+00	Yes
3/28/2005	0.0796	88.233	26.1	3.788E+01	1.935E-01	1.799E+00	Yes
3/16/2004	0.0732	85.822	26.5	3.388E+01	1.731E-01	1.750E+00	Yes
3/27/2000	0.0722	42.429	37.3	1.652E+01	8.440E-02	8.651E-01	Yes
1/20/1998	0.07196	123.911	21.5	4.809E+01	2.457E-01	2.526E+00	Yes
4/17/2001	0.07146	342.806	6.9	1.321E+02	6.749E-01	6.989E+00	Yes
6/25/2002	0.07083	6.750	75.7	2.579E+00	1.317E-02	1.376E-01	Yes
1/26/1999	0.0686	318.698	7.8	1.179E+02	6.024E-01	6.498E+00	Yes
5/22/2001	0.06828	41.465	37.7	1.527E+01	7.801E-02	8.454E-01	Yes
3/26/2001	0.0664	163.930	17.5	5.871E+01	2.999E-01	3.342E+00	Yes
2/17/1998	0.06538	270.002	9.8	9.521E+01	4.864E-01	5.505E+00	Yes
1/2/2007	0.0628	315.805	8.1	1.070E+02	5.464E-01	6.439E+00	Yes
2/27/2001	0.0627	163.930	17.5	5.544E+01	2.832E-01	3.342E+00	Yes
9/17/2002	0.0579	3.375	84.1	1.054E+00	5.384E-03	6.881E-02	Yes
6/29/1999	0.0552	315.805	7.9	9.403E+01	4.803E-01	6.439E+00	Yes
12/14/2004	0.055	218.412	12.9	6.479E+01	3.310E-01	4.453E+00	Yes
2/25/1997	0.054446	290.734	8.8	8.538E+01	4.361E-01	5.928E+00	Yes
3/26/2002	0.05427	188.037	15.3	5.504E+01	2.812E-01	3.834E+00	Yes
3/11/1997	0.053619	196.233	14.6	5.675E+01	2.899E-01	4.001E+00	Yes
12/19/2000	0.053	366.913	6.3	1.049E+02	5.358E-01	7.481E+00	Yes
7/21/1998	0.0491	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
2/17/2004	0.0485	427.181	4.9	1.117E+02	5.708E-01	8.710E+00	Yes
11/30/2004	0.0433	388.127	5.7	9.065E+01	4.630E-01	7.913E+00	Yes
10/15/2002	0.0364	5.786	78	1.136E+00	5.802E-03	1.180E-01	Yes
7/15/2003	0.0359	15.911	58.9	3.081E+00	1.574E-02	3.244E-01	Yes
1/30/2001	0.03321	282.537	9.1	5.061E+01	2.585E-01	5.761E+00	Yes
4/28/1999	0.0294	29.893	44.3	4.740E+00	2.421E-02	6.095E-01	Yes
3/17/1998	0.02675	378.966	6	5.468E+01	2.793E-01	7.727E+00	Yes
10/24/2006	0.0231	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
11/28/2006	0.022	2.748	86.2	3.261E+01	1.666E-03	5.603E-02	Yes
2/25/2003	0.0218	1104.113	1	1.298E+02	6.632E-01	2.251E-01	Yes
1/21/2003	0.0117	22.661	50.9	1.430E+00	7.305E-03	4.620E-01	Yes
12/27/2005	0.0108	17.839	56.4	1.039E+00	5.308E-03	3.637E-01	Yes
9/21/1999	0.00887	0.222	97.4	1.061E-02	5.420E-05	4.522E-03	Yes
1/26/1999	0.00878	318.698	7.8	1.509E+01	7.710E-02	6.498E+00	Yes
7/27/1999	0.00825	7.714	73.5	3.433E-01	1.753E-03	1.573E-01	Yes
9/18/2000	0.00806	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
8/14/2006	0.00753	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
8/8/1995	0.0074	10.125	68.5	4.041E-01	2.064E-03	2.064E-01	Yes
11/19/2001	0.00732	12.536	64.4	4.949E-01	2.528E-03	2.556E-01	Yes

Table J-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
9/17/2002	0.00691	3.375	84.1	1.258E-01	6.426E-04	6.881E-02	Yes
1/28/1997	0.0069	400.181	5.4	1.489E+01	7.608E-02	8.159E+00	Yes
9/10/1996	0.0065	7.714	73.5	2.705E-01	1.382E-03	1.573E-01	Yes
9/17/2001	0.0064	1.157	93.3	3.994E-02	2.040E-04	2.359E-02	Yes
1/25/2000	0.00623	10.125	68.5	3.402E-01	1.738E-03	2.064E-01	Yes
7/23/2002	0.00613	10.607	67.7	3.507E-01	1.791E-03	2.163E-01	Yes
9/21/2004	0.00583	0.227	97.4	7.126E-03	3.640E-05	4.620E-03	Yes
11/22/1999	0.0058	12.536	64.4	3.922E-01	2.003E-03	2.556E-01	Yes
7/21/1998	0.00544	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
7/25/2000	0.00539	0.868	94.7	2.523E-02	1.289E-04	1.769E-02	Yes
4/24/1995	0.0051	525.539	3.7	1.446E+01	7.385E-02	1.071E+01	Yes
9/26/2006	0.00495	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
5/21/1996	0.0048	2.555	86.9	6.616E-02	3.379E-04	5.210E-02	Yes
3/26/2001	0.00461	163.930	17.5	4.076E+00	2.082E-02	3.342E+00	Yes
9/23/2003	0.00452	2.363	87.8	5.760E-02	2.942E-04	4.817E-02	Yes
9/1/1998	0.00449	8.196	72.3	1.985E-01	1.014E-03	1.671E-01	Yes
5/28/2002	0.00434	9.161	70.4	2.144E-01	1.095E-03	1.868E-01	Yes
5/11/2004	0.0042	17.839	56.4	4.041E-01	2.064E-03	3.637E-01	Yes
4/23/1996	0.0039	96.911	24.7	2.039E+00	1.041E-02	1.976E+00	Yes
5/25/1999	0.00381	14.464	61	2.972E-01	1.518E-03	2.949E-01	Yes
12/18/1995	0.0037	103.661	23.6	2.069E+00	1.057E-02	2.113E+00	Yes
7/20/2004	0.00365	8.679	71.4	1.709E-01	8.728E-04	1.769E-01	Yes
7/16/1996	0.0035	22.661	50.9	4.278E-01	2.185E-03	4.620E-01	Yes
3/23/1999	0.00348	64.608	30.5	1.213E+00	6.195E-03	1.317E+00	Yes
6/20/1995	0.00327	8.679	71.4	1.531E-01	7.819E-04	1.769E-01	Yes
7/15/2003	0.00322	15.911	58.9	2.763E-01	1.412E-03	3.244E-01	Yes
5/20/2003	0.00319	109.447	23	1.883E+00	9.619E-03	2.231E+00	Yes
3/27/2000	0.00301	42.429	37.3	6.888E-01	3.519E-03	8.651E-01	Yes
5/22/2001	0.00301	41.465	37.7	6.732E-01	3.439E-03	8.454E-01	Yes
3/11/1997	0.0029	196.233	14.6	3.069E+00	1.568E-02	4.001E+00	Yes
11/30/2004	0.00288	388.127	5.7	6.029E+00	3.080E-02	7.913E+00	Yes
3/16/2004	0.00286	85.822	26.5	1.324E+00	6.763E-03	1.750E+00	Yes
3/26/2002	0.00284	188.037	15.3	2.880E+00	1.471E-02	3.834E+00	Yes
11/11/2003	0.00281	2.121	88.9	3.215E-02	1.642E-04	4.325E-02	Yes
11/5/2002	0.0028	40.500	38.2	6.117E-01	3.124E-03	8.257E-01	Yes
11/16/1998	0.00274	72.804	28.7	1.076E+00	5.496E-03	1.484E+00	Yes
3/25/2003	0.00264	130.179	20.9	1.854E+00	9.469E-03	2.654E+00	Yes
1/2/2007	0.00253	315.805	8.1	4.310E+00	2.201E-02	6.439E+00	Yes
1/30/2001	0.0025	282.537	9.1	3.810E+00	1.946E-02	5.761E+00	Yes
7/24/2001	0.00244	1.688	90.8	2.221E-02	1.134E-04	3.441E-02	Yes
2/20/1996	0.0024	38.090	39.3	4.931E-01	2.519E-03	7.766E-01	Yes
3/13/2007	0.00239	3.664	8.1	4.724E-02	2.413E-04	7.471E-02	Yes
9/26/2006	0.00234	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
11/13/1995	0.0023	4.484	80.7	5.563E-02	2.841E-04	9.142E-02	Yes
12/19/2000	0.00227	366.913	6.3	4.492E+00	2.295E-02	7.481E+00	Yes
2/12/2007	0.00211	24.107	8.1	2.744E-01	1.401E-03	4.915E-01	Yes
5/30/2000	0.0021	94.983	25	1.076E+00	5.496E-03	1.937E+00	Yes
9/27/2005	0.00208	5.786	78	6.491E-02	3.316E-04	1.180E-01	Yes
11/29/2005	0.00192	18.322	55.8	1.897E-01	9.692E-04	3.735E-01	Yes
1/20/2004	0.00181	19.768	54	1.930E-01	9.858E-04	4.030E-01	Yes
5/16/2006	0.00161	2.555	86.9	2.219E-02	1.134E-04	5.210E-02	Yes
11/28/2006	0.00158	2.748	86.2	2.342E-02	1.196E-04	5.603E-02	Yes
5/23/2005	0.00144	10.125	68.5	7.864E-02	4.017E-04	2.064E-01	Yes
7/25/2006	0.00116	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
7/26/2005	0.00104	0.270	97.1	1.515E-03	7.737E-06	5.505E-03	Yes
9/18/2000	0.00092	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
11/13/2006	0.00084	2.314	88	1.049E-02	5.356E-05	4.719E-02	Yes
3/28/2005	0.00078	88.233	26.1	3.712E-01	1.896E-03	1.799E+00	Yes
1/9/1995	0.00025	143.197	19.4	1.931E-01	9.863E-04	2.920E+00	Yes
2/14/1995	0.00025	39.054	38.8	5.266E-02	2.690E-04	7.962E-01	Yes
3/28/1995	0.00025	59.786	31.5	8.062E-02	4.118E-04	1.219E+00	Yes
5/23/1995	0.00025	24.107	49.5	3.251E-02	1.661E-04	4.915E-01	Yes
7/17/1995	0.00025	2.314	88	3.121E-03	1.594E-05	4.719E-02	Yes
9/19/1995	0.00025	1.929	89.8	2.601E-03	1.328E-05	3.932E-02	Yes
10/17/1995	0.00025	6.750	75.7	9.102E-03	4.649E-05	1.376E-01	Yes
1/30/1996	0.00025	29.411	44.7	3.966E-02	2.026E-04	5.996E-01	Yes
3/12/1996	0.00025	21.697	51.9	2.926E-02	1.494E-04	4.424E-01	Yes
6/18/1996	0.00025	14.947	60.3	2.015E-02	1.030E-04	3.047E-01	Yes

Table J-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
11/19/1996	0.00025	36.161	40.4	4.876E-02	2.491E-04	7.373E-01	Yes
1/17/2006	0.00025	65.572	30.2	8.842E-02	4.517E-04	1.337E+00	Yes
4/23/2007	0.00025	3.905	8.1	5.266E-03	2.690E-05	7.962E-02	Yes

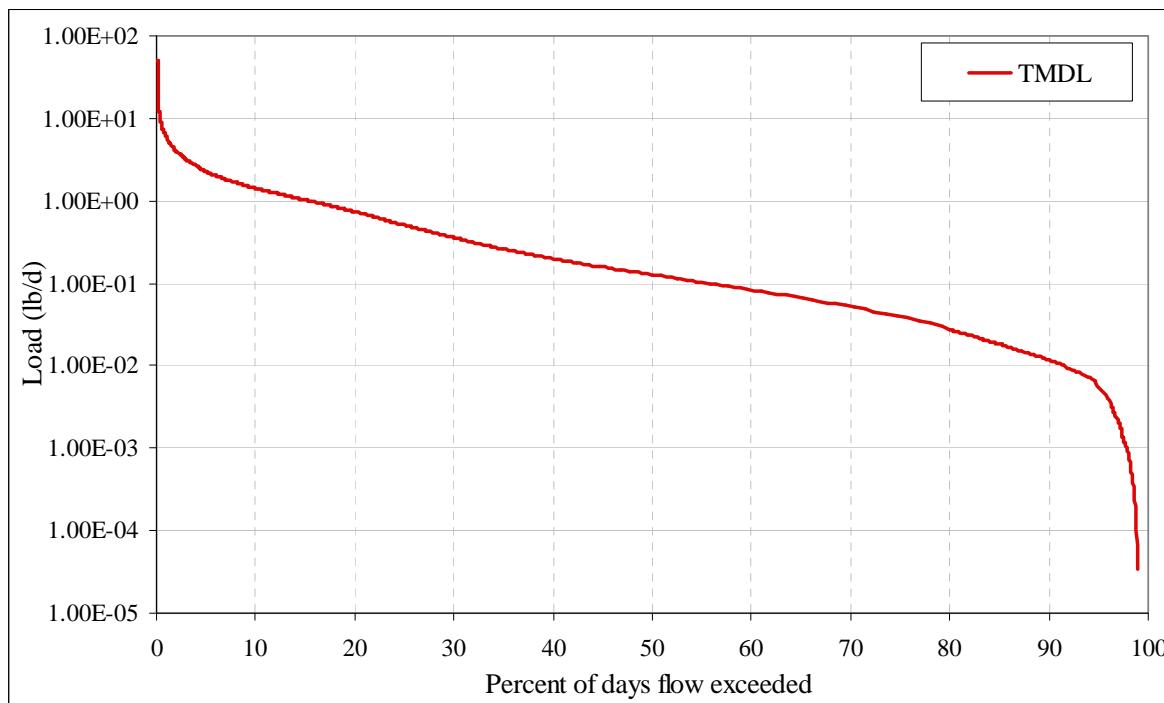


Figure J-2. Copper load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)

Table J-3. Allowable copper load for Bayou De L'Outre (HUC/reach 08040202-007)

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 (lb/day)	Area under TMDL curve (lb/day)
						0.6
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	816.287	0.00	18.4920	0.00E+00
4/26/1958	8060	0.100	916.323	0.00	20.7583	0.00E+00
4/6/1997	8210	0.100	933.375	0.00	21.1445	0.00E+00
4/15/1991	8840	0.100	1004.992	0.00	22.7670	0.00E+00
4/29/1958	11000	0.100	1250.537	0.00	28.3295	0.00E+00
4/28/1991	11400	0.100	1296.008	0.00	29.3596	0.00E+00
4/30/1991	13800	0.100	1568.836	0.00	35.5402	0.00E+00
4/27/1958	18200	0.100	2069.020	0.00	46.8713	0.00E+00
6/9/1974	19100	0.100	2171.330	0.00	49.1890	0.00E+00
4/29/1991	19300	0.100	2194.066	0.10	49.7041	4.97E-02
4/28/1958	20000	0.000	2273.641	0.00	51.5067	0.00E+00

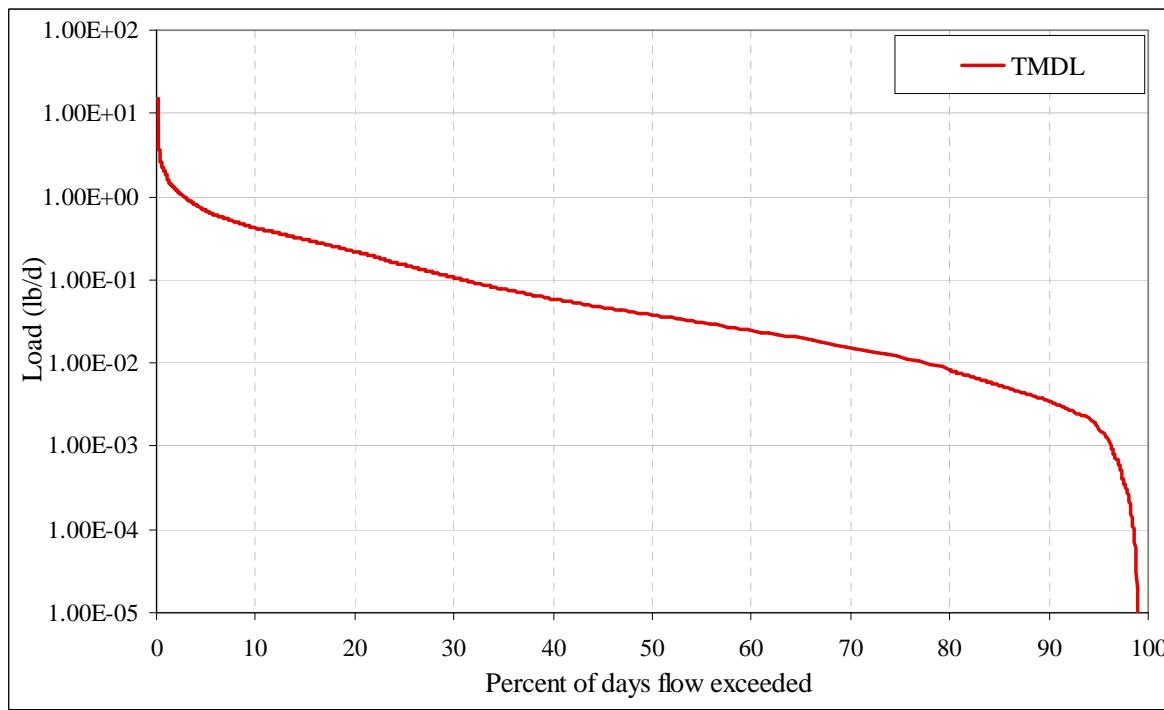


Figure J-3. Copper load duration curve for Bayou De L'Outre (HUC/reach 08040202-008)

Table J-4. Allowable copper load for Bayou De L'Outre (HUC/reach 08040202-008)

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 (lb/day)	Area under TMDL curve (lb/day)
					0.2	
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	242.657	0.00	5.4971	0.00E+00
4/26/1958	8060	0.100	272.395	0.00	6.1708	0.00E+00
4/6/1997	8210	0.100	277.464	0.00	6.2856	0.00E+00
4/15/1991	8840	0.100	298.754	0.00	6.7679	0.00E+00
4/29/1958	11000	0.100	371.747	0.00	8.4215	0.00E+00
4/28/1991	11400	0.100	385.264	0.00	8.7277	0.00E+00
4/30/1991	13800	0.100	466.368	0.00	10.5650	0.00E+00
4/27/1958	18200	0.100	615.057	0.00	13.9334	0.00E+00
6/9/1974	19100	0.100	645.471	0.00	14.6224	0.00E+00
4/29/1991	19300	0.100	652.230	0.10	14.7755	1.48E-02
4/28/1958	20000	0.000	675.885	0.00	15.3114	0.00E+00

Appendix K

Load Duration Curve Summaries and Plots for Lead

Figure K-1. Lead load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Figure K-2. Lead load duration curve for Bayou De L'Outre (HUC/reach 08040202-007).....	6
Figure K-3. Lead load duration curve for Bayou De L'Outre (HUC/reach 08040202-008).....	7
Table K-1. Allowable lead load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Table K-2. Existing load for lead for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	3
Table K-3. Allowable lead load for Bayou De L'Outre (HUC/reach 08040202-007)	6
Table K-4. Allowable lead load for Bayou De L'Outre (HUC/reach 08040202-008)	7

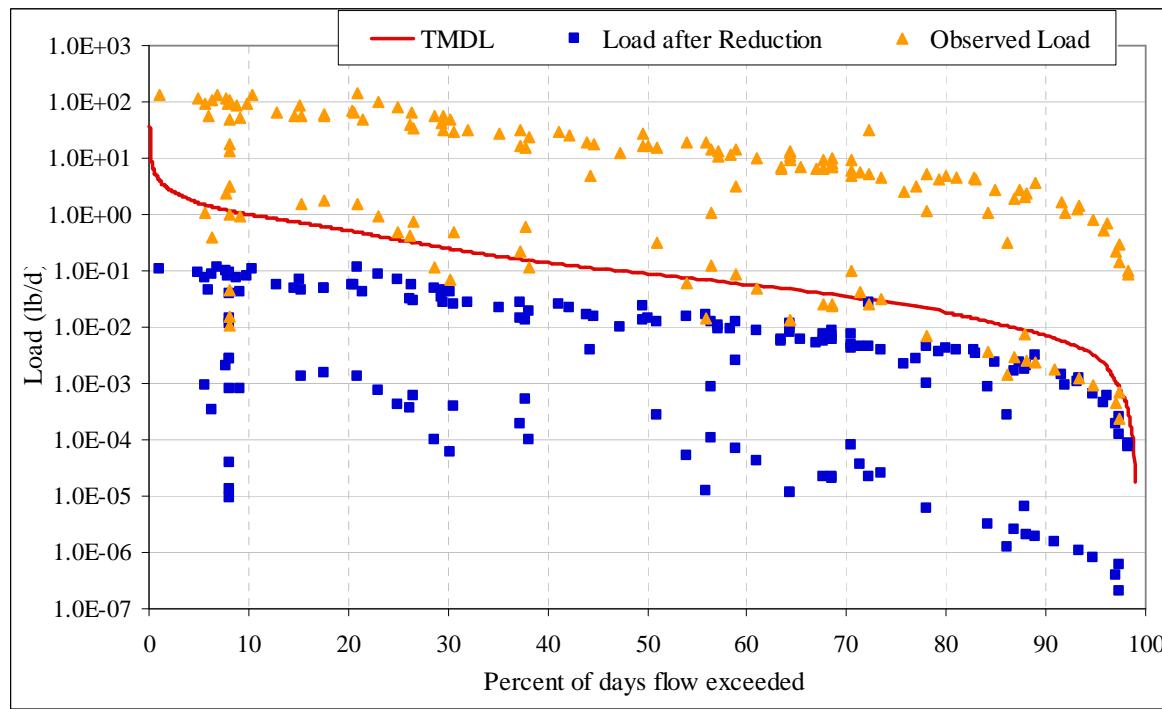


Figure K-1. Lead load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Table K-1. Allowable lead load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

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 (lb/day)	Area under TMDL curve (lb/day)
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	3461.805	0.00	13.0705	0.00E+00
4/26/1958	8060	0.100	3886.093	0.00	14.6725	0.00E+00
4/6/1997	8210	0.100	3958.415	0.00	14.9456	0.00E+00
4/15/1991	8840	0.100	4262.167	0.00	16.0924	0.00E+00
4/29/1958	11000	0.100	5303.602	0.00	20.0245	0.00E+00
4/28/1991	11400	0.100	5496.460	0.00	20.7527	0.00E+00
4/30/1991	13800	0.100	6653.609	0.00	25.1217	0.00E+00
4/27/1958	18200	0.100	8775.050	0.00	33.1315	0.00E+00
6/9/1974	19100	0.100	9208.981	0.00	34.7698	0.00E+00
4/29/1991	19300	0.100	9305.410	0.10	35.1339	3.51E-02
4/28/1958	20000	0.000	9642.912	0.00	36.4082	0.00E+00

Table K-2. Existing load for lead for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
6/21/2005	0.74	8.196	72.3	3.272E+01	2.785E-02	2.785E-02	Yes
11/11/2003	0.327	2.121	88.9	3.742E+00	3.186E-03	7.209E-03	Yes
8/14/2006	0.31	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
7/25/2006	0.249	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/25/2005	0.243	0.530	96.1	6.951E-01	5.918E-04	1.802E-03	Yes
9/21/2004	0.241	0.227	97.4	2.946E-01	2.508E-04	7.700E-04	Yes
9/17/2001	0.235	1.157	93.3	1.467E+00	1.249E-03	3.932E-03	Yes
8/20/2001	0.21575	3.857	82.7	4.489E+00	3.821E-03	1.311E-02	Yes
8/12/2003	0.213	2.459	87.3	2.825E+00	2.405E-03	8.356E-03	Yes
8/22/2000	0.21048	0.087	98.3	9.853E-02	8.388E-05	2.949E-04	Yes
12/16/2003	0.208	24.107	49.5	2.705E+01	2.303E-02	8.192E-02	Yes
8/17/2004	0.204	3.713	83	4.085E+00	3.478E-03	1.262E-02	Yes
4/18/2006	0.203	1.543	91.5	1.689E+00	1.438E-03	5.243E-03	Yes
11/19/2001	0.2018	12.536	64.4	1.364E+01	1.162E-02	4.260E-02	Yes
11/29/2005	0.2	18.322	55.8	1.976E+01	1.683E-02	6.226E-02	Yes
6/27/2006	0.198	4.388	81	4.686E+00	3.989E-03	1.491E-02	Yes
3/25/2003	0.197	130.179	20.9	1.383E+02	1.178E-01	4.424E-01	Yes
11/13/2006	0.196	2.314	88	2.447E+00	2.083E-03	7.864E-03	Yes
8/29/2006	0.193	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/14/2003	0.192	1.205	93.1	1.248E+00	1.063E-03	4.096E-03	Yes
12/5/2006	0.188	4.821	80	4.889E+00	4.162E-03	1.638E-02	Yes
12/20/1999	0.187	12.536	64.4	1.264E+01	1.076E-02	4.260E-02	Yes
5/23/2005	0.187	10.125	68.5	1.021E+01	8.694E-03	3.441E-02	Yes
11/7/2000	0.1834	9.161	70.4	9.062E+00	7.715E-03	3.113E-02	Yes
10/17/2000	0.1779	0.092	98.2	8.790E-02	7.484E-05	3.113E-04	Yes
5/20/2003	0.175	109.447	23	1.033E+02	8.795E-02	3.719E-01	Yes
1/20/2004	0.175	19.768	54	1.866E+01	1.589E-02	6.717E-02	Yes
9/27/2005	0.169	5.786	78	5.274E+00	4.490E-03	1.966E-02	Yes
7/25/2000	0.16845	0.868	94.7	7.885E-01	6.713E-04	2.949E-03	Yes
12/3/2002	0.168	15.911	58.9	1.442E+01	1.227E-02	5.407E-02	Yes
9/23/2003	0.165	2.363	87.8	2.103E+00	1.790E-03	8.028E-03	Yes
3/13/2007	0.163	3.664	8.1	3.222E+00	2.743E-03	1.245E-02	Yes
11/22/1999	0.16164	12.536	64.4	1.093E+01	9.305E-03	4.260E-02	Yes
4/15/2003	0.16038	34.714	41.2	3.003E+01	2.557E-02	1.180E-01	Yes
10/19/1999	0.16	3.134	84.8	2.705E+00	2.303E-03	1.065E-02	Yes
5/30/2000	0.159	94.983	25	8.146E+01	6.935E-02	3.228E-01	Yes
7/23/2002	0.159	10.607	67.7	9.097E+00	7.745E-03	3.604E-02	Yes
7/26/2005	0.154	0.270	97.1	2.243E-01	1.909E-04	9.175E-04	Yes
8/17/1999	0.153	0.627	95.7	5.173E-01	4.404E-04	2.130E-03	Yes
10/23/2001	0.14895	5.304	79.2	4.261E+00	3.628E-03	1.802E-02	Yes
2/29/2000	0.148	68.465	29.6	5.465E+01	4.653E-02	2.326E-01	Yes
4/23/2007	0.148	3.905	8.1	3.118E+00	2.654E-03	1.327E-02	Yes
5/11/2004	0.147	17.839	56.4	1.414E+01	1.204E-02	6.062E-02	Yes
1/25/2000	0.14696	10.125	68.5	8.026E+00	6.833E-03	3.441E-02	Yes
2/14/2006	0.144	86.304	26.3	6.703E+01	5.707E-02	2.933E-01	Yes
1/14/2002	0.14238	33.268	42.1	2.555E+01	2.175E-02	1.130E-01	Yes
11/16/1998	0.142	72.804	28.7	5.576E+01	4.747E-02	2.474E-01	Yes
1/17/2006	0.142	65.572	30.2	5.022E+01	4.276E-02	2.228E-01	Yes
4/3/2007	0.142	61.715	8.1	4.727E+01	4.024E-02	2.097E-01	Yes
10/28/1997	0.139	42.429	37.3	3.181E+01	2.708E-02	1.442E-01	Yes
4/23/2002	0.139	17.357	57.1	1.301E+01	1.108E-02	5.898E-02	Yes
5/16/2006	0.139	2.555	86.9	1.916E+00	1.631E-03	8.683E-03	Yes
6/9/1998	0.137	12.536	64.4	9.263E+00	7.886E-03	4.260E-02	Yes
9/30/1997	0.1365	1.446	91.9	1.065E+00	9.066E-04	4.915E-03	Yes
2/12/2007	0.133	24.107	8.1	1.729E+01	1.472E-02	8.192E-02	Yes
9/29/1998	0.13	10.125	68.5	7.100E+00	6.044E-03	3.441E-02	Yes
5/25/1999	0.13	14.464	61	1.014E+01	8.635E-03	4.915E-02	Yes
12/15/1997	0.128833	23.625	50	1.642E+01	1.398E-02	8.028E-02	Yes
6/27/2000	0.127	10.125	68.5	6.936E+00	5.905E-03	3.441E-02	Yes
10/19/2004	0.126	16.393	58.3	1.114E+01	9.485E-03	5.570E-02	Yes
6/17/2003	0.124	24.107	49.5	1.612E+01	1.373E-02	8.192E-02	Yes
1/21/2003	0.122	22.661	50.9	1.491E+01	1.270E-02	7.700E-02	Yes
9/1/1998	0.121	8.196	72.3	5.349E+00	4.554E-03	2.785E-02	Yes
9/21/1999	0.121	0.222	97.4	1.447E-01	1.232E-04	7.536E-04	Yes

TMDLs for Cl, SO₄, TDS, Cu, Pb, and Zn in the Bayou de L'Outre Basin, Arkansas

Table K-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
8/11/1998	0.119	9.161	70.4	5.880E+00	5.006E-03	3.113E-02	Yes
4/26/2005	0.118	17.357	57.1	1.105E+01	9.405E-03	5.898E-02	Yes
7/20/2004	0.117	8.679	71.4	5.477E+00	4.663E-03	2.949E-02	Yes
4/14/1998	0.115371	30.375	44	1.890E+01	1.609E-02	1.032E-01	Yes
2/6/2007	0.115	21.697	8.1	1.346E+01	1.146E-02	7.373E-02	Yes
5/19/1998	0.114	10.607	67.7	6.522E+00	5.553E-03	3.604E-02	Yes
7/27/1999	0.112	7.714	73.5	4.660E+00	3.968E-03	2.621E-02	Yes
4/24/2000	0.111	12.054	65.3	7.217E+00	6.144E-03	4.096E-02	Yes
4/27/1999	0.11031	29.411	44.7	1.750E+01	1.490E-02	9.994E-02	Yes
2/26/2002	0.109	69.429	29.4	4.082E+01	3.475E-02	2.359E-01	Yes
11/5/2002	0.106	40.500	38.2	2.316E+01	1.971E-02	1.376E-01	Yes
6/19/2001	0.1051	11.089	66.9	6.286E+00	5.352E-03	3.768E-02	Yes
2/23/1999	0.104	47.732	35.2	2.678E+01	2.280E-02	1.622E-01	Yes
8/26/1997	0.102153	13.018	63.5	7.173E+00	6.107E-03	4.424E-02	Yes
5/28/2002	0.102	9.161	70.4	5.040E+00	4.291E-03	3.113E-02	Yes
2/22/2005	0.101	58.340	31.9	3.178E+01	2.706E-02	1.982E-01	Yes
7/22/1997	0.095939	6.268	76.9	3.243E+00	2.761E-03	2.130E-02	Yes
4/13/2004	0.0942	134.519	20.4	6.835E+01	5.819E-02	4.571E-01	Yes
5/15/2004	0.0938	257.466	10.4	1.303E+02	1.109E-01	8.749E-01	Yes
8/20/2002	0.09126	13.018	63.5	6.408E+00	5.455E-03	4.424E-02	Yes
12/11/2001	0.0909	133.554	20.5	6.548E+01	5.575E-02	4.538E-01	Yes
5/13/1997	0.084899	26.518	47.2	1.214E+01	1.034E-02	9.011E-02	Yes
4/15/1997	0.084756	68.465	29.6	3.130E+01	2.665E-02	2.326E-01	Yes
3/23/1999	0.0842	64.608	30.5	2.934E+01	2.498E-02	2.195E-01	Yes
12/22/1998	0.0826	189.001	15.2	8.420E+01	7.169E-02	6.422E-01	Yes
3/28/2005	0.0796	88.233	26.1	3.788E+01	3.225E-02	2.998E-01	Yes
3/16/2004	0.0732	85.822	26.5	3.388E+01	2.885E-02	2.916E-01	Yes
3/27/2000	0.0722	42.429	37.3	1.652E+01	1.407E-02	1.442E-01	Yes
1/20/1998	0.07196	123.911	21.5	4.809E+01	4.095E-02	4.211E-01	Yes
4/17/2001	0.07146	342.806	6.9	1.321E+02	1.125E-01	1.165E+00	Yes
6/25/2002	0.07083	6.750	75.7	2.579E+00	2.195E-03	2.294E-02	Yes
1/26/1999	0.0686	318.698	7.8	1.179E+02	1.004E-01	1.083E+00	Yes
5/2/2001	0.06828	41.465	37.7	1.527E+01	1.300E-02	1.409E-01	Yes
3/26/2001	0.0664	163.930	17.5	5.871E+01	4.998E-02	5.570E-01	Yes
2/17/1998	0.06538	270.002	9.8	9.521E+01	8.106E-02	9.175E-01	Yes
1/2/2007	0.0628	315.805	8.1	1.070E+02	9.107E-02	1.073E+00	Yes
2/27/2001	0.0627	163.930	17.5	5.544E+01	4.720E-02	5.570E-01	Yes
9/17/2002	0.0579	3.375	84.1	1.054E+00	8.973E-04	1.147E-02	Yes
6/29/1999	0.0552	315.805	7.9	9.403E+01	8.005E-02	1.073E+00	Yes
12/14/2004	0.055	218.412	12.9	6.479E+01	5.516E-02	7.422E-01	Yes
2/25/1997	0.054446	290.734	8.8	8.538E+01	7.269E-02	9.879E-01	Yes
3/26/2002	0.05427	188.037	15.3	5.504E+01	4.686E-02	6.390E-01	Yes
3/11/1997	0.053619	196.233	14.6	5.675E+01	4.832E-02	6.668E-01	Yes
12/19/2000	0.053	366.913	6.3	1.049E+02	8.930E-02	1.247E+00	Yes
7/21/1998	0.0491	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
2/17/2004	0.0485	427.181	4.9	1.117E+02	9.514E-02	1.452E+00	Yes
11/30/2004	0.0433	388.127	5.7	9.065E+01	7.717E-02	1.319E+00	Yes
10/15/2002	0.0364	5.786	78	1.136E+00	9.671E-04	1.966E-02	Yes
7/15/2003	0.0359	15.911	58.9	3.081E+00	2.623E-03	5.407E-02	Yes
1/30/2001	0.03321	282.537	9.1	5.061E+01	4.309E-02	9.601E-01	Yes
4/28/1999	0.0294	29.893	44.3	4.740E+00	4.036E-03	1.016E-01	Yes
3/17/1998	0.02675	378.966	6	5.468E+01	4.655E-02	1.288E+00	Yes
10/24/2006	0.0231	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
11/28/2006	0.022	2.748	86.2	3.261E-01	2.776E-04	9.339E-03	Yes
2/25/2003	0.0218	1104.113	1	1.298E+02	1.105E-01	3.752E+00	Yes
12/27/2005	0.0108	17.839	56.4	1.039E+00	8.847E-04	6.062E-02	Yes
9/18/2000	0.00806	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/26/2006	0.00495	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
5/2/2001	0.00278	41.465	37.7	6.217E-01	5.293E-04	1.409E-01	Yes
1/21/2003	0.00259	22.661	50.9	3.166E-01	2.695E-04	7.700E-02	Yes
3/25/2003	0.00224	130.179	20.9	1.573E+00	1.339E-03	4.424E-01	Yes
3/26/2001	0.00203	163.930	17.5	1.795E+00	1.528E-03	5.570E-01	Yes
5/28/2002	0.00198	9.161	70.4	9.783E-02	8.329E-05	3.113E-02	Yes
3/16/2004	0.00158	85.822	26.5	7.314E-01	6.227E-04	2.916E-01	Yes

Table K-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
5/20/2003	0.00154	109.447	23	9.091E-01	7.740E-04	3.719E-01	Yes
3/26/2002	0.00151	188.037	15.3	1.531E+00	1.304E-03	6.390E-01	Yes
1/26/1999	0.00138	318.698	7.8	2.372E+00	2.020E-03	1.083E+00	Yes
3/23/1999	0.00136	64.608	30.5	4.739E-01	4.035E-04	2.195E-01	Yes
5/11/2004	0.00129	17.839	56.4	1.241E-01	1.057E-04	6.062E-02	Yes
7/21/1998	0.00113	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
7/15/2003	0.00099	15.911	58.9	8.496E-02	7.233E-05	5.407E-02	Yes
5/30/2000	0.00098	94.983	25	5.021E-01	4.274E-04	3.228E-01	Yes
3/27/2000	0.00097	42.429	37.3	2.220E-01	1.890E-04	1.442E-01	Yes
7/20/2004	0.00091	8.679	71.4	4.260E-02	3.627E-05	2.949E-02	Yes
3/28/2005	0.00087	88.233	26.1	4.140E-01	3.525E-04	2.998E-01	Yes
3/13/2007	0.00077	3.664	8.1	1.522E-02	1.296E-05	1.245E-02	Yes
7/27/1999	0.00074	7.714	73.5	3.079E-02	2.621E-05	2.621E-02	Yes
5/25/1999	0.00063	14.464	61	4.915E-02	4.184E-05	4.915E-02	Yes
1/30/2001	0.00061	282.537	9.1	9.296E-01	7.914E-04	9.601E-01	Yes
9/23/2003	0.00061	2.363	87.8	7.773E-03	6.618E-06	8.028E-03	Yes
9/21/1999	0.00059	0.222	97.4	7.058E-04	6.009E-07	7.536E-04	Yes
9/1/1998	0.00058	8.196	72.3	2.564E-02	2.183E-05	2.785E-02	Yes
1/2/2007	0.00057	315.805	8.1	9.709E-01	8.266E-04	1.073E+00	Yes
1/20/2004	0.00056	19.768	54	5.971E-02	5.083E-05	6.717E-02	Yes
11/5/2002	0.00053	40.500	38.2	1.158E-01	9.857E-05	1.376E-01	Yes
11/30/2004	0.00052	388.127	5.7	1.089E+00	9.268E-04	1.319E+00	Yes
4/23/2007	0.00051	3.905	8.1	1.074E-02	9.146E-06	1.327E-02	Yes
1/25/2000	0.00047	10.125	68.5	2.567E-02	2.185E-05	3.441E-02	Yes
7/23/2002	0.00045	10.607	67.7	2.575E-02	2.192E-05	3.604E-02	Yes
5/23/2005	0.00044	10.125	68.5	2.403E-02	2.046E-05	3.441E-02	Yes
7/25/2006	0.00039	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
2/12/2007	0.00036	24.107	8.1	4.681E-02	3.985E-05	8.192E-02	Yes
7/26/2005	0.00031	0.270	97.1	4.515E-04	3.844E-07	9.175E-04	Yes
11/16/1998	0.0003	72.804	28.7	1.178E-01	1.003E-04	2.474E-01	Yes
9/27/2005	0.00022	5.786	78	6.866E-03	5.845E-06	1.966E-02	Yes
5/16/2006	0.00022	2.555	86.9	3.032E-03	2.582E-06	8.683E-03	Yes
11/22/1999	0.0002	12.536	64.4	1.352E-02	1.151E-05	4.260E-02	Yes
7/25/2000	0.0002	0.868	94.7	9.362E-04	7.970E-07	2.949E-03	Yes
9/18/2000	0.0002	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
12/19/2000	0.0002	366.913	6.3	3.958E-01	3.370E-04	1.247E+00	Yes
7/24/2001	0.0002	1.688	90.8	1.820E-03	1.550E-06	5.734E-03	Yes
9/17/2001	0.0002	1.157	93.3	1.248E-03	1.063E-06	3.932E-03	Yes
11/19/2001	0.0002	12.536	64.4	1.352E-02	1.151E-05	4.260E-02	Yes
9/17/2002	0.0002	3.375	84.1	3.641E-03	3.100E-06	1.147E-02	Yes
11/11/2003	0.0002	2.121	88.9	2.289E-03	1.948E-06	7.209E-03	Yes
9/21/2004	0.0002	0.227	97.4	2.445E-04	2.081E-07	7.700E-04	Yes
1/17/2006	0.0002	65.572	30.2	7.074E-02	6.022E-05	2.228E-01	Yes
8/14/2006	0.0002	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/26/2006	0.0002	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
11/13/2006	0.0002	2.314	88	2.497E-03	2.125E-06	7.864E-03	Yes
11/29/2005	0.00015	18.322	55.8	1.482E-02	1.262E-05	6.226E-02	Yes
11/28/2006	0.0001	2.748	86.2	1.482E-03	1.262E-06	9.339E-03	Yes

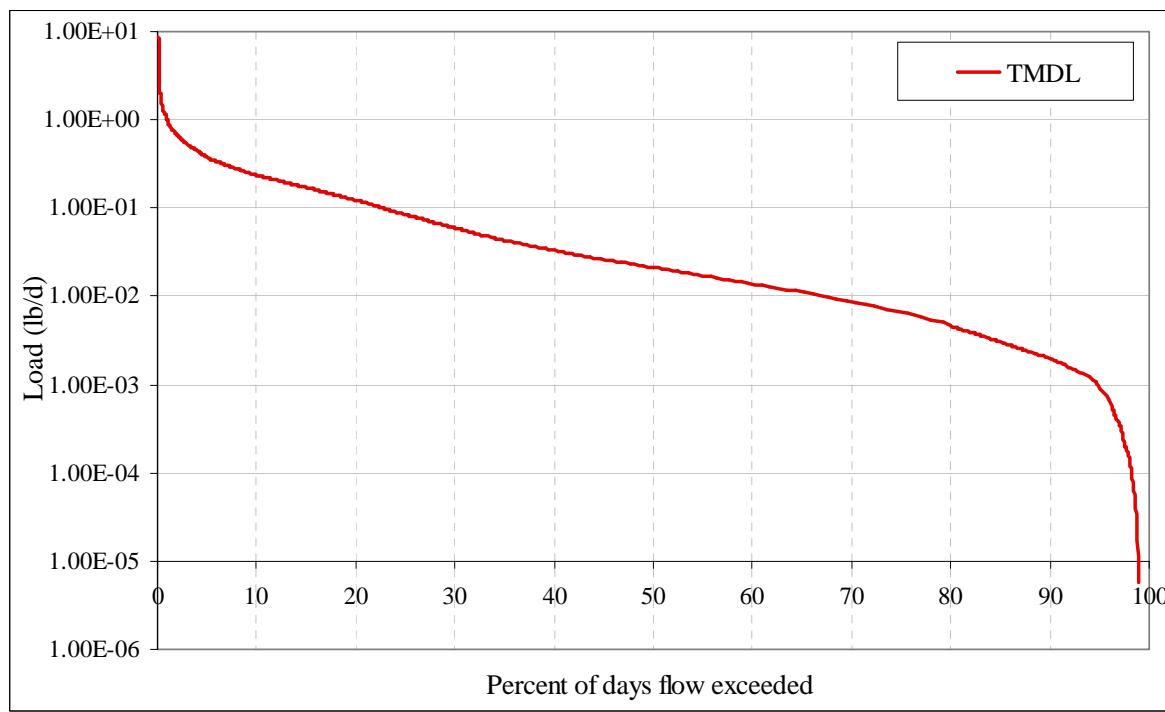


Figure K-2. Lead load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)

Table K-3. Allowable lead load for Bayou De L'Outre (HUC/reach 08040202-007)

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 (lb/day)	Area under TMDL curve (lb/day)
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	816.287	0.00	3.0820	0.00E+00
4/26/1958	8060	0.100	916.323	0.00	3.4597	0.00E+00
4/6/1997	8210	0.100	933.375	0.00	3.5241	0.00E+00
4/15/1991	8840	0.100	1004.992	0.00	3.7945	0.00E+00
4/29/1958	11000	0.100	1250.537	0.00	4.7216	0.00E+00
4/28/1991	11400	0.100	1296.008	0.00	4.8933	0.00E+00
4/30/1991	13800	0.100	1568.836	0.00	5.9234	0.00E+00
4/27/1958	18200	0.100	2069.020	0.00	7.8119	0.00E+00
6/9/1974	19100	0.100	2171.330	0.00	8.1982	0.00E+00
4/29/1991	19300	0.100	2194.066	0.10	8.2840	8.28E-03
4/28/1958	20000	0.000	2273.641	0.00	8.5845	0.00E+00

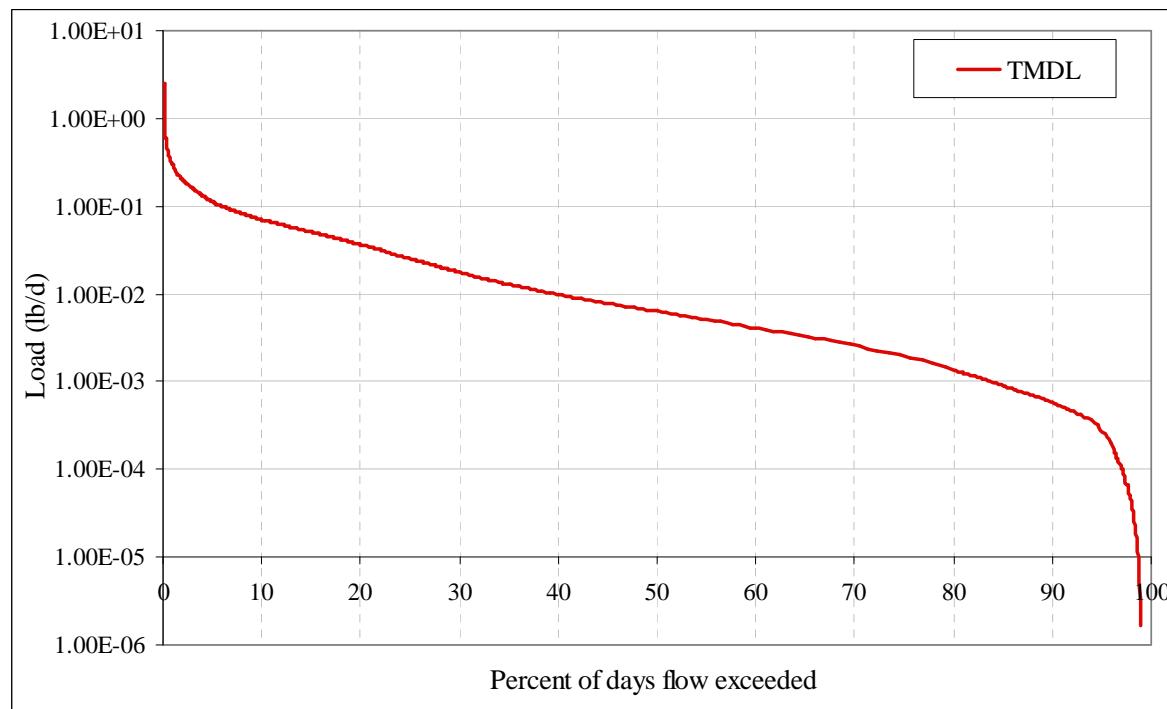


Figure K-3. Lead load duration curve for Bayou De L'Outre (HUC/reach 08040202-008)

Table K-4. Allowable lead load for Bayou De L'Outre (HUC/reach 08040202-008)

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 (lb/day)	Area under TMDL curve (lb/day)
						0.0
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	242.657	0.00	0.9162	0.00E+00
4/26/1958	8060	0.100	272.395	0.00	1.0285	0.00E+00
4/6/1997	8210	0.100	277.464	0.00	1.0476	0.00E+00
4/15/1991	8840	0.100	298.754	0.00	1.1280	0.00E+00
4/29/1958	11000	0.100	371.747	0.00	1.4036	0.00E+00
4/28/1991	11400	0.100	385.264	0.00	1.4546	0.00E+00
4/30/1991	13800	0.100	466.368	0.00	1.7608	0.00E+00
4/27/1958	18200	0.100	615.057	0.00	2.3222	0.00E+00
6/9/1974	19100	0.100	645.471	0.00	2.4371	0.00E+00
4/29/1991	19300	0.100	652.230	0.10	2.4626	2.46E-03
4/28/1958	20000	0.000	675.885	0.00	2.5519	0.00E+00

Appendix L

Load Duration Curve Summaries and Plots for Zinc

Figure L-1. Zinc load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Figure L-2. Zinc load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)	6
Figure L-3. Zinc load duration curve for Bayou De L'Outre (HUC/reach 08040202-008).....	7
Table L-1. Allowable zinc load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	2
Table L-2. Existing load for zinc for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006).....	3
Table L-3. Allowable zinc load for Bayou De L'Outre (HUC/reach 08040202-007).....	6
Table L-4. Allowable zinc load for Bayou De L'Outre (HUC/reach 08040202-008).....	7

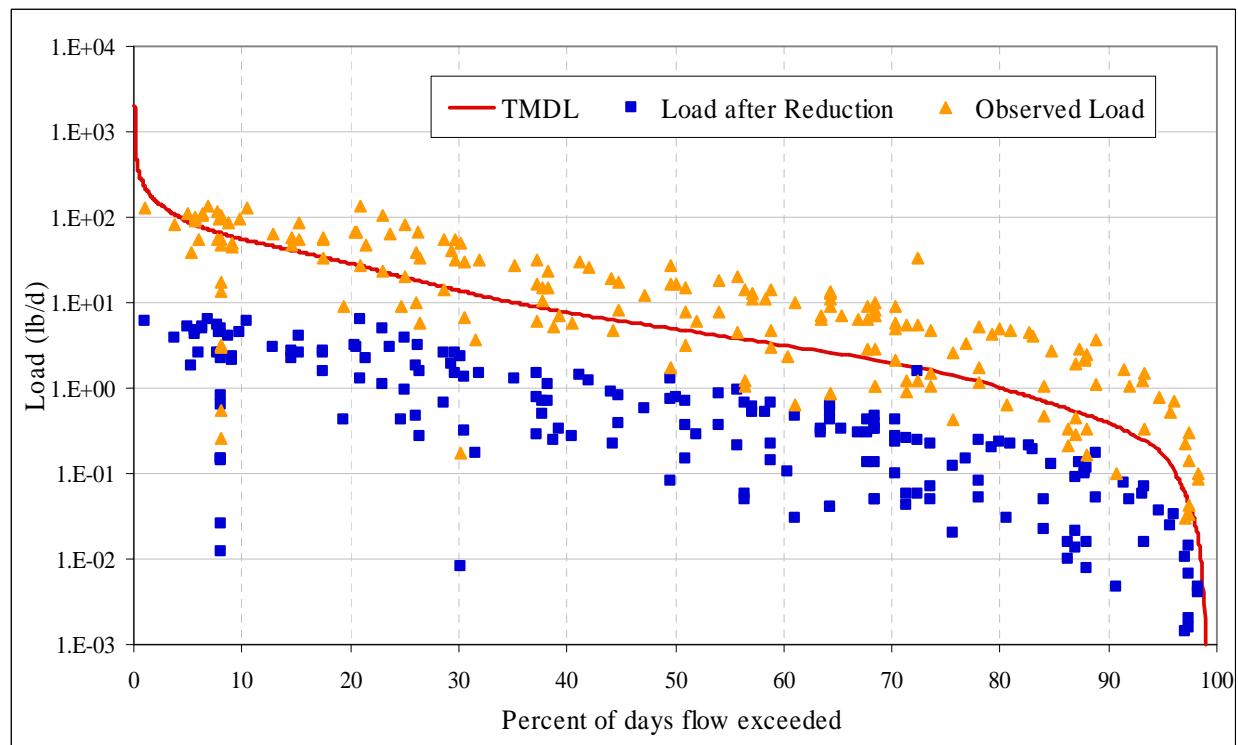


Figure L-1. Zinc load duration curve for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Table L-1. Allowable zinc load for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

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 (lb/day)	Area under TMDL curve (lb/day)
						22.5
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	3461.805	0.00	722.6143	0.00E+00
4/26/1958	8060	0.100	3886.093	0.00	811.1798	0.00E+00
4/6/1997	8210	0.100	3958.415	0.00	826.2762	0.00E+00
4/15/1991	8840	0.100	4262.167	0.00	889.6811	0.00E+00
4/29/1958	11000	0.100	5303.602	0.00	1107.0692	0.00E+00
4/28/1991	11400	0.100	5496.460	0.00	1147.3263	0.00E+00
4/30/1991	13800	0.100	6653.609	0.00	1388.8686	0.00E+00
4/27/1958	18200	0.100	8775.050	0.00	1831.6963	0.00E+00
6/9/1974	19100	0.100	9208.981	0.00	1922.2747	0.00E+00
4/29/1991	19300	0.100	9305.410	0.10	1942.4032	1.94E+00
4/28/1958	20000	0.000	9642.912	0.00	2012.8531	0.00E+00

Table L-2. Existing load for zinc for station OUA0005 for Bayou De L'Outre (HUC/reach 08040202-006)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
6/21/2005	0.74	8.196	72.3	3.272E+01	0.000E+00	1.540E+00	Yes
11/11/2003	0.327	2.121	88.9	3.742E+00	0.000E+00	3.985E-01	Yes
8/14/2006	0.31	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
7/25/2006	0.249	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/25/2005	0.243	0.530	96.1	6.951E-01	0.000E+00	9.964E-02	Yes
9/21/2004	0.241	0.227	97.4	2.946E-01	0.000E+00	4.257E-02	Yes
9/17/2001	0.235	1.157	93.3	1.467E+00	0.000E+00	2.174E-01	Yes
8/20/2001	0.21575	3.857	82.7	4.489E+00	0.000E+00	7.246E-01	Yes
8/12/2003	0.213	2.459	87.3	2.825E+00	0.000E+00	4.619E-01	Yes
8/22/2000	0.21048	0.087	98.3	9.853E-02	0.000E+00	1.630E-02	Yes
12/16/2003	0.208	24.107	49.5	2.705E+01	0.000E+00	4.529E+00	Yes
8/17/2004	0.204	3.713	83	4.085E+00	0.000E+00	6.975E-01	Yes
4/18/2006	0.203	1.543	91.5	1.689E+00	0.000E+00	2.899E-01	Yes
11/19/2001	0.2018	12.536	64.4	1.364E+01	0.000E+00	2.355E+00	Yes
11/29/2005	0.2	18.322	55.8	1.976E+01	0.000E+00	3.442E+00	Yes
6/27/2006	0.198	4.388	81	4.686E+00	0.000E+00	8.243E-01	Yes
3/25/2003	0.197	130.179	20.9	1.383E+02	0.000E+00	2.446E+01	Yes
11/13/2006	0.196	2.314	88	2.447E+00	0.000E+00	4.348E-01	Yes
8/29/2006	0.193	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
10/14/2003	0.192	1.205	93.1	1.248E+00	0.000E+00	2.264E-01	Yes
12/5/2006	0.188	4.821	80	4.889E+00	0.000E+00	9.058E-01	Yes
12/20/1999	0.187	12.536	64.4	1.264E+01	0.000E+00	2.355E+00	Yes
5/23/2005	0.187	10.125	68.5	1.021E+01	0.000E+00	1.902E+00	Yes
11/7/2000	0.1834	9.161	70.4	9.062E+00	0.000E+00	1.721E+00	Yes
10/17/2000	0.1779	0.092	98.2	8.790E-02	0.000E+00	1.721E-02	Yes
5/20/2003	0.175	109.447	23	1.033E+02	0.000E+00	2.056E+01	Yes
1/20/2004	0.175	19.768	54	1.866E+01	0.000E+00	3.714E+00	Yes
9/23/2003	0.172	2.363	87.8	2.192E+00	0.000E+00	4.438E-01	Yes
9/27/2005	0.169	5.786	78	5.274E+00	0.000E+00	1.087E+00	Yes
7/25/2000	0.16845	0.868	94.7	7.885E-01	0.000E+00	1.630E-01	Yes
12/3/2002	0.168	15.911	58.9	1.442E+01	0.000E+00	2.989E+00	Yes
9/23/2003	0.165	2.363	87.8	2.103E+00	0.000E+00	4.438E-01	Yes
3/13/2007	0.163	3.664	8.1	3.222E+00	0.000E+00	6.884E-01	Yes
11/22/1999	0.16164	12.536	64.4	1.093E+01	0.000E+00	2.355E+00	Yes
4/15/2003	0.16038	34.714	41.2	3.003E+01	0.000E+00	6.522E+00	Yes
10/19/1999	0.16	3.134	84.8	2.705E+00	0.000E+00	5.888E-01	Yes
5/30/2000	0.159	94.983	25	8.146E+01	0.000E+00	1.784E+01	Yes
7/23/2002	0.159	10.607	67.7	9.097E+00	0.000E+00	1.993E+00	Yes
7/26/2005	0.154	0.270	97.1	2.243E-01	0.000E+00	5.072E-02	Yes
8/17/1999	0.153	0.627	95.7	5.173E-01	0.000E+00	1.178E-01	Yes
10/23/2001	0.14895	5.304	79.2	4.261E+00	0.000E+00	9.964E-01	Yes
2/29/2000	0.148	68.465	29.6	5.465E+01	0.000E+00	1.286E+01	Yes
4/23/2007	0.148	3.905	8.1	3.118E+00	0.000E+00	7.337E-01	Yes
5/11/2004	0.147	17.839	56.4	1.414E+01	0.000E+00	3.351E+00	Yes
1/25/2000	0.14696	10.125	68.5	8.026E+00	0.000E+00	1.902E+00	Yes
2/14/2006	0.144	86.304	26.3	6.703E+01	0.000E+00	1.621E+01	Yes
1/14/2002	0.14238	33.268	42.1	2.555E+01	0.000E+00	6.250E+00	Yes
11/16/1998	0.142	72.804	28.7	5.576E+01	0.000E+00	1.368E+01	Yes
1/17/2006	0.142	65.572	30.2	5.022E+01	0.000E+00	1.232E+01	Yes
4/3/2007	0.142	61.715	8.1	4.727E+01	0.000E+00	1.159E+01	Yes
10/28/1997	0.139	42.429	37.3	3.181E+01	0.000E+00	7.971E+00	Yes
4/23/2002	0.139	17.357	57.1	1.301E+01	0.000E+00	3.261E+00	Yes
5/16/2006	0.139	2.555	86.9	1.916E+00	0.000E+00	4.801E-01	Yes
6/9/1998	0.137	12.536	64.4	9.263E+00	0.000E+00	2.355E+00	Yes
9/30/1997	0.1365	1.446	91.9	1.065E+00	0.000E+00	2.717E-01	Yes
2/12/2007	0.133	24.107	8.1	1.729E+01	0.000E+00	4.529E+00	Yes
9/29/1998	0.13	10.125	68.5	7.100E+00	0.000E+00	1.902E+00	Yes
5/25/1999	0.13	14.464	61	1.014E+01	0.000E+00	2.717E+00	Yes
12/15/1997	0.128833	23.625	50	1.642E+01	0.000E+00	4.438E+00	Yes
6/27/2000	0.127	10.125	68.5	6.936E+00	0.000E+00	1.902E+00	Yes
10/19/2004	0.126	16.393	58.3	1.114E+01	0.000E+00	3.080E+00	Yes
6/17/2003	0.124	24.107	49.5	1.612E+01	0.000E+00	4.529E+00	Yes
1/21/2003	0.122	22.661	50.9	1.491E+01	0.000E+00	4.257E+00	Yes
9/1/1998	0.121	8.196	72.3	5.349E+00	0.000E+00	1.540E+00	Yes
9/21/1999	0.121	0.222	97.4	1.447E-01	0.000E+00	4.167E-02	Yes

Table L-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
8/11/1998	0.119	9.161	70.4	5.880E+00	0.000E+00	1.721E+00	Yes
4/26/2005	0.118	17.357	57.1	1.105E+01	0.000E+00	3.261E+00	Yes
7/20/2004	0.117	8.679	71.4	5.477E+00	0.000E+00	1.630E+00	Yes
12/18/1995	0.116	103.661	23.6	6.486E+01	0.000E+00	1.947E+01	Yes
4/14/1998	0.115371	30.375	44	1.890E+01	0.000E+00	5.706E+00	Yes
2/6/2007	0.115	21.697	8.1	1.346E+01	0.000E+00	4.076E+00	Yes
5/19/1998	0.114	10.607	67.7	6.522E+00	0.000E+00	1.993E+00	Yes
7/27/1999	0.112	7.714	73.5	4.660E+00	0.000E+00	1.449E+00	Yes
4/24/2000	0.111	12.054	65.3	7.217E+00	0.000E+00	2.264E+00	Yes
4/27/1999	0.11031	29.411	44.7	1.750E+01	0.000E+00	5.525E+00	Yes
2/26/2002	0.109	69.429	29.4	4.082E+01	0.000E+00	1.304E+01	Yes
11/5/2002	0.106	40.500	38.2	2.316E+01	0.000E+00	7.609E+00	Yes
6/19/2001	0.1051	11.089	66.9	6.286E+00	0.000E+00	2.083E+00	Yes
2/23/1999	0.104	47.732	35.2	2.678E+01	0.000E+00	8.967E+00	Yes
8/26/1997	0.102153	13.018	63.5	7.173E+00	0.000E+00	2.446E+00	Yes
5/28/2002	0.102	9.161	70.4	5.040E+00	0.000E+00	1.721E+00	Yes
2/22/2005	0.101	58.340	31.9	3.178E+01	0.000E+00	1.096E+01	Yes
11/11/2003	0.0965	2.121	88.9	1.104E+00	0.000E+00	3.985E-01	Yes
7/22/1997	0.095939	6.268	76.9	3.243E+00	0.000E+00	1.178E+00	Yes
4/13/2004	0.0942	134.519	20.4	6.835E+01	0.000E+00	2.527E+01	Yes
5/15/2004	0.0938	257.466	10.4	1.303E+02	0.000E+00	4.837E+01	Yes
8/20/2002	0.09126	13.018	63.5	6.408E+00	0.000E+00	2.446E+00	Yes
12/11/2001	0.0909	133.554	20.5	6.548E+01	0.000E+00	2.509E+01	Yes
5/13/1997	0.084899	26.518	47.2	1.214E+01	0.000E+00	4.982E+00	Yes
4/15/1997	0.084756	68.465	29.6	3.130E+01	0.000E+00	1.286E+01	Yes
3/23/1999	0.0842	64.608	30.5	2.934E+01	0.000E+00	1.214E+01	Yes
12/22/1998	0.0826	189.001	15.2	8.420E+01	0.000E+00	3.551E+01	Yes
3/28/2005	0.0796	88.233	26.1	3.788E+01	0.000E+00	1.658E+01	Yes
3/16/2004	0.0732	85.822	26.5	3.388E+01	0.000E+00	1.612E+01	Yes
1/20/2004	0.0725	19.768	54	7.730E+00	0.000E+00	3.714E+00	Yes
3/27/2000	0.0722	42.429	37.3	1.652E+01	0.000E+00	7.971E+00	Yes
1/20/1998	0.07196	123.911	21.5	4.809E+01	0.000E+00	2.328E+01	Yes
4/17/2001	0.071146	342.806	6.9	1.321E+02	0.000E+00	6.440E+01	Yes
6/25/2002	0.07083	6.750	75.7	2.579E+00	0.000E+00	1.268E+00	Yes
11/5/2002	0.0686	40.500	38.2	1.499E+01	0.000E+00	7.609E+00	Yes
1/26/1999	0.0686	318.698	7.8	1.179E+02	0.000E+00	5.987E+01	Yes
5/22/2001	0.06828	41.465	37.7	1.527E+01	0.000E+00	7.790E+00	Yes
7/21/1998	0.0666	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
3/26/2001	0.0664	163.930	17.5	5.871E+01	0.000E+00	3.080E+01	Yes
2/17/1998	0.06538	270.002	9.8	9.521E+01	0.000E+00	5.072E+01	Yes
1/21/2003	0.0638	22.661	50.9	7.798E+00	0.000E+00	4.257E+00	Yes
1/2/2007	0.0628	315.805	8.1	1.070E+02	0.000E+00	5.933E+01	Yes
2/27/2001	0.0627	163.930	17.5	5.544E+01	0.000E+00	3.080E+01	Yes
9/17/2002	0.0579	3.375	84.1	1.054E+00	0.000E+00	6.340E-01	Yes
9/27/2005	0.0559	5.786	78	1.744E+00	0.000E+00	1.087E+00	Yes
12/19/2000	0.0554	366.913	6.3	1.096E+02	0.000E+00	6.893E+01	Yes
6/29/1999	0.0552	315.805	7.9	9.403E+01	0.000E+00	5.933E+01	Yes
12/14/2004	0.055	218.412	12.9	6.479E+01	0.000E+00	4.103E+01	Yes
2/25/1997	0.054446	290.734	8.8	8.538E+01	0.000E+00	5.462E+01	Yes
9/17/2001	0.0544	1.157	93.3	3.395E-01	0.000E+00	2.174E-01	Yes
3/26/2002	0.05427	188.037	15.3	5.504E+01	0.000E+00	3.533E+01	Yes
7/15/2003	0.054	15.911	58.9	4.634E+00	0.000E+00	2.989E+00	Yes
3/11/1997	0.053619	196.233	14.6	5.675E+01	0.000E+00	3.687E+01	Yes
1/25/2000	0.0534	10.125	68.5	2.916E+00	0.000E+00	1.902E+00	Yes
12/19/2000	0.053	366.913	6.3	1.049E+02	0.000E+00	6.893E+01	Yes
1/30/1996	0.0523	29.411	44.7	8.297E+00	0.000E+00	5.525E+00	Yes
3/12/1996	0.0507	21.697	51.9	5.933E+00	0.000E+00	4.076E+00	Yes
7/21/1998	0.0491	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
7/23/2002	0.049	10.607	67.7	2.803E+00	0.000E+00	1.993E+00	Yes
2/17/2004	0.0485	427.181	4.9	1.117E+02	0.000E+00	8.025E+01	Yes
11/30/2004	0.0478	388.127	5.7	1.001E+02	0.000E+00	7.292E+01	Yes
5/22/2001	0.0464	41.465	37.7	1.038E+01	0.000E+00	7.790E+00	Yes
11/29/2005	0.0462	18.322	55.8	4.566E+00	0.000E+00	3.442E+00	Yes
3/11/1997	0.0453	196.233	14.6	4.795E+01	0.000E+00	3.687E+01	Yes

Table L-2. (continued)

Date	Observed Concentration (mg/L)	Flow/unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Current load (lbs/day)	Reduced load (lbs/day)	Allowable load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow load?
5/28/2002	0.0437	9.161	70.4	2.159E+00	0.000E+00	1.721E+00	Yes
11/30/2004	0.0433	388.127	5.7	9.065E+01	0.000E+00	7.292E+01	Yes
5/20/2003	0.0404	109.447	23	2.385E+01	0.000E+00	2.056E+01	Yes
5/30/2000	0.0392	94.983	25	2.008E+01	0.000E+00	1.784E+01	Yes
3/25/2003	0.0384	130.179	20.9	2.696E+01	0.000E+00	2.446E+01	Yes
3/26/2001	0.038	163.930	17.5	3.360E+01	0.000E+00	3.080E+01	Yes
9/21/1999	0.0364	0.222	97.4	4.354E-02	0.000E+00	4.167E-02	Yes
10/15/2002	0.0364	5.786	78	1.136E+00	0.000E+00	1.087E+00	Yes
7/15/2003	0.0359	15.911	58.9	3.081E+00	0.000E+00	2.989E+00	Yes
11/16/1998	0.0357	72.804	28.7	1.402E+01	0.000E+00	1.368E+01	Yes
9/10/1996	0.0356	7.714	73.5	1.481E+00	0.000E+00	1.449E+00	Yes
2/20/1996	0.0342	38.090	39.3	7.026E+00	0.000E+00	7.156E+00	Yes
1/30/2001	0.03321	282.537	9.1	5.061E+01	0.000E+00	5.308E+01	Yes
5/21/1996	0.0325	2.555	86.9	4.480E-01	0.000E+00	4.801E-01	Yes
1/26/1999	0.0318	318.698	7.8	5.466E+01	0.000E+00	5.987E+01	Yes
1/2/2007	0.0317	315.805	8.1	5.400E+01	0.000E+00	5.933E+01	Yes
11/19/1996	0.0303	36.161	40.4	5.910E+00	0.000E+00	6.793E+00	Yes
4/28/1999	0.0294	29.893	44.3	4.740E+00	0.000E+00	5.616E+00	Yes
1/30/2001	0.0289	282.537	9.1	4.404E+01	0.000E+00	5.308E+01	Yes
4/24/1995	0.0286	525.539	3.7	8.107E+01	0.000E+00	9.873E+01	Yes
6/18/1996	0.0284	14.947	60.3	2.290E+00	0.000E+00	2.808E+00	Yes
9/1/1998	0.0275	8.196	72.3	1.216E+00	0.000E+00	1.540E+00	Yes
9/21/2004	0.0272	0.227	97.4	3.325E-02	0.000E+00	4.257E-02	Yes
3/13/2007	0.0272	3.664	8.1	5.376E-01	0.000E+00	6.884E-01	Yes
7/17/1995	0.0269	2.314	88	3.358E-01	0.000E+00	4.348E-01	Yes
3/17/1998	0.02675	378.966	6	5.468E+01	0.000E+00	7.119E+01	Yes
11/13/1995	0.0266	4.484	80.7	6.433E-01	0.000E+00	8.424E-01	Yes
3/27/2000	0.0266	42.429	37.3	6.087E+00	0.000E+00	7.971E+00	Yes
7/16/1996	0.0264	22.661	50.9	3.227E+00	0.000E+00	4.257E+00	Yes
9/17/2002	0.0261	3.375	84.1	4.751E-01	0.000E+00	6.340E-01	Yes
7/20/2004	0.0258	8.679	71.4	1.208E+00	0.000E+00	1.630E+00	Yes
7/27/1999	0.0252	7.714	73.5	1.049E+00	0.000E+00	1.449E+00	Yes
2/14/1995	0.0246	39.054	38.8	5.182E+00	0.000E+00	7.337E+00	Yes
2/12/2007	0.0233	24.107	8.1	3.030E+00	0.000E+00	4.529E+00	Yes
10/24/2006	0.0231	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
11/28/2006	0.022	2.748	86.2	3.261E-01	0.000E+00	5.163E-01	Yes
2/25/2003	0.0218	1104.113	1	1.298E+02	0.000E+00	2.074E+02	Yes
3/28/2005	0.0213	88.233	26.1	1.014E+01	0.000E+00	1.658E+01	Yes
5/16/2006	0.0209	2.555	86.9	2.881E-01	0.000E+00	4.801E-01	Yes
7/26/2005	0.0208	0.270	97.1	3.029E-02	0.000E+00	5.072E-02	Yes
6/20/1995	0.0195	8.679	71.4	9.128E-01	0.000E+00	1.630E+00	Yes
8/8/1995	0.0193	10.125	68.5	1.054E+00	0.000E+00	1.902E+00	Yes
3/23/1999	0.0189	64.608	30.5	6.586E+00	0.000E+00	1.214E+01	Yes
5/23/2005	0.0189	10.125	68.5	1.032E+00	0.000E+00	1.902E+00	Yes
1/28/1997	0.0181	400.181	5.4	3.907E+01	0.000E+00	7.518E+01	Yes
4/23/1996	0.0173	96.911	24.7	9.043E+00	0.000E+00	1.821E+01	Yes
11/28/2006	0.0144	2.748	86.2	2.135E-01	0.000E+00	5.163E-01	Yes
11/13/2006	0.0134	2.314	88	1.673E-01	0.000E+00	4.348E-01	Yes
5/23/1995	0.0132	24.107	49.5	1.716E+00	0.000E+00	4.529E+00	Yes
5/11/2004	0.0128	17.839	56.4	1.232E+00	0.000E+00	3.351E+00	Yes
11/22/1999	0.0127	12.536	64.4	8.587E-01	0.000E+00	2.355E+00	Yes
11/19/2001	0.0125	12.536	64.4	8.452E-01	0.000E+00	2.355E+00	Yes
4/23/2007	0.0125	3.905	8.1	2.633E-01	0.000E+00	7.337E-01	Yes
3/16/2004	0.0123	85.822	26.5	5.694E+00	0.000E+00	1.612E+01	Yes
10/17/1995	0.0119	6.750	75.7	4.333E-01	0.000E+00	1.268E+00	Yes
3/28/1995	0.0116	59.786	31.5	3.741E+00	0.000E+00	1.123E+01	Yes
1/9/1995	0.0115	143.197	19.4	8.882E+00	0.000E+00	2.690E+01	Yes
7/24/2001	0.0112	1.688	90.8	1.019E-01	0.000E+00	3.170E-01	Yes
12/27/2005	0.0108	17.839	56.4	1.039E+00	0.000E+00	3.351E+00	Yes
7/25/2006	0.00929	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/18/2000	0.00806	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
5/25/1999	0.008	14.464	61	6.241E-01	0.000E+00	2.717E+00	Yes
9/26/2006	0.00495	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/26/2006	0.00443	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
9/18/2000	0.0034	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes
1/17/2006	0.0005	65.572	30.2	1.768E-01	0.000E+00	1.232E+01	Yes
8/14/2006	0.0005	0.000	100	0.000E+00	0.000E+00	0.000E+00	Yes

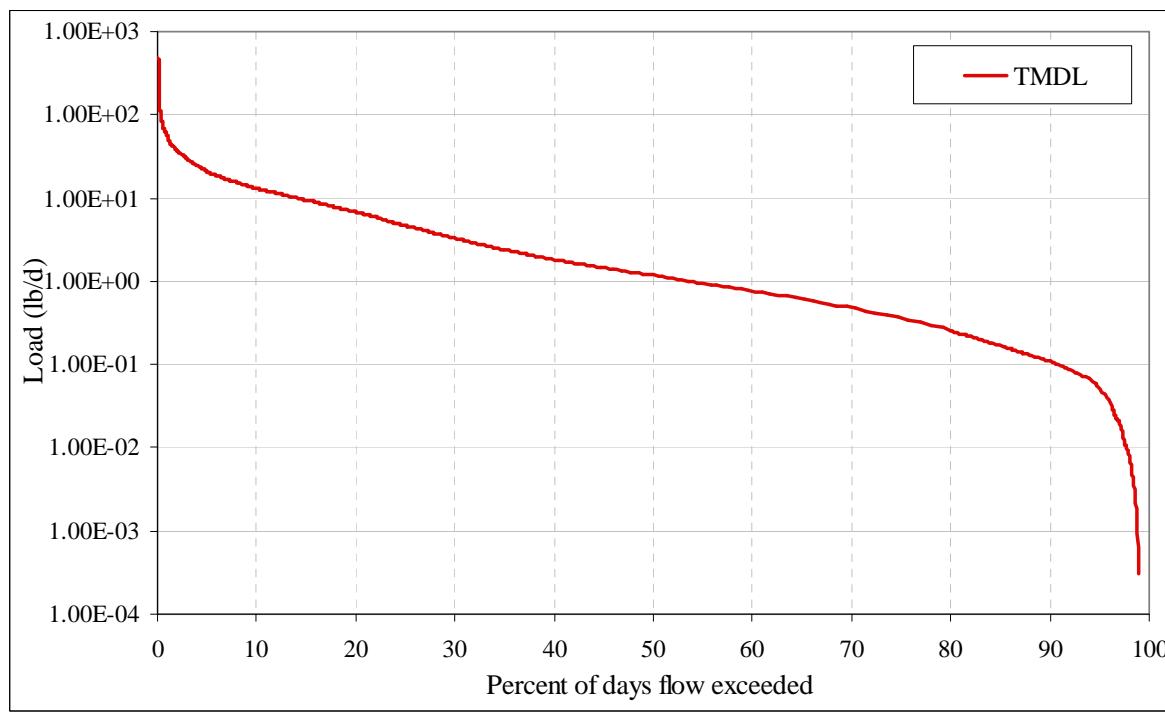
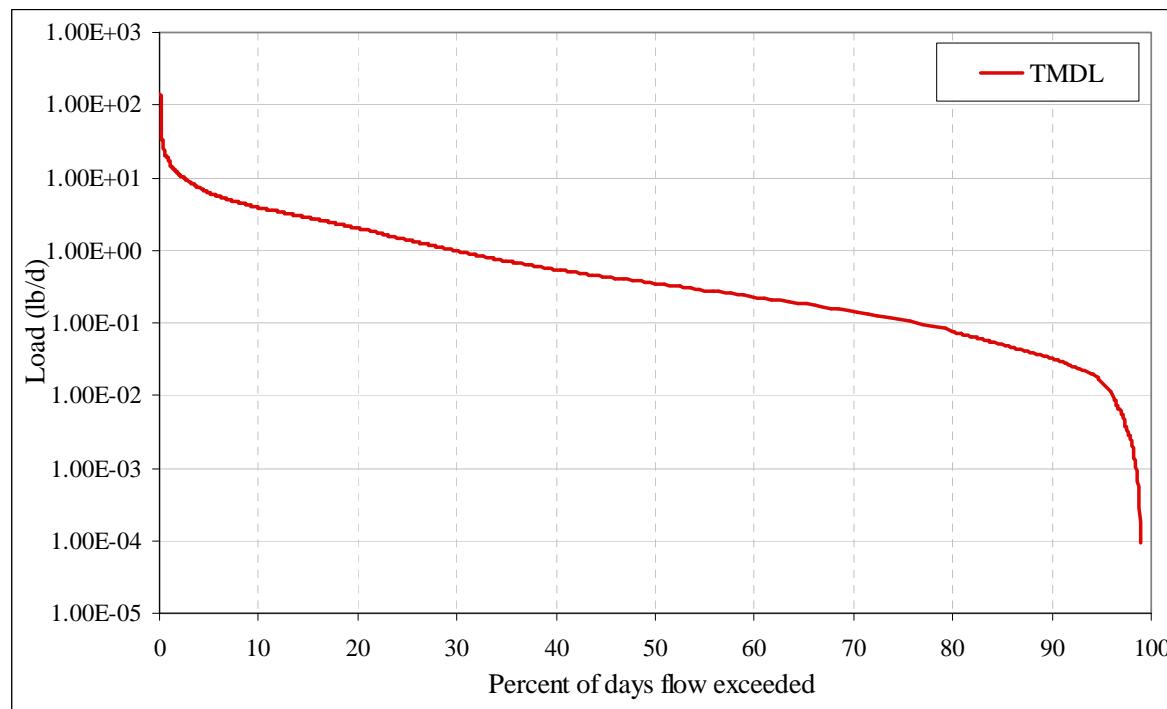


Figure L-2. Zinc load duration curve for Bayou De L'Outre (HUC/reach 08040202-007)

Table L-3. Allowable zinc load for Bayou De L'Outre (HUC/reach 08040202-007)

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 (lb/day)	Area under TMDL curve (lb/day)
						5.3
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity most cells in this spreadsheet have been hidden						
3/3/1997	6820	0.100	775.362	0.00	161.8485	0.00E+00
5/1/1991	7180	0.100	816.287	0.00	170.3910	0.00E+00
4/26/1958	8060	0.100	916.323	0.00	191.2726	0.00E+00
4/6/1997	8210	0.100	933.375	0.00	194.8319	0.00E+00
4/15/1991	8840	0.100	1004.992	0.00	209.7812	0.00E+00
4/29/1958	11000	0.100	1250.537	0.00	261.0360	0.00E+00
4/28/1991	11400	0.100	1296.008	0.00	270.5277	0.00E+00
4/30/1991	13800	0.100	1568.836	0.00	327.4775	0.00E+00
4/27/1958	18200	0.100	2069.020	0.00	431.8854	0.00E+00
6/9/1974	19100	0.100	2171.330	0.00	453.2416	0.00E+00
4/29/1991	19300	0.100	2194.066	0.10	457.9874	4.58E-01
4/28/1958	20000	0.000	2273.641	0.00	474.5978	0.00E+00

**Figure L-3. Zinc load duration curve for Bayou De L'Outre (HUC/reach 08040202-008)****Table L-4. Allowable zinc load for Bayou De L'Outre (HUC/reach 08040202-008)**

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 (lb/day)	Area under TMDL curve (lb/day)
						1.6
8/18/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/19/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
8/20/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/21/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/22/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/23/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/24/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/25/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
9/26/1956	0	100.000	0.000	0.00	0.0000	0.00E+00
For brevity, most cells in this spreadsheet have been hidden						
5/1/1991	7180	0.100	242.657	0.00	50.6521	0.00E+00
4/26/1958	8060	0.100	272.395	0.00	56.8596	0.00E+00
4/6/1997	8210	0.100	277.464	0.00	57.9177	0.00E+00
4/15/1991	8840	0.100	298.754	0.00	62.3617	0.00E+00
4/29/1958	11000	0.100	371.747	0.00	77.5982	0.00E+00
4/28/1991	11400	0.100	385.264	0.00	80.4198	0.00E+00
4/30/1991	13800	0.100	466.368	0.00	97.3492	0.00E+00
4/27/1958	18200	0.100	615.057	0.00	128.3866	0.00E+00
6/9/1974	19100	0.100	645.471	0.00	134.7351	0.00E+00
4/29/1991	19300	0.100	652.230	0.10	136.1459	1.36E-01
4/28/1958	20000	0.000	675.885	0.00	141.0837	0.00E+00