FINAL
TMDLs for Total Dissolved Solids for Selected Subsegments in the Lake Pontchartrain Basin, Louisiana

(040501 and 040504)

Prepared for:

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Permits, Oversight, and TMDL Team
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EXECUTIVE SUMMARY

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA's) Water Quality Planning and Management Regulations (at Title 40 of *Code of Federal Regulations* [CFR] section 130.7) apply to waterbody-pollutant pairs on the approved 303(d) impaired waters list, even if pollutant sources have implemented technology-based controls. A total maximum daily load (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can assimilate while still meeting the 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 uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody, and it may include a future growth (FG) component. The components of the TMDL calculation are illustrated using the following equation:

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

The area for this TMDL includes subsegments 040501 and 040504 in the Lake Pontchartrain Basin in southeastern Louisiana. Subsegment 040501 is in St. Helena and Livingston parishes and incorporates the Tickfaw River from the northern Mississippi/Louisiana border to Louisiana Highway 42. This subsegment has an area of 324.5 square miles that is predominantly covered by forests (33 percent), wetlands (29 percent), and grass/shrubs (23 percent). Subsegment 040504 is in the Tangipahoa Parish near Hammond City and includes the Yellow Water River from its headwaters to where it drains into Ponchatoula Creek. Subsegment 040504 has an area of 17.25 square miles and is mainly urban development land (43 percent), followed by wetlands (21 percent), forest (13 percent), and pasture/hay (11 percent).

The Louisiana Department of Environmental Quality (LDEQ) has included subsegments 040501 and 040504 on the state's 2010 section 303(d) list of impaired waterbodies (*2010 Integrated Report*) (LDEQ 2010a) and there designated uses (Table ES-1). Subsegment 040501 is listed for mercury and total dissolved solids (TDS) impairments. The impaired designated use is fish and wildlife propagation (FWP). Subsegment 040504 is listed for chloride, fecal coliform bacteria, dissolved oxygen, and TDS. The impaired designated uses are primary contact recreation (PCR), secondary contact recreation (SCR), and FWP.

Table ES-1. The subsegment and impairments addressed in this report

Subsegment number	Subsegment name	Designated use		
		Primary contact recreation	Secondary contact recreation	Fish and wildlife propagation
040501	Tickfaw River	Fully supporting	Fully supporting	Not supporting
040504	Yellow Water River	Not supporting	Not supporting	Not supporting

Source: LDEQ 2010a

TMDLs for TDS were calculated using a load reduction approach. Subsegments 040501 and 040504 contain wetlands, where streamflow is a negligible component of hydrology or is influenced by tidal action. Using the load reduction approach, the water quality criteria and the average water yield were multiplied by the calculated drainage area of each subsegment to estimate the total allowable load.

In developing the TMDL, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established and thereby provide the basis for establishing water quality-based controls. WLAs were given to permitted point source discharges, including regulated stormwater and municipal separate storm sewer systems (MS4s). The LAs include background loadings, as well as human-induced nonpoint sources. An explicit MOS of 10 percent and an FG component of 10 percent were also included.

This TMDL establishes load limitations for TDS. The numeric TDS water quality criteria that apply to the impaired subsegments and that were used to calculate the total allowable loads are presented in Table ES-2. Table ES-3 presents summaries of the TMDLs for the subsegments addressed in this report. The percent reduction is calculated using the current concentrations and the reduction needed to get those concentrations to meet the water quality targets.

Table ES-2. Numeric water quality criteria for the listed subsegments in this TMDL

Subsegment	Subsegment name	TDS (mg/L)
040501	Tickfaw River	55
040504	Yellow Water River	150

Source: LDEQ 2011b

Table ES-3. Summary of TDS TMDLs, WLAs, LAs, MOS, and FG

Subsegment	TMDL (lb/d)	WLA (lb/d)	LA (lb/d)	Explicit MOS (lb/d)	FG (lb/d)	Percent reduction
040501	258,304.5	2,586.8	204,574.2	25,571.8	25,571.8	80.4%
040504	40,025.6	23,312.9	9,298.9	3,706.9	3,706.9	69.6%

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Appendix A: Tidal Influence in Selected Subsegments: Information Provided by Max Forbes via Personal Communication

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1. Introduction

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA's) Water Quality Planning and Management Regulations (at Title 40 of *Code of Federal Regulations* [CFR] section 130.7) apply to waterbody-pollutant pairs on the approved 303(d) impaired waters list even if pollutant sources have implemented technology-based controls. A total maximum daily load (TMDL) is a calculation of the maximum allowable load (in mass per unit time) of a pollutant that a waterbody is able to assimilate while still supporting 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).

The text of 40 CFR 130.7 has been affected by several Federal District Court suits, appeals rulings, and a Supreme Court ruling mandating that a TMDL must be described in terms of mass per day. According to 40 CFR 130.7, if EPA does not approve a TMDL submitted by a state, EPA is responsible for developing a TMDL. In a District Court case regarding the TMDL program in Louisiana (*Sierra Club and Louisiana Environmental Action Network, Inc. v. EPA*, Civil Action Number: 96-0527), EPA was listed as the sole defendant. That case resulted in the April 1, 2002, consent decree approved by the judge. A consent decree is a negotiated set of actions to satisfy the plaintiff. In many situations, the actions are more stringent than the established regulation. For example, most consent decrees require an annual report to the plaintiff summarizing the work done in the year; that is not required by any regulation and will cease when the consent decree is closed.

The 2002 consent decree between EPA and the plaintiffs establishes a fixed set of waterbody-pollutant pairs for which TMDLs are to be established or approved, and it establishes a timeline for each set of TMDLs. Each set is determined to be complete upon establishment or approval of a TMDL for every waterbody-pollutant pair; the set also would be complete if one or more originally specified waterbody-pollutant pairs no longer appear on a subsequently approved 303(d) list, and all other waterbody-pollutant pairs have established/approved TMDLs. The TMDLs in this report are part of that consent decree. Because the original court suit was initiated because of a lack of progress in establishing TMDLs, the date when a TMDL is established or approved is not easy to extend and requires another agreement with the plaintiffs.

In most circumstances, a variety of scientifically acceptable methods can be used for developing a TMDL, wasteload allocation (WLA), and load allocation (LA). For these TMDLs, simple Microsoft Excel-based methods were used according to the resources and data available. It should be noted that appearance of some acceptable TMDL calculation methods as simple does not imply invalid results. Models vary in the amount of necessary resources (e.g. training, setup/computational time, personnel, expense), required input and background data, questions answered, and output capability (e.g., charts, tables, data files). The final result of these TMDLs (and any TMDL) is a plan that is adopted into the Water Quality Management Plan (WQMP) to achieve the TMDL. Stakeholder involvement and additional information, such as monitoring data, might lead to an update of the WQMP and in turn a proposal for a different plan to meet water quality objectives. Such a WQMP update receives the same public participation as the original TMDL and WQMP review and approval.

For the TMDL discussed in this report, monitoring data collected by the Louisiana Department of Environmental Quality (LDEQ) indicate that observed TDS concentrations sometimes do not meet the state's water quality criteria for subsegment 040501 and 040504 in the Lake Pontchartrain Basin. The impaired designated use for subsegment 040501 is fish and wildlife propagation, and for 040504, the impaired designated uses are primary and secondary contact recreation, and fish and wildlife propagation (Table 1-1). The subsegments are listed as not supporting the designated uses in Louisiana's 2010 section 303(d) list (as included in the *2010 Integrated Report*). Suspected causes of the TDS impairment in subsegment 040501 are *drainage/filling/loss of wetlands.* Suspected causes of the TDS impairment in subsegment 040504 are *drought-related impacts and site clearance (land development or redevelopment).*

Table 1-1. Section 303(d) listing information for subsegments included in this report

Subsegment number	Subsegment name	Subsegment description	Impaired designated use[a]	Suspected sources of TDS impairment
040501	Tickfaw River	Mississippi state line to LA-42	FWP	Drainage/filling/loss of wetlands
040504	Yellow Water River	Headwaters to Ponchatoula Creek	PCR, SCR, FWP	Drought-related impacts; site clearance (land development or redevelopment)

[a] PCR = primary contact recreation, SCR = secondary contact recreation , and FWP = fish and wildlife protection
Source: LDEQ 2010a

2. Background Information

2.1 General Description

The Lake Pontchartrain Basin is an estuarine system covering approximately 4,700 square miles (mi^2), within which rivers, canals, wetlands, and bayous drain the southeastern portion of Louisiana into a series of connected lakes, and eventually flow into the Gulf of Mexico (USGS 2002). The basin's northern boundary is defined by the Mississippi state line; the Mississippi River levees form the western and southern border of the basin; the Pearl forms the eastern edge; and the Breton and Chandeleur sounds are on the southeastern portion of the Lake Pontchartrain Basin (LDEQ 2010b, LPBF 2009). The three lakes in the watershed, from west to east, are Lakes Maurepas, Pontchartrain, and Borgne. The main rivers contributing fresh water to Lake Maurepas are the Amite, Tickfaw, Natalbany, and Comite Rivers. Lake Maurepas and the Tangipahoa, Tchefuncte, and Bogue Falaya Rivers flow into Lake Pontchartrain. The lakes themselves contain brackish water due to mixing with waters from the Gulf (USGS 2002). Portions of several rivers within the selected subsegments of the Lake Pontchartrain Basin are tidally influenced. Land in the northern part of the basin includes forests, pastures, and dairies, whereas the southern section contains large areas of brackish and saline marshes (LDEQ 2010b). Elevations in the basin range from minus 5 feet at New Orleans to greater than 200 feet near the Mississippi River (LDEQ 2010b).

Subsegment 040501 (Tickfaw River from Mississippi state line to LA-42) is in the St. Helena and Livingston Parishes, and encompasses 324.5 mi^2 (840.6 km^2 [square kilometers]). Subsegment 040504 (Yellow Water River from headwaters to Ponchatoula Creek) is in Tangipahoa Parish, and encompasses 17.25 mi^2 (44.68 km^2). Figure 2-1 shows the locations of subsegments 040501 and 040504 within the Lake Pontchartrain Basin. The Yellow Water River is a larger tributary of the Natalbany River. Downstream of subsegment 040501 and 040504, the Natalbany River connects to the Tickfaw River and eventually drains into Lake Maurepas.

2.2 Land Use

Land use data were obtained from the 2006 U.S. Geological Survey (USGS) National Land Cover Data set (NLCD) (Table 2-1 and Figure 2-2). The predominant land use in subsegment 040501 is forested land (33.3 percent), followed by wetlands (29.2 percent) and grass/shrub (23.3 percent). Subsegment 040504 is mostly urban development (43.3 percent), as the City of Hammond lies within the subsegment's boundaries. The subsegment also has moderate amounts of wetlands (21.5 percent), forest (12.9 percent) and pasture/hay (11.5 percent).

Table 2-1. Percent land use per subsegment

Land use	040501	040504
Open water	0.1%	0.6%
Developed	5.3%	43.3%
Barren land	0.1%	0.9%
Forest	33.3%	12.9%
Grass/shrub	23.3%	8.4%
Pasture/hay	6.5%	11.5%
Cultivated crops	2.2%	0.8%
Wetlands	29.2%	21.5%
Total	100.00%	100.00%

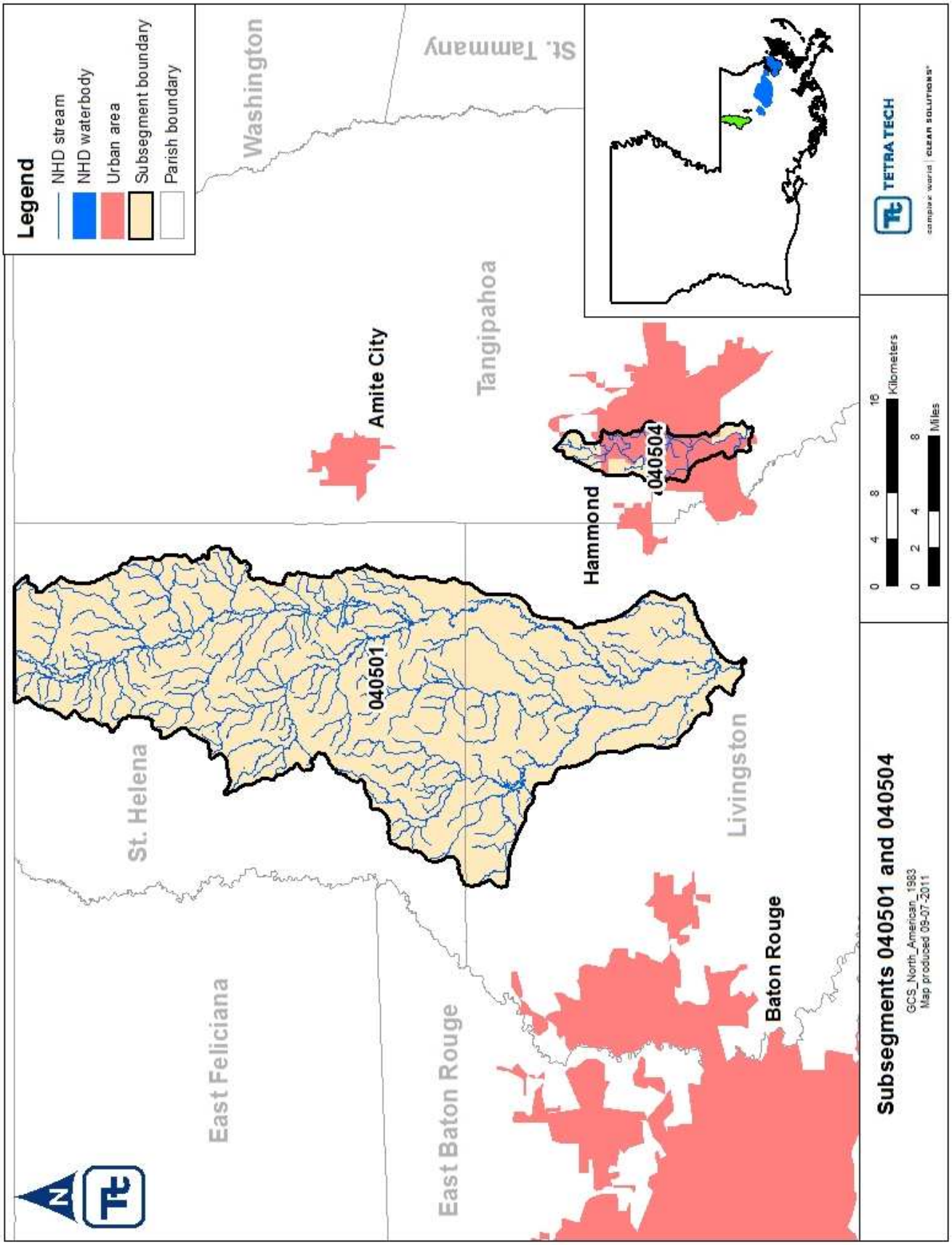

Figure 2-1. Locations of selected Lake Pontchartrain Basin subsegments.

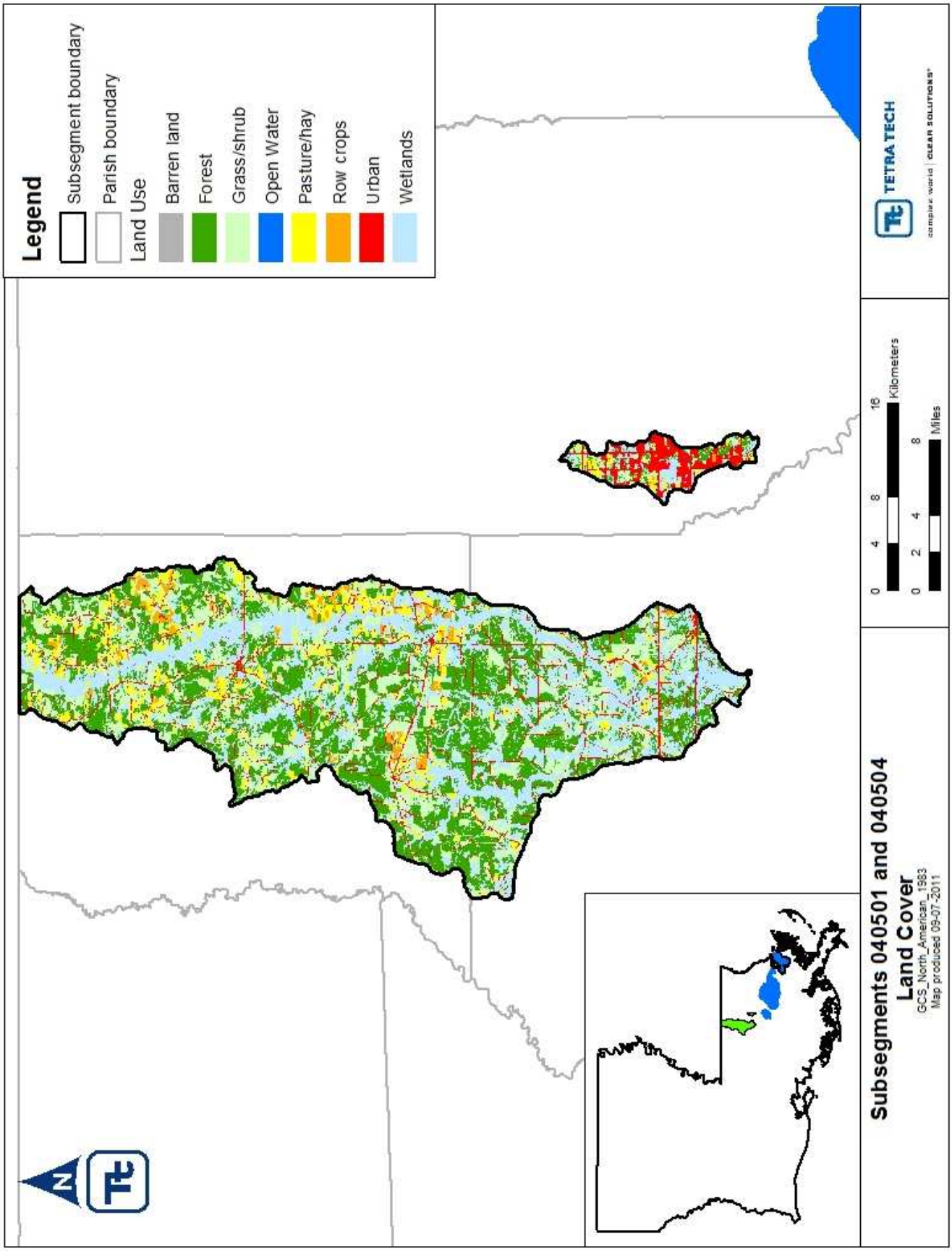

Figure 2-2. Land use in subsegments 040501 and 040504.

Several areas within the Lake Pontchartrain Basin are undergoing population growth and urban development. Rapid development is occurring in Livingston Parish, and population growth within Tangipahoa Parish has been noticeable following Hurricane Katrina. Most of this growth has involved conversion of agricultural land uses to urban land types (Bourgeois-Calvin 2008).

2.3 Hydrologic Setting

Historical data are available from three active USGS flow-monitoring gages for subsegment 040501, and from one station near subsegment 040504 of the Lake Pontchartrain Basin. Table 2-2 presents information for the nearby flow gages, and Figure 2-3 shows locations of the selected USGS stations.

As part of an estuarine system, portions of waterbodies within the Lake Pontchartrain Basin subsegments are influenced by tidal action, especially those close to Lake Maurepas, Pontchartrain, or Borgne. In portions of the Tickfaw River in subsegment 040501, tidal influences are believed to occur south of Springville. In the Yellow Water River (subsegment 040504), tidal action is believed to take place south of Louisiana State Highway 22 (Max Forbes, retired USGS staff, personal communication, May 31, 2011; for complete transcript, see Appendix A).

Table 2-2. USGS gage information for subsegments 040501 and 040504

Station number	Station name	Date range	Drainage area (sq. mi.)	Average flow (cfs)
07375800	Tickfaw River at Liverpool, LA	04/01/56–02/10/11[a]	89.7	107.47
07375960	Tickfaw River at Montpelier, LA	05/17/01–02/10/11[a]	220.0	320.55
07376000	Tickfaw River at Holden, LA	10/01/40–02/10/11[a]	247.0	376.06
07376500	Natalbany River at Baptist, LA	09/01/43–02/10/11[a]	79.5	115.24

[a] Data pull date. More recent data are now available.

2.4 Designated Uses and Water Quality Criteria

Louisiana's 2010 section 303(d) list (as included in the *2010 Integrated Report*) indicates that designated uses of the subsegments are primary contact recreation, secondary contact recreation, and fish and wildlife propagation. Primary contact recreation includes any recreational or other water contact involving full-body exposure to water and a considerable probability of ingesting water. Examples of this use are swimming and water skiing. Secondary contact recreation involves activities like fishing, wading, or boating, whereby water contact is accidental or incidental, and the chance of ingesting appreciable amounts of water is minimal. Fish and wildlife propagation includes the use of water for aquatic habitat, food, resting, reproduction, cover, or travel corridors by any indigenous wildlife and aquatic life species associated with the aquatic environment. The fish and wildlife propagation use also includes maintaining water quality at a level that prevents damage to native wildlife and aquatic species associated with the aquatic environment, and prevents contamination of aquatic life consumed by humans (LDEQ 2010a). The impaired designated uses are listed in Table 1-1 above.

The assessment methodology presented in LDEQ's 305(b) report (LDEQ 2010a) specifies that primary contact recreation, secondary contact recreation, and fish and wildlife propagation uses are to be fully supported. Water quality criteria for TDS in this TMDL are 55 mg/L for subsegment 040501 and 150 mg/L for subsegment 040504 year-round.

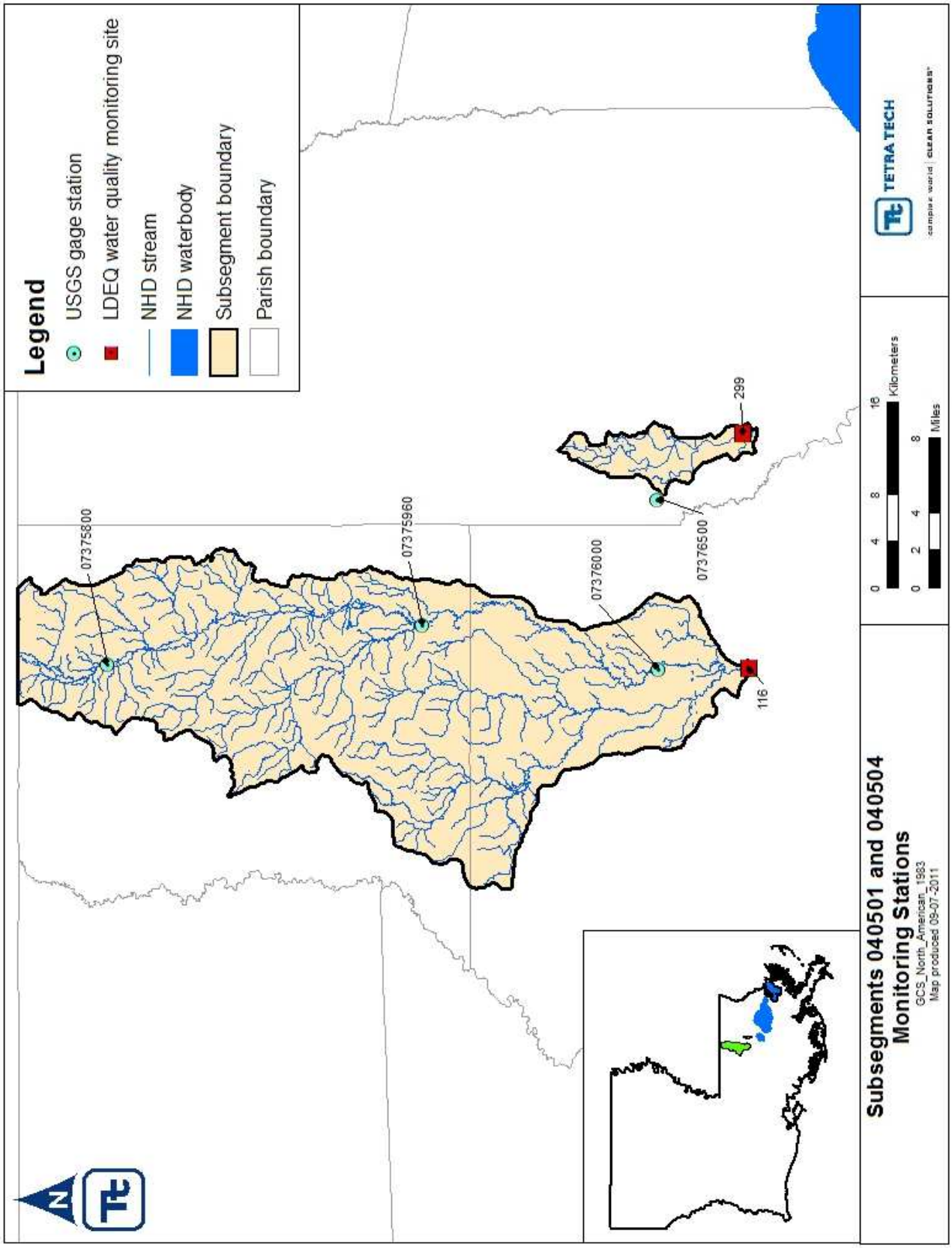

Figure 2-3. Locations of water quality sampling stations in the Lake Pontchartrain Basin.

The Louisiana water quality standards also include an antidegradation policy (*Louisiana Administrative Code* [LAC] Title 33, Part IX, Section 1109.A), which specifies that state waters exhibiting high water quality should be maintained at that high level of water quality. If that is not possible, water quality of a level that supports the designated uses of the waterbody should be maintained. The designated uses of a waterbody may be changed to allow a lower level of water quality only through a use attainability study.

2.5 Identification of Sources

2.5.1 Point Sources

LDEQ stores permit information using internal databases. LDEQ generated a list of point source discharges in the subsegments by using the TEMPO database. Information on point source discharges to the listed subsegments was obtained from the Integrated Compliance Information System - National Pollutant Discharge Elimination System (ICIS-NPDES) and Louisiana's Electronic Document Management System (EDMS). Data were pulled from ICIS for the list of permits generated by LDEQ, and data were confirmed through EDMS. Each facility was evaluated on the basis of its discharges and permit limits to determine whether the facility should be used in developing the TMDLs. The evaluation yielded 26 active permitted point source discharges in subsegment 040501 and 86 active permitted point source dischargers (10 terminated permits) into subsegment 040504 (Figure 2-4). Because of the large number of permits, they are listed in Appendix B.

Several facilities in the selected subsegments have TDS permit limits (Appendix E); however, there could be additional potential sources including sewage treatment plants and wash water outfalls (LDEQ 2011a). One source of TDS in portions of the Lake Pontchartrain Basin includes potable water originating from groundwater. Groundwater quality analysis in a nearby subsegment (040201) within the Lake Pontchartrain has indicated significant concentrations of TDS (LDEQ 2011a). The Lake Pontchartrain Basin Foundation (LPBF) and Southeastern Louisiana University conducted studies comparing groundwater and stream water chemistry. They found that the chemistry in groundwater and stream water is similar, indicating that groundwater is a potential input of TDS to streams (Andrea Bourgeois-Calvin (LPBF), personal communication, January 6, 2012; see Appendix G, Table G-3, comment 2). Potable water used by homes, businesses, and public agencies is sent to sewage treatment plants, which are then responsible for treating the additional pollutant loadings. Other sources of loading could also include lawn watering, washing cars or buildings, recreational uses of water, and individual home sewage treatment units (LDEQ 2011a).

Phase I and II stormwater systems are additional possible point source contributors within the Lake Pontchartrain Basin. Stormwater discharges are generated by runoff from urban land and impervious areas such as paved streets, parking lots, and rooftops during precipitation events. These discharges often contain high concentrations of pollutants that can eventually enter nearby waterbodies. Most stormwater discharges are considered point sources and require coverage by a NPDES permit.

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

Phase II requires a select subset of small MS4s to obtain an NPDES stormwater permit. A small MS4 is any MS4 not already covered by the Phase I program as a medium or large MS4. The Phase II rule automatically covers all small MS4s in urbanized areas (UAs), as defined by the Bureau of the Census, and also includes small MS4s outside an UA that are so designated by NPDES permitting authorities, case by case (USEPA 2000).

In Louisiana, a MS4 can be identified as a regulated, small MS4 in two ways. This category includes all cities within UAs and any small MS4 area outside UAs with a population of at least 10,000 and a population density of at least 1,000 people per square mile (LDEQ 2002). The city of Hammond is a small MS4 (AI 104053, LAR041030) within subsegment 040504. No regulated MS4s are in subsegment 040501.

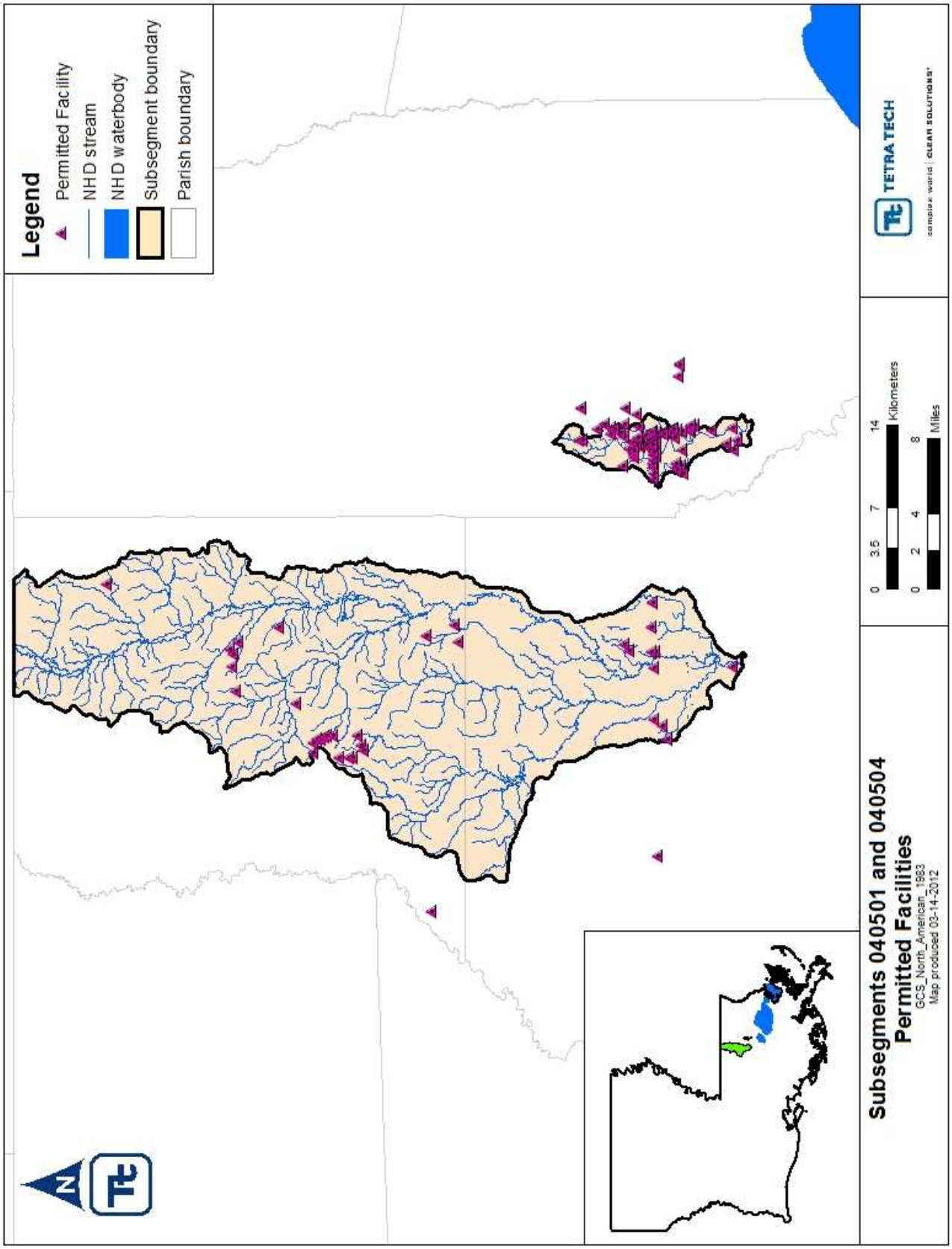

Figure 2-4. Locations of LDEQ permitted facilities in Lake Pontchartrain Basin.

2.5.2 Nonpoint Sources

Louisiana's 2010 section 303(d) list (*2010 Integrated Report*) identifies suspected causes for the TDS impairment in subsegment 040501 as *drainage/filling/loss of wetlands* (LDEQ 2010a). Draining, filling, or loss of wetlands can impact associated wetland functions such as water storage, sediment trapping, recharge, and habitat (FISRWG 1998).

Within subsegment 040504, the suspected causes for impairment are listed as *drought-related impacts and site clearance (and development or redevelopment)* in Louisiana's draft 2010 section 303(d) list. Drought episodes, especially multi-year events, can lead to a decrease in water supply, which can accentuate pollution problems (LDEQ 2010a). Site clearance activities include urban areas and industrial parks or other construction sites outside of municipalities (LDEQ 2010a). Site clearance related to new construction or filling in of vacant lands within areas of previous development (redevelopment) often involves converting pervious land types to more impervious land cover (USEPA 1992). Similarly, stream clearing practices, where soils are exposed on stream banks, have been observed in the Yellow Water River, subsegment 040504 (Appendix G, Table G-3, comment 3). Development often results in alteration of physical, chemical, and biological characteristics of a watershed. Examples of hydrological impacts include increased runoff volumes, altered channel geometry, sedimentation, and contamination (FISRWG 1998). Increased impervious cover also prevents rain from recharging groundwater, which can lead to lower baseflows in streams, especially during long dry periods (FISRWG 1998). Various construction activities are now regulated as Phase II stormwater regulations (LDEQ 2010a).

3. Characterization of Existing Water Quality

3.1 Water Quality Data

Water quality data were obtained from LDEQ's routine ambient water quality monitoring program. Two water quality stations (116 and 299) furnished data relevant to the subsegments addressed in this report (040501 and 040504) (Figure 2-3). Table 3-1 summarizes the observations at LDEQ water quality stations in subsegments 040501 and 040504, including the number of observations and the minimum, maximum, and average TDS concentrations. Appendix C presents the raw water quality data.

Table 3-1. Summary of available TDS data

Subsegment	Station	Station name	Period of record	No. of obs.	TDS min. (mg/L)	TDS max. (mg/L)	TDS ave. (mg/L)
040501	116	Tickfaw River at Springville, Louisiana	4/10/78–5/4/10	310	2	280	59.8
040505	299	Yellow Water River west of Ponchatoula, Louisiana	1/14/91–5/4/10	76	88	494	197.8

3.2 Comparison of Observed Data to Criteria

Louisiana's draft 2010 section 303(d) list identifies subsegments 040501 and 040504 for TDS impairments within the Lake Pontchartrain Basin (LDEQ 2010a) that this TMDL addresses. Monitoring data collected by LDEQ indicate that observed TDS concentrations sometimes do not meet the state's water quality criteria for subsegments 040501 and 040504. The year-round water quality criteria are 55 mg/L within subsegment 040501 and 150 mg/L within subsegment 040504.

3.3 Trends and Patterns in Observed Data

The TDS data were plotted over time for both impaired subsegments (Figures 3-1 through 3-4). On Figures 3-1 and 3-2, water quality data were plotted over a continuous time scale. On Figures 3-3 and 3-4, water quality data were grouped by sampling month. On both sets of charts, no distinct seasonal or temporal trends or patterns are evident in the water quality data. TDS data were not compared to flow because at least portions of these subsegments are within tidal areas for which no representative flow data are available.

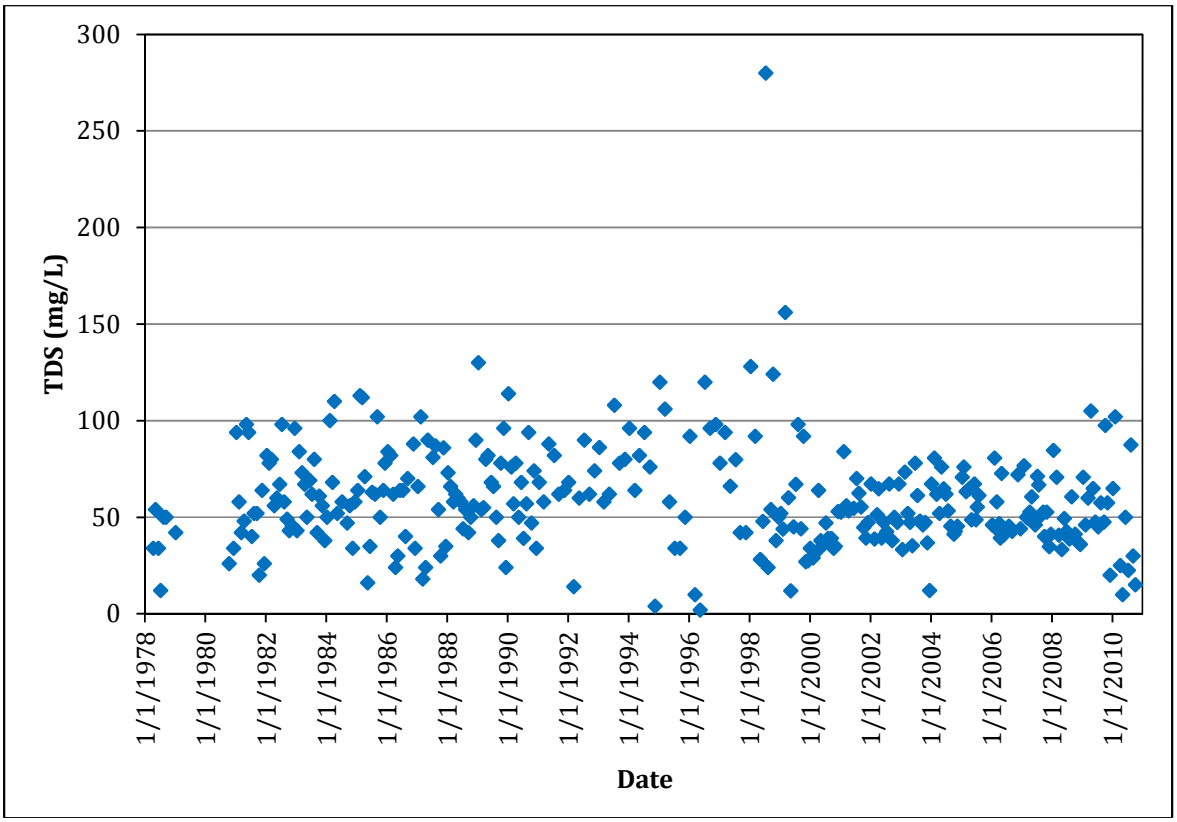

Figure 3-1. TDS concentrations over time at station 116 on subsegment 040501.

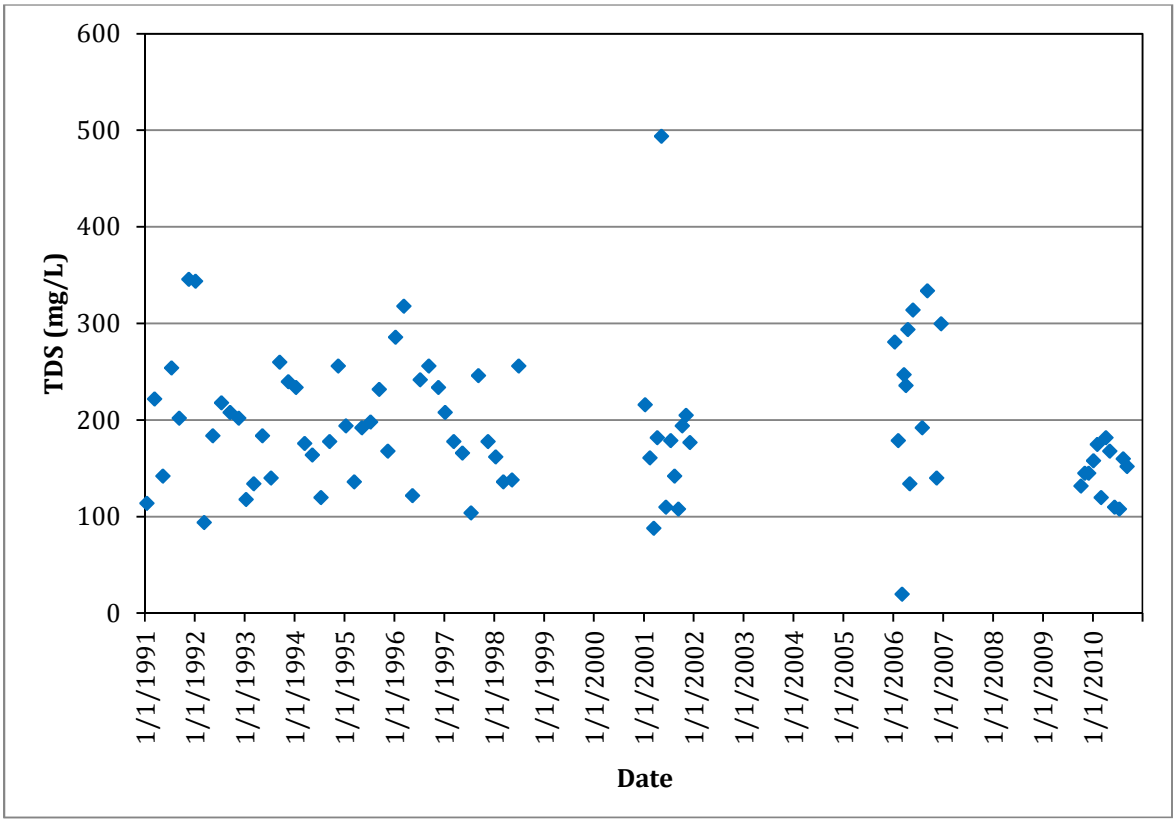

Figure 3-2. TDS concentrations over time at station 299 on subsegment 040504.

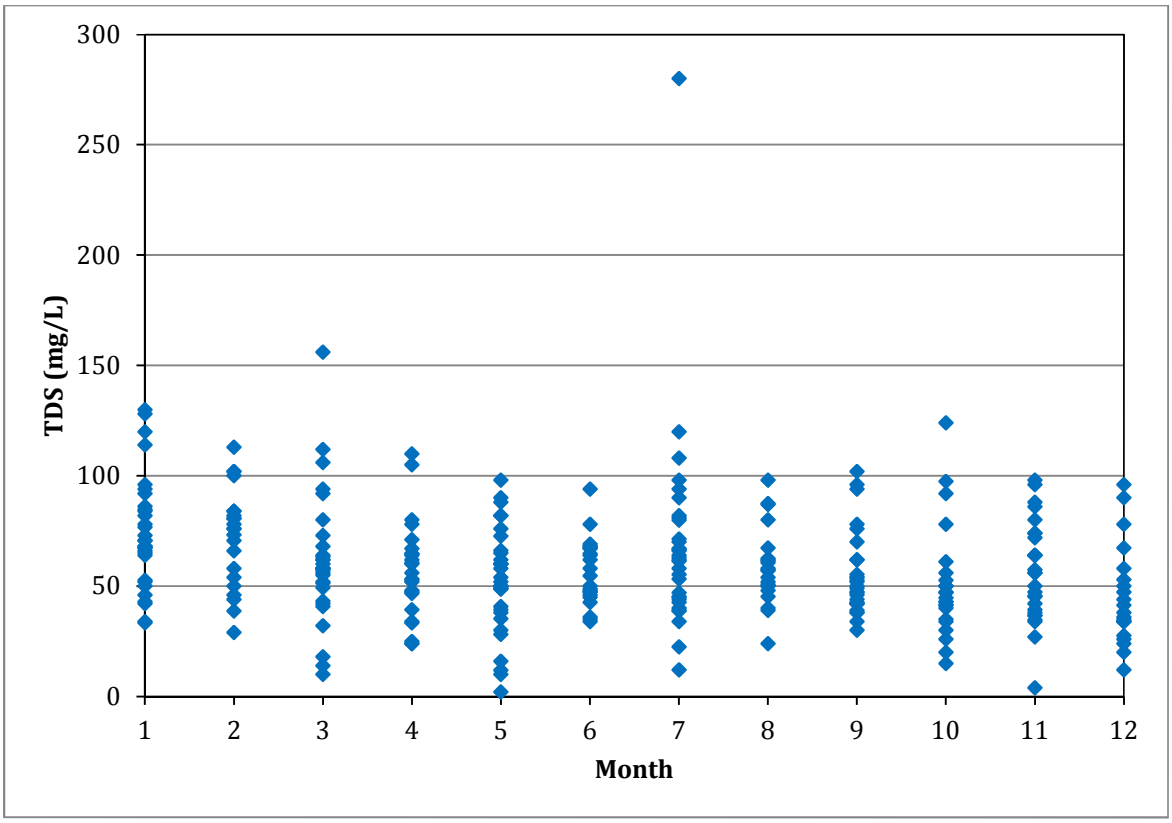

Figure 3-3. Seasonal TDS concentrations at station 116 on subsegment 040501.

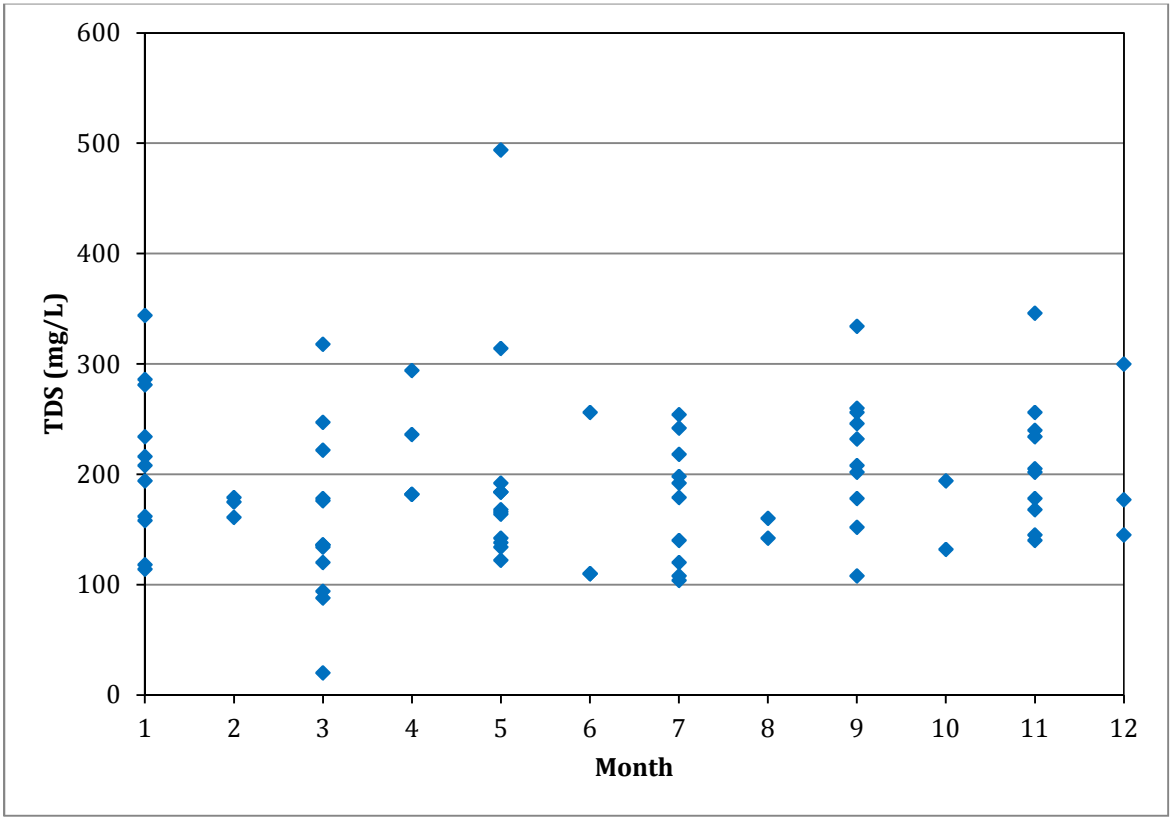

Figure 3-4. Seasonal TDS concentrations at station 299 on subsegment 040504.

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 and thereby provide the basis for establishing water quality-based controls.

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

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

4.1 TMDL Analytical Approach

For this TMDL, the water quality targets of each subsegment (Table ES-2) were multiplied by the average daily runoff to determine the TMDL loading. Because of flow dynamics of the selected subsegments within the Lake Pontchartrain Basin where stream flow could not be used, the monthly water yield was used to obtain TMDL loadings. Monthly water yields for the East Central Climate Divisions were obtained from the Louisiana Office of State Climatology and used to characterize conditions in subsegments 040501 and 040504. The monthly water yield was divided by the number of days in the month to obtain runoff intensity. Available data from 1980 to 2003 were averaged to obtain an annual average of 2.509 millimeters per day for the selected subsegments.[1] The average yield was multiplied by the area of the subsegment to obtain the flow from the subsegment into the waterbodies. Flows from point sources were not incorporated in the water yield. This method produces loading on the basis of expected average flows and does not rely on expected point source flows to meet water quality criteria.

4.2 TMDL, WLA, and LA

The TDS TMDLs for the Lake Pontchartrain Basin subsegments 040501 and 040504 were calculated on the basis of each subsegment's water quality criteria and average local water yield. The water quality criterion was multiplied by the average water yield and the calculated drainage area of each subsegment to estimate the total allowable load. A summary of the TMDLs is presented in Table 4-1. The percent reduction is calculated using the current concentrations and the reduction needed to get those concentrations to meet the water quality targets.

Table 4-1. Summary of TDS TMDLs, WLAs, LAs, MOS, and FG for the Lake Pontchartrain Basin

Subsegment	TMDL (lb/d)	WLA (lb/d)	LA (lb/d)	Explicit MOS (lb/d)	FG (lb/d)	Percent reduction
040501	258,304.5	2,586.8	204,574.2	25,571.8	25,571.8	80.4%
040504	40,025.6	23,312.9	9,298.9	3,706.9	3,706.9	69.6%

4.2.1 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 within the selected subsegments of the Lake Pontchartrain Basin include sanitary and industrial wastewater facilities, and industrial stormwater. This TMDL provides allocations as a starting point for permit writing, and carries assumptions as to which permits received allocations and the targets and flow used in the allocation. Because of the large number of permits, the individual WLAs for each point source included in these

[1] The Louisiana Office of State Climatology did not respond to requests for updated data.

Lake Pontchartrain Basin TMDLs are presented in Appendix E. The WLAs for subsegments 040501 and 04054 are presented in Table 4-1.

In calculating the WLAs, the preferred facility flow was the facility design or expected flow. If neither was available, the average (expected or observed) flows were used to calculate the WLAs. The permit maximum flow was used if the permitted or average flow was not available. The permit maximum flow was usually the maximum flow covered by the specific type of general permit. For example, the Louisiana Pollution Discharge Elimination System (LPDES) Class II Sanitary General Permit covers facilities with flow rates of up to 25,000 gallons per day. The permit maximum flow sometimes significantly exceeded the expected flow, and therefore the permit maximum was used only when other flows were not available.

To be conservative, the facilities were assigned WLAs using a water quality target, and no point source has been given a reduction from that level. That was done to ensure that water quality targets are met during critical conditions. It is not known if upstream discharges are sufficient to cause dilution during these critical conditions of little or no flow. Those WLAs should be confirmed during the permitting process. To avoid an unnecessary permitting process or unintended monitoring requirements for a number of sources that may not be discharging the pollutants of concern, LDEQ will review these WLAs during the permitting process on a case-by-case basis. LDEQ then will determine if a permit limit is appropriate or if the permittee reasonably could cause or contribute to a water quality violation (with LDEQ ensuring that the goals of the TMDL are still being met). As long as existing or future point source discharges contain concentrations at or below water quality criteria or target, they should not cause a violation of water quality targets. Although the derived WLAs are for TDS, meeting the WLAs might not be necessary if alternative remediation and future monitoring indicate control of TDS concentrations without reduction of WLAs. The decision to specify a WLA for those point sources does not reflect any EPA determination of a required effluent limit in their respective NPDES permits.

EPA's stormwater permitting regulations require municipalities to obtain permit coverage for all stormwater discharges from MS4s. For each MS4 in the basin, a gross MS4 load was computed by multiplying the LA by the ratio of the MS4 area in each subsegment to the subsegment area. Note that those values are estimates that can be refined in the future as more information about the MS4s and land-use-specific loadings becomes available. Note also that the MS4 loads presented reflect only that portion of the MS4 in the subsegment. The computed MS4 load was subtracted from the LA and included as a WLA component of the TMDL because MS4s are permitted dischargers but function similarly to nonpoint sources (through storm-driven processes). EPA expects that the MS4 WLAs will be achieved through best management practices (BMPs) and adaptive management.

Table 4-2 lists the individual WLAs for the MS4s identified in Section 2.5.

Table 4-2. TDS WLAs for the MS4s within the selected subsegments in Lake Pontchartrain Basin

Subsegment	Urban area (UA)	NPDES number	MS4 area (acres)	MS4 WLA (lb/day)
040504	City of Hammond	LAR041030	7,583	20,356.2

4.2.2 Load Allocation

The LA is the portion of the TMDL assigned to natural background loadings, as well as nonpoint sources urban runoff and other anthropogenic sources. For this TMDL, the LA was calculated by subtracting the WLA, MOS, and FG from the total TMDL. LAs were not allocated to separate nonpoint sources because of a lack of available source characterization data. The permitting authority may reallocate LAs to WLAs if the undocumented wastewater treatment plant effluent loads are more than the allocation provided for in the FG. The LAs are presented in Table 4-1.

4.3 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. For this TMDL, TDS sampling results were plotted over time and reviewed for any seasonal patterns (see Section 3.2). The water quality criteria for TDS apply all year, accounting for seasonal variations. These TMDLs were developed over a several-year period, therefore accounting for seasonal variations.

4.4 Margin of Safety

Section 303(d) of the Clean Water Act and the regulations at 40 CFR 130.7 require that TMDLs include a MOS to account for uncertainty in available data or in the actual effect that controls will have on the loading reductions and quality of the receiving water. The MOS may be expressed explicitly as unallocated assimilative capacity or implicitly using conservative assumptions in establishing the TMDL. In addition to the MOS, an FG component may be added to account specifically for FG within the TMDL area. For this analysis, the MOS is explicit: 10 percent of each targeted TMDL was reserved as the MOS to account for any uncertainty in the TMDL. Using 10 percent of the TMDL load provides an additional level of protection to the designated uses of the subsegments of concern.

4.5 Future Growth

The MOS is an allocation for scientific uncertainly, while the FG is an allocation for growth. Ten percent of the load was allocated for FG in the area covered by the TMDL. This growth includes future urban development, including point sources, MS4 areas, agriculture, and other nonpoint sources. The FG could also be used for unaccounted or unknown sources not included in the TMDL.

5. Future Activities

This section discusses TMDL implementation strategies, environmental monitoring activities, and stormwater permitting requirements and presumptive BMPs for the TMDL within subsegments 040501 and 040504.

5.1 TMDL Implementation Strategies

Current TMDL requirements do not require inclusion of implementation plans in TMDL reports. Louisiana is responsible for developing and implementing the TMDL implementation plans. Section 303(d) of the Clean Water Act and the implementing regulations at 40 CFR 130.7 specify that EPA has no authority to approve or disapprove TMDL implementation plans. WLAs will be implemented through LPDES permit procedures. LDEQ was delegated to manage the NPDES program in August 1996, and LDEQ is responsible for all permits covered by the delegation package. As part of that designation, a Memorandum of Agreement (MOA) was established between LDEQ and EPA. The designation and memorandum were revised in April 2004. In accordance with Section 1.C of the NPDES MOA between LDEQ and EPA (Revision 1, April 28, 2004), EPA has the responsibility of providing continued technical and other assistance, including interpreting and implementing federal regulations, policies, and guidelines on permitting and enforcement matters. The MOA further states that LDEQ has primary responsibilities for implementing the LPDES program in Louisiana, including applicable sections of the federal Clean Water Act, applicable state legal authority, the applicable requirements of 40 CFR Parts 122–125, and any other applicable federal regulations establishing LPDES program priorities with consideration of EPA Region 6 and national NPDES goals and objectives. For details on the designation and agreement, see the EPA Region 6 website at http://www.epa.gov/region6/water/npdes/docs/louisiana-moa.pdf.[2] LDEQ's position is that, if any unresolved LDEQ comments to these TMDLs become the basis for an EPA Region 6 objection to an LDEQ-drafted permit or permittee objection/appeal of an LDEQ drafted permit, LDEQ may relinquish permitting authority to EPA Region 6.

LAs will be addressed through the LDEQ Nonpoint Source Management Program. Louisiana's *Nonpoint Source Management Plan* (LDEQ 2010b) states that TMDLs are being developed through a close relationship between LDEQ and EPA Region 6. It further states that, "[m]anagement strategies outlined within this document (both statewide and watershed) will be implemented in each of the watersheds where water quality problems have been attributed to nonpoint sources of pollution." On page ii, Objective 3 of the watershed management strategies is to, "utilize pollutant load reductions of the TMDL to develop nonpoint source pollution reduction strategies for each of the watersheds...that have water quality problems identified."

The plan includes a discussion of a number of nonpoint source activities and provides BMPs that can be used to achieve the nonpoint source load reductions established in these TMDLs. The plan broadly discusses programs to address agriculture, forestry, hydromodification, urban runoff, construction, and resource extraction. Provided with each BMP is an evaluation of the BMP's effectiveness, ranked as high, medium, or low. Additional evaluations should be conducted to determine the most likely source of impairment within this watershed and to identify localized hot spots to be targeted for effective BMP implementation. These and other BMPs can be implemented at a scale adequate to achieve the load reductions established in the TMDL.

5.2 Water Quality Monitoring Activities

LDEQ uses funds provided under section 106 of the Clean Water Act and under the authority of the Louisiana Environmental Quality Act to run a program for monitoring the quality of Louisiana's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations using appropriate sampling methods and procedures to ensure the quality of the data obtained. 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 water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water

[2] Accessed March 13, 2012.

monitoring program are used to develop the state's biennial section 305(b) report (*Water Quality Inventory*) and section 303(d) list of impaired waters (*2010 Integrated Report*).

LDEQ has implemented a rotating approach to surface water quality monitoring. Through the rotating approach, the entire state is sampled on a 4-year cycle. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the 4-year cycle. Sampling is conducted monthly during a water year (October through September) to yield approximately 12 samples per site during each year the site is monitored. Sampling locations are selected as representative of the waterbody. Under the current monitoring schedule, approximately one-half of the state's waters are newly assessed for section 305(b) and section 303(d) listing purposes for each biennial cycle. Monitoring allows LDEQ to determine whether any improvement in water quality occurred after the TMDLs had been implemented. LDEQ evaluates the monitoring results to generate the Integrated Report submitted by April 1 on even-numbered years. More information can be found in *Louisiana's Water Quality Assessment Method and Integrated Report Rationale: 2010 Water Quality Integrated Report* (LDEQ 2010a). Monitoring will allow LDEQ to determine whether water quality improves following TMDL implementation. As the monitoring results are evaluated at the end of each year, waterbodies might be added to or removed from the section 303(d) list of impaired waterbodies.

5.3 Stormwater Permitting Requirements and Presumptive Best Management Practices Approach

5.3.1 Background

The NPDES permitting program for stormwater discharges was established under the Clean Water Act as the result of a 1987 amendment. The Act specifies the level of control to be incorporated into the NPDES stormwater permitting program depending on the source (industrial versus municipal stormwater). These programs contain specific requirements for the regulated communities/facilities to establish a comprehensive stormwater management program (SWMP) or stormwater pollution prevention plan (SWPPP) to implement any requirements of the TMDL allocation (see 40 CFR Part 130).

Stormwater discharges vary significantly in flow and pollutant concentrations, and relationships between discharges and water quality can be complex. For municipal stormwater discharges in particular, use of system-wide permits and a variety of jurisdiction-wide BMPs, including educational and programmatic BMPs, does not easily accommodate to the existing methodologies for deriving numeric water quality-based effluent limitations. These methodologies were designed primarily for process wastewater discharges, which occur at predictable rates with predictable pollutant loadings under low-flow conditions in receiving waters. EPA has recognized such problems and has developed permitting guidance for stormwater permits (USEPA 1996).

Because of the nature of stormwater discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA recommends basing an interim permitting approach for NPDES stormwater on BMPs. EPA permitting guidance states that, "[t]he interim permitting approach uses BMPs in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards" (USEPA 1996).

A monitoring component is also included in the recommended BMP approach. According to EPA permitting guidance, "each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits" (USEPA 1996). This approach was further elaborated in a guidance memo issued in 2002, "The policy outlined in this memorandum affirms the appropriateness of an iterative, adaptive management BMP approach, whereby permits include effluent limits (e.g., a combination of structural and nonstructural BMPs) that address stormwater discharges, implement mechanisms to evaluate the performance of such controls, and make adjustments (i.e., more stringent controls or specific BMPs) as necessary to protect water quality…If it is determined that a BMP approach (including an iterative BMP approach) is appropriate to meet the storm water component of the TMDL, EPA recommends that the TMDL reflect this" (Wayland and Hanlon 2002). This BMP-based approach to stormwater sources in TMDLs is also recognized and described in the most recent EPA guidance (USEPA 2008).

This TMDL adopts the EPA-recommended approach and relies on appropriate BMPs for implementation. No numeric effluent limitations are required or anticipated for municipal stormwater discharge permits.

5.3.2 Specific SWMP/SWPPP Requirements

As discussed in the Louisiana Small MS4 NPDES permit, if a TMDL assigns an individual WLA specifically to a MS4's stormwater discharge, LDEQ's permit specifies that the WLA must be included as a measurable goal for the SWMP.

Examples of activities that the MS4 may conduct to be consistent with the WLA include:

- Monitoring to evaluate program compliance, the appropriateness of identified BMPs, and progress toward achieving identified measurable goals
- Development of a schedule for implementation of additional controls and/or BMPs, if necessary, on the basis of monitoring results, to ensure compliance with applicable TMDLs.

6. Public Participation

Federal regulations require EPA to notify the public and seek comments concerning the TMDLs it prepares. These TMDLs were developed under contract to EPA, and EPA held a public review period seeking comments, information, and data from the public and any other interested parties. The notice for the public review period was published in the *Federal Register* on November 14, 2011. The review period closed on January 13, 2012, after being extended from December 29, 2011 on December 12, 2011.

Comments were received from LDEQ and LPBF. EPA reviewed the comments and referred to them while revising and finalizing this TMDL document, as necessary. Full comment text is included in Appendix F. Responses to the comments are included in Appendix G.

EPA will submit the final TMDL to LDEQ for implementation and incorporation into LDEQ's water quality management plan.

7. References

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