FINAL
TMDLs for Mercury in Selected Subsegments in the Lake Pontchartrain Basin, Louisiana

(040303, 040401, 040403, 040501, 040701, 040801, 040905, 040906)

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United States Environmental Protection Agency, Region 6
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Permits, Oversight, and TMDL Team
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Prepared by:

Tetra Tech, Inc.
10306 Eaton Place, Suite 340
Fairfax, VA 22030

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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 the *Code of Federal Regulations* [CFR] section 130.7) for 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. The components of the TMDL calculation are illustrated using the following equation:

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

The study area for these TMDLs includes eight Lake Pontchartrain Basin subsegments. The subsegments that drain to Lake Pontchartrain include segments in Bayou Liberty and the Amite, Blind, Tickfaw, Tangipahoa and Tchefuncte rivers. In the TMDL study area, the largest percentage of area is wetland, followed by forest, shrubland, and agriculture.

The Louisiana Department of Environmental Quality (LDEQ) included those subsegments on the state's 2010 section 303(d) list of impaired waterbodies (*Final 2010 Integrated Report*) (LDEQ 2010a). The subsegments are listed because of mercury impairments. The impaired designated uses for the subsegments (Table ES-1) are fish and wildlife propagation (FWP) and outstanding natural resource water (ONR). The subsegments are characterized as fully supporting the designated uses (F) and not supporting (N).

The numeric water quality criteria that were used to calculate the total allowable pollutant loads are a Louisiana fish tissue mercury action level of 0.5 ppm (mg/kg) and a water column measurement of 12 nanograms per liter (ng/L).

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 assigned to permitted point source discharges. The LAs include background loadings and loadings from human-induced nonpoint sources. An implicit MOS based on conservative assumptions was used in these TMDLs. Table ES-2 presents a summary of the TMDLs for the subsegments addressed in this report.

Table ES-1. Excerpt from the Final 2010 Integrated Report

Subsegment	Subsegment name	Subsegment description	Designated use				303 (d)-listed suspected impairment sources	
			PCR	SCR	FWP	ONR	Source unknown	Atmospheric deposition
040303	Amite River	Amite River-From Amite River Diversion Canal to Lake Maurepas	F	F	N		X	X
040401	Blind River	Blind River-From Amite River Diversion Canal to mouth at Lake Maurepas	F	F	N	N	X	X
040403	Blind River	Blind River-From Amite River Diversion Canal to mouth at Lake Maurepas	F	F	N	F	X	X
040501	Tickfaw River	Tickfaw River-From Mississippi state line to LA-42	F	F	N	F	X	X
040701	Tangipahoa River	Tangipahoa River-From Mississippi state line to I-12	F	F	N	F	X	X
040801	Tchefuncte River	Tchefuncte River- From headwaters to Bogue Falaya River; includes tributaries	F	F	N	F	X	X
040905	Bayou Liberty	Bayou Liberty-From headwaters to LA-433	F	F	N		X	X
040906	Bayou Liberty	Bayou Liberty-From LA-433 to Bayou Bonfouca	F	F	N		X	X

Note: F = fully supporting, N = not supporting, X = suspected impairment source.

This TMDL report indicates that current mercury loadings throughout the project study area are primarily from nonpoint sources. Consequently, significant reductions in atmospheric deposition within and outside the study area will be necessary. Atmospheric deposition makes up 99.6 percent of the current load. EPA expects that a combination of ongoing and future activities under the Clean Air Act will achieve reductions in air deposition of mercury that will enable progress toward achieving water quality standards.

Table ES-2. Summary of mercury TMDLs, WLAs, and LAs for Lake Pontchartrain Basin

Subsegment	Existing load	Total allowable loading	∑ WLAs	∑ LAs
	lb/yr	lb/day		
040303	6.65	1.6E-02	0.0E+00	1.6E-02
040401	3.76	5.9E-03	0.0E+00	5.9E-03
040403	19.97	3.8E-02	0.0E+00	3.8E-02
040501	13.90	1.9E-02	0.0E+00	1.9E-02
040701	9.60	1.8E-02	3.1E-04	1.8E-02
040801	6.01	9.9E-03	4.0E-04	9.5E-03
040905	0.49	8.3E-04	0.0E+00	8.3E-04
040906	0.59	9.9E-04	0.0E+00	9.9E-04

Information on point source discharges to the listed subsegments was obtained from the Electronic Document Management System database at LDEQ. Data were pulled from the database, and each facility was evaluated to determine whether including the facility in developing the TMDLs was appropriate. The evaluation yielded three point source discharges that might discharge mercury. For most of the dischargers, however, little is known about the potential to discharge mercury. EPA believes it is appropriate to assume that discharges from the municipal wastewater treatment plants (Standard Industrial Classification code 4952) discharging greater than 100,000 gallons per day in the subsegments contain mercury concentrations of 12.0 ng/L (USEPA 2005).

EPA recognizes that additional data and information might be necessary to validate the assumptions of the TMDLs and to provide greater certainty that the TMDLs will achieve the applicable water quality standard. At some point in the future, it might be appropriate to revise these TMDLs on the basis of new information gathered and analyses performed. An adaptive management approach allows EPA or the state to use the best information available at the time to establish a TMDL at levels necessary to implement applicable water quality standards and to make allocations to the pollutant sources. The adaptive management approach is appropriate for these TMDLs because information on the actual contributions of mercury from both point and nonpoint sources will be much better characterized in the future. EPA expects point source loadings of mercury to be reduced primarily through mercury minimization programs developed and implemented by some point sources.

During implementation of the TMDLs, EPA expects the following activities to occur:

- National Pollutant Discharge Elimination System dischargers will develop and implement mercury minimization plans, as appropriate.
- Air emissions of mercury will be reduced through implementation of the Clean Air Act regulations.
- LDEQ will collect additional ambient data on mercury concentrations in water, sediment, fish, and soil, as appropriate.
- LDEQ will develop and implement a mercury risk reduction plan that assesses all sources of mercury.

CONTENTS

1. Introduction 1-1

2. Background Information 2-1

2.1 General Description 2-1
2.2 Land Use 2-1
2.3 Hydrology 2-4
2.4 Designated Uses and Water Quality Criteria 2-5
2.5 Point Sources 2-5
2.6 Nonpoint Sources 2-6

3. Characterization of Existing Water Quality 3-1

3.1 Comparison of Observed Data to Criterion 3-1
3.2 Analysis of Fish Sampling 3-2
3.3 Sediment Data 3-2

4. TMDL Development 4-1

4.1 TMDL Analytical Approach 4-1
4.1.1 Nonpoint Source Loading Estimates 4-1
4.1.2 Point Source Load Estimates 4-1
4.1.3 Load Reduction Estimates 4-1
4.2 TMDLs, WLAs, and LAs 4-3
4.2.1 Wasteload Allocation 4-3
4.2.2 Load Allocation 4-4
4.3 Margin of Safety 4-4

5. Future Activities 5-6

5.1 Pollution Prevention 5-6
5.2 National Assurances 5-6
5.3 State-level Assurances: LDEQ Statewide Mercury Program 5-7
5.4 Environmental Monitoring Activities 5-9
5.5 TMDL Implementation Strategies 5-10

6. Public Participation 6-1

7. References 7-1

APPENDICES

Appendix A: NPDES Permitted Facilities

Appendix B: Environmental Mercury Data

Appendix C: TMDL Calculations (CD-ROM—Available upon request)

Appendix D: Original Public Comment Letters

Appendix E: EPA Responses to Public Comments

TABLES

Table ES-1. Excerpt from the Final 2010 Integrated Report ii
Table ES-2. Summary of mercury TMDLs, WLAs, and LAs for Lake Pontchartrain Basin ii
Table 1-1. Subsegments and impairments addressed in this report 1-2
Table 2-1. Parish and drainage area for each listed subsegment in the Lake Pontchartrain Basin 2-1
Table 2-2. Land use percentages for each listed subsegment in the Lake Pontchartrain Basin 2-3
Table 2-3. Current USGS flow stations in the Lake Pontchartrain Basin 2-4
Table 2-4. Point source discharge information for the Lake Pontchartrain Basin 2-5
Table 2-5. Atmospheric deposition data 2-6
Table 3-1. Summary of water column data in the Lake Pontchartrain Basin 3-1
Table 3-2. Available inorganic mercury sediment data for the Lake Pontchartrain Basin 3-3
Table 3-3. Available organic mercury sediment data for the Lake Pontchartrain Basin 3-3
Table 4-1. Summary of TMDLs, WLAs, and LAs for Lake Pontchartrain Basin 4-3
Table 4-2. Summary of WLAs for Lake Pontchartrain Basin 4-3

FIGURES

Figure 2-1. Locations of Lake Pontchartrain Basin subsegments. 2-2
Figure 2-2. Land use in the Lake Pontchartrain Basin subsegments. 2-3
Figure 2-3. Locations of fish tissue sampling stations and USGS flow gauges in the Pearl River Basin 2-4
Figure 2-4. Location of the mercury atmospheric deposition station. 2-7
Figure 3-1. Locations of environmental sampling stations in Lake Pontchartrain Basin. 3-2

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 the *Code of Federal Regulations* [CFR] section 130.7) for 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 the 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.

In most circumstances, a variety of scientifically acceptable methods can be used for developing a TMDL, wasteload allocation (WLA), and load allocation (LA). It should be noted that because some acceptable TMDL calculation methods appear simple, that does not imply that its results are not valid. 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 to propose 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.

Monitoring data collected by the Louisiana Department of Environmental Quality (LDEQ) indicate that observed water quality and mercury in fish tissue sometimes exceed criteria for eight subsegments in the Lake Pontchartrain Basin. The impaired designated uses for the subsegments are fish and wildlife propagation and outstanding natural resource water. The subsegments are characterized as fully supporting their designated uses (F) and not supporting (N). Table 1-1 presents information from Louisiana's 2010 section 303(d) list for the subsegments (*Final 2010 Integrated Report*) (LDEQ 2010a).

Table 1-1 also presents the suspected sources of mercury impairment. All subsegments are listed for atmospheric deposition. The subsegments also have the suspected cause *unknown sources*, which indicates that other sources might be present but not enough data are available to identify them. Natural sources of mercury include natural degassing of the earth's crust and trace amounts of mercury present in minerals or rocks, such as cinnabar, limestone, serpentine, and sandstone (LDEQ 2004). Man-made mercury sources include pesticides, fungicides, manometers (25,000–30,000 of which are in use in Louisiana at gas line metering stations), wastewater treatment sludge, batteries, waste incinerators, paints, fluorescent light bulbs, toys, shoes, dental amalgams, and medical devices (LDEQ 2004).

Table 1-1. Subsegments and impairments addressed in this report

Subsegment	Subsegment name	Subsegment description	Designated use*				303 (d)-listed suspected impairment sources	
			PCR	SCR	FWP	ONR	Source unknown	Atmospheric deposition
040303	Amite River	Amite River-From Amite River Diversion Canal to Lake Maurepas	F	F	N		X	X
040401	Blind River	Blind River-From Amite River Diversion Canal to mouth at Lake Maurepas	F	F	N	N	X	X
040403	Blind River	Blind River-From Amite River Diversion Canal to mouth at Lake Maurepas	F	F	N	F	X	X
040501	Tickfaw River	Tickfaw River-From Mississippi state line to LA-42	F	F	N	F	X	X
040701	Tangipahoa River	Tangipahoa River-From Mississippi state line to I-12	F	F	N	F	X	X
040801	Tchefuncte River	Tchefuncte River- From headwaters to Bogue Falaya River; includes tributaries	F	F	N	F	X	X
040905	Bayou Liberty	Bayou Liberty-From headwaters to LA-433	F	F	N		X	X
040906	Bayou Liberty	Bayou Liberty-From LA-433 to Bayou Bonfouca	F	F	N		X	X

* Notes: F = fully supporting, N = not supporting, I = insufficient data, X = not assessed; PCR = primary contact recreation; SCR = secondary contact recreation; FWP = fish and wildlife propagation; ONR = outstanding natural resource water

2. Background Information

2.1 General Description

The Lake Pontchartrain Basin is in southeastern Louisiana and is primarily comprised of the rivers and bayous that drain into Lake Pontchartrain. The basin is bordered by the Pearl River Basin to the east, by Breton and Chandeleur Sound to the southeast, and by the Mississippi River Levee to the south and west. The northern portion of the Lake Pontchartrain Basin consists of forests, pines and hardwoods, pastures, and dairies. The southern portion consists of cypress-tupelo swamps and lowlands, and brackish and saline marshes. Elevations in the basin range from minus 5 feet at New Orleans to greater than 200 feet near the Mississippi River (LDEQ 2010b).

The area for these TMDLs includes eight Lake Pontchartrain Basin subsegments. The subsegments that drain to Lake Pontchartrain include segments in Bayou Liberty and the Amite, Blind, Tickfaw, Tangipahoa and Tchefuncte rivers. The basin's U.S. Geological Survey (USGS) hydrologic unit codes include 08070202, 08070203, 08070204, 08070205, 08090201.

The area of interest for these TMDLs consists of selected subsegments in the Lake Pontchartrain Basin in Washington, St. Tammany, Tangipahoa, St. Helena, Livingston, Ascension and St. James parishes. Table 2-1 lists the parish and approximate drainage area of each subsegment, and Figure 2-1 shows the locations of the subsegments.

Table 2-1. Parish and drainage area for each listed subsegment in the Lake Pontchartrain Basin

Subsegment	Subsegment name	Parish	Drainage area (acres)	Tidally influenced?[a]
040303	Amite River	Livingston	48,165	Yes
040401	Blind River	Livingston	17,155	Yes
040403	Blind River	Ascension, St. James	110,125	Yes
040501	Tickfaw River	St. Helena	207,793	Yes
040701	Tangipahoa River	Tangipahoa	159,473	Yes
040801	Tchefuncte River	St. Tammany	139,139,810	Yes
040905	Bayou Liberty	St. Tammany	19,122	Yes
040906	Bayou Liberty	St. Tammany	7,335	Yes

Note: a. Source: Max Forbes, Retired USGS, personal communication, May 31, 2011.

2.2 Land Use

Land use data were obtained from the 2006 U.S. Geological Survey (USGS) National Land Cover Dataset (NLCD; Figure 2-2 and Table 2-2). The largest percentage of area is wetland, followed by forest, grass/shrub, and agriculture. There is not much developed land.

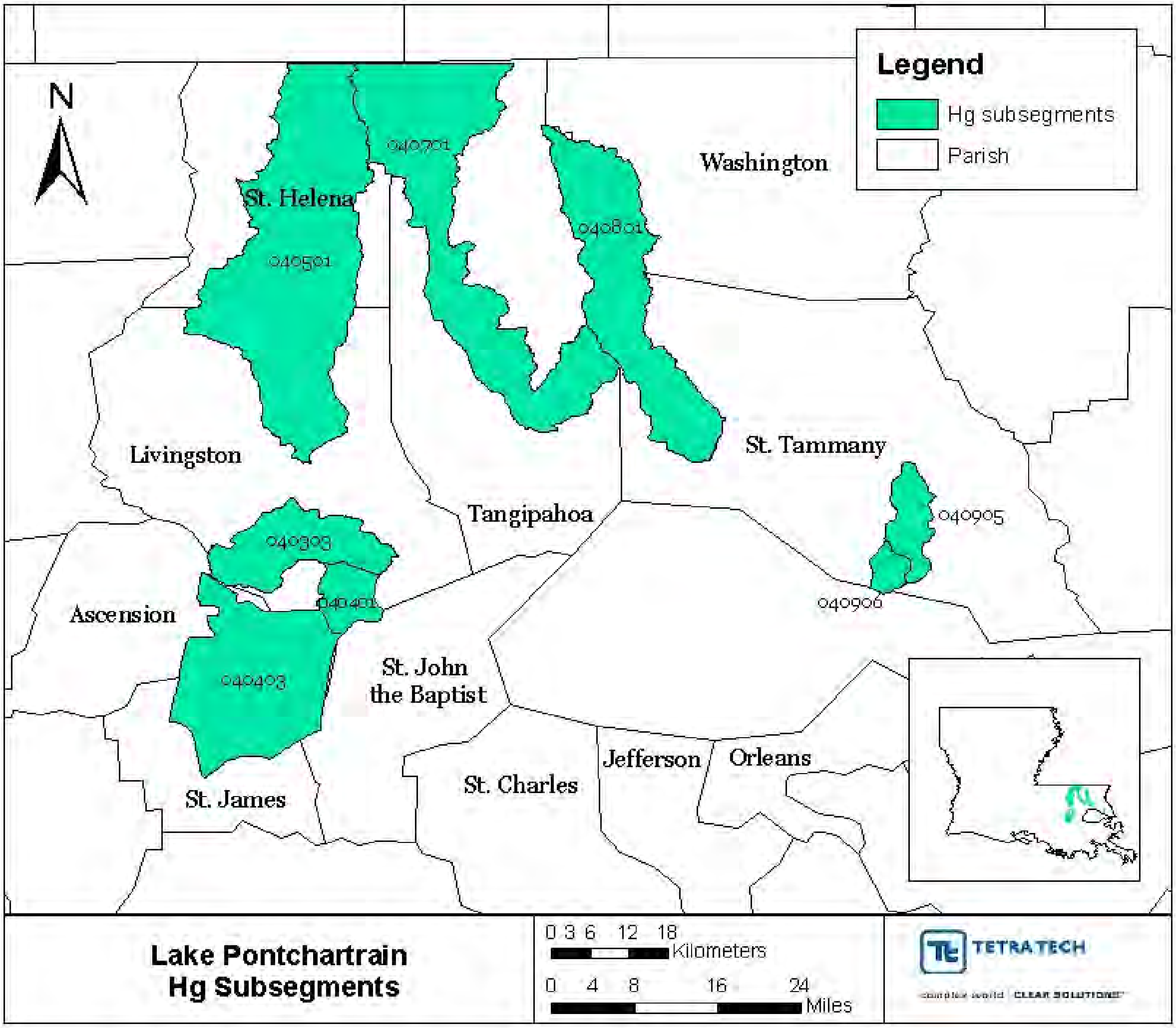

Figure 2-1. Locations of Lake Pontchartrain Basin subsegments.

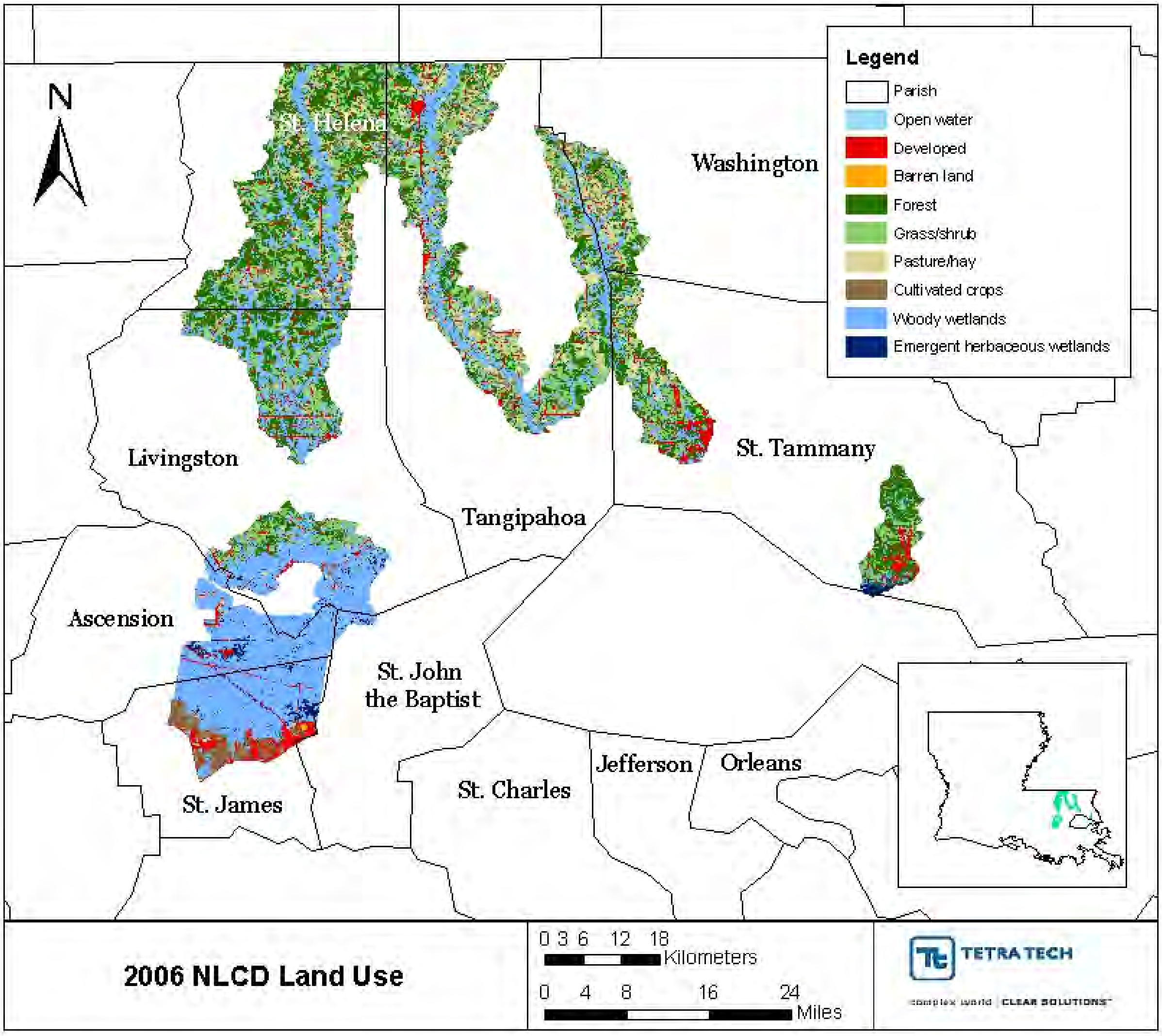

Figure 2-2. Land use in the Lake Pontchartrain Basin subsegments.

Table 2-2. Land use percentages for each listed subsegment in the Lake Pontchartrain Basin

Subsegment	Open water	Developed	Barren land	Forest	Grass/ shrub	Pasture/ hay	Cultivated crops	Woody wetland	Emergent herbaceous wetland
040303	1.90%	4.64%	0.01%	12.57%	17.67%	2.19%	2.54%	55.83%	2.65%
040401	2.16%	0.92%	0.00%	0.20%	0.04%	0.38%	2.53%	88.34%	5.44%
040403	1.24%	8.63%	0.17%	0.00%	0.54%	0.62%	10.73%	73.03%	5.03%
040501	0.12%	5.22%	0.11%	33.23%	23.51%	6.52%	2.15%	28.95%	0.18%
040701	1.65%	6.22%	0.59%	22.59%	25.06%	14.36%	5.16%	23.85%	0.52%
040801	0.79%	7.51%	0.19%	25.40%	23.79%	15.45%	4.03%	22.53%	0.32%
040905	0.16%	13.44%	0.20%	56.29%	18.08%	0.68%	0.04%	10.09%	1.02%
040906	0.73%	9.97%	0.17%	37.80%	15.88%	0.26%	0.92%	14.49%	19.78%

2.3 Hydrology

The USGS online hydrology database (NWISWeb) contains 10 stations with flow data for the subsegments that are impaired for mercury. Those stations are listed in Table 2-3 and are shown in Figure 2-3. The Lake Pontchartrain Basin is tidally influenced. USGS flow data were not used in developing the TMDLs.

Table 2-3. Current USGS flow stations in the Lake Pontchartrain Basin

Station	Station name	Subsegment
7375000	Tchefuncte River near Folsom, LA	040801
7375050	Tchefuncte River near Covington, LA	040801
7375300	Tangipahoa River near Kentwood, LA	040701
7375430	Tangipahoa River near Amite, LA	040701
7375500	Tangipahoa River at Robert, LA	040701
7375800	Tickfaw River at Liverpool, LA	040501
7376000	Tickfaw River at Holden, LA	040501
7380200	Amite River near French Settlement, LA	040303
7380215	Amite River at Hwy 22 near Maurepas, LA	040303
73802282	New River Canal near Sorrento, LA	040403

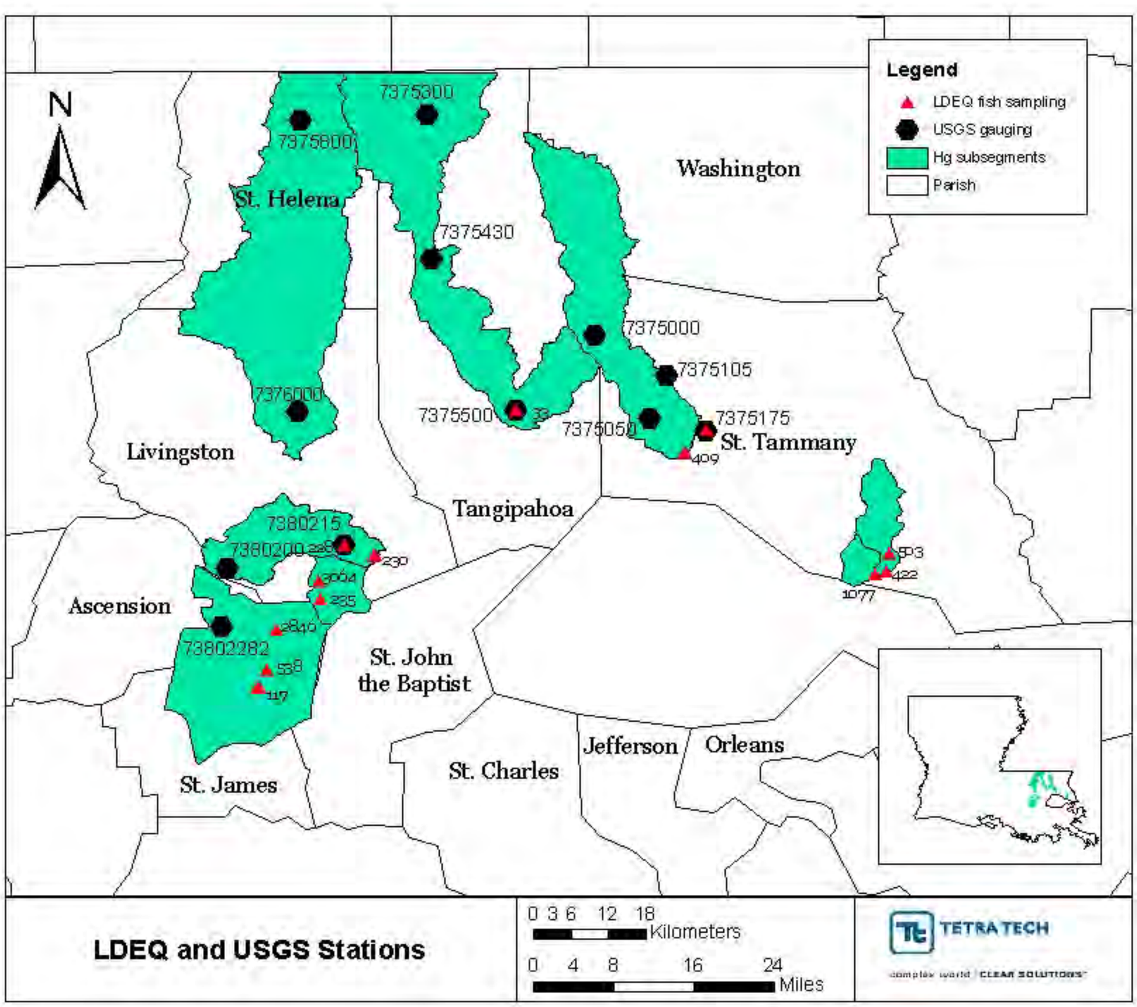

Figure 2-3. Locations of fish tissue sampling stations and USGS flow gauges in the Pearl River Basin.

2.4 Designated Uses and Water Quality Criteria

Louisiana's 2010 section 303(d) list indicates that the eight listed subsegments—all assigned a use of fish and wildlife propagation or outstanding natural resource water—are not meeting applicable water quality standards because of impairments suspected to be the result of nonpoint atmospheric deposition.

Fish and wildlife propagation includes the use of water for aquatic habitat, food, resting, reproduction, cover, or travel corridors for any indigenous wildlife and aquatic life species associated with the aquatic environment. Outstanding natural resource waters are waterbodies designated for preservation, protection, reclamation, or enhancement of wilderness, aesthetic qualities, and ecological regimes, such as those designated under the Louisiana Natural and Scenic Rivers System or those designated by LDEQ as waters of ecological significance.

The state's numeric criteria were used in conjunction with the assessment methodology presented in LDEQ's section 305(b) report (LDEQ 2002). The assessment methodology specifies that primary contact recreation, secondary contact recreation, fish and wildlife propagation, and outstanding natural resource uses are to be fully supported. The water quality criterion is 12 nanograms per liter (ng/L) for chronic aquatic life protection in fresh and brackish water. Mercury levels in fish tissue are not to exceed the state's criterion, 0.5 ppm.

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

2.5 Point Sources

LDEQ stores permit information using internal databases. 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 the relevant subsegment's 303(d) listing to determine whether the facility would be used in developing the TMDLs. This report lists only permitted municipal facilities with flows greater than 100,000 gallons per day (gpd) as per methodology in the EPA approved TMDL, *Total Maximum Daily Loads (TMDLs) for Mercury in Fish Tissue for Coastal Bays and Gulf Waters of Louisiana* (USEPA 2005). The evaluation yielded 10 point source discharges (Table 2-4) that could have a mercury concentration. A full list of permits is included in Appendix A.

Table 2-4. Point source discharge information for the Lake Pontchartrain Basin

Agency interest (AI) #	Permit number	Facility name	Sub-segment	Outfall	Flow (gpd)	Receiving water
19979	LA0038431	Amite City, Town of - WWTP	040701	001	1,300,000	Tangipahoa River
33911	LA0042544	Independence, Town of - WWTP	040701	001	900,000	Tangipahoa River
33972	LA0046051	Kentwood, Town of - Sewerage WWTF	040701	001	700,000	Tangipahoa River
154673	LA0123897	Sewerage District #1 of Tangipahoa Parish - Nelson Development	040701	001	250,000	Tangipahoa River
18460	LA0084336	Covington, City of – WWTP	040801	001	2,630,000	Tchefuncte River
19208	LA0066567	Utilities of LA Inc - Green Brier Oxidation Pond	040801	001	640,000	Tchefuncte River
31222	LA0105520	Artesian Utility Co Inc - Lake Ramsey Subdivision	040801	001	120,000	Tchefuncte River
51671	LA0122645	Southeastern LA Water & Sewer Co LLC - Timber Branch II Subdivision	040801	001	300,000	Tchefuncte River
111355	LAR10C283	H2O Systems Inc - Penn Mill Lakes STF	040801	001	190,000	Tchefuncte River
115894	LA0117927	Southeastern LA Water & Sewer Co LLC-Tallow Cr STP	040801	001	146,000	Tchefuncte River

Phase I and II stormwater systems are additional possible point source contributors in 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. Those discharges often contain high concentrations of pollutants that can eventually enter nearby waterbodies. Most stormwater discharges are considered point sources and require coverage by an 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 an 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 includes small MS4s outside an UA that are so designated by NPDES permitting authorities, case by case (USEPA 2000). These TMDLs will not result in permit limits for any MS4 permittees. However, mercury minimization programs may be required.

In Louisiana, there are two ways that an MS4 can be identified as a regulated, small MS4. 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).

2.6 Nonpoint Sources

Louisiana's section 303(d) list identifies atmospheric deposition as the suspected cause of the mercury impairment in the subsegments of the Lake Pontchartrain Basin. The predominant land use in the impaired subsegments is wetland. The percentage of wetlands in the subsegments ranges from 11 to 94 percent. The subsegments also contain pasture, cropland, forest, and urban areas. The regional atmospheric deposition data (Table 2-5) were obtained from the National Atmospheric Deposition Network. Station LA28 is in Tangipahoa Parish (Figure 2-4). Appendix B contains a full list of the atmospheric deposition data.

Table 2-5. Atmospheric deposition data

Subsegment	Station	Period of record	No. of obs.	Min. Hg conc. **(ng/L)**	Min. Hg load (ng/m^2)	Max. Hg conc. **(ng/L)**	Max. Hg load (ng/m^2)	Avg. Hg conc. **(ng/L)**	Avg. Hg load (ng/m^2)
040701	LA28	10/7/1998–12/29/2009	434	0.62	2.71	99.56	2,747	14.97	354

The land use statistics show that most of the subsegments consist largely of wetlands, water, and forests, which are largely undeveloped, natural areas. The Lake Pontchartrain Basin consists of vast areas of swamps and marshes, especially in the lower reaches, which contribute a large natural organic load to the waterbodies. The organic load, in turn, creates conditions conducive to the production of methyl mercury. What contribution natural sources make to the mercury impairment in this basin is not clear. Those natural conditions might not be affected by implementing the TMDLs, and more data are needed to assess the natural contributions.

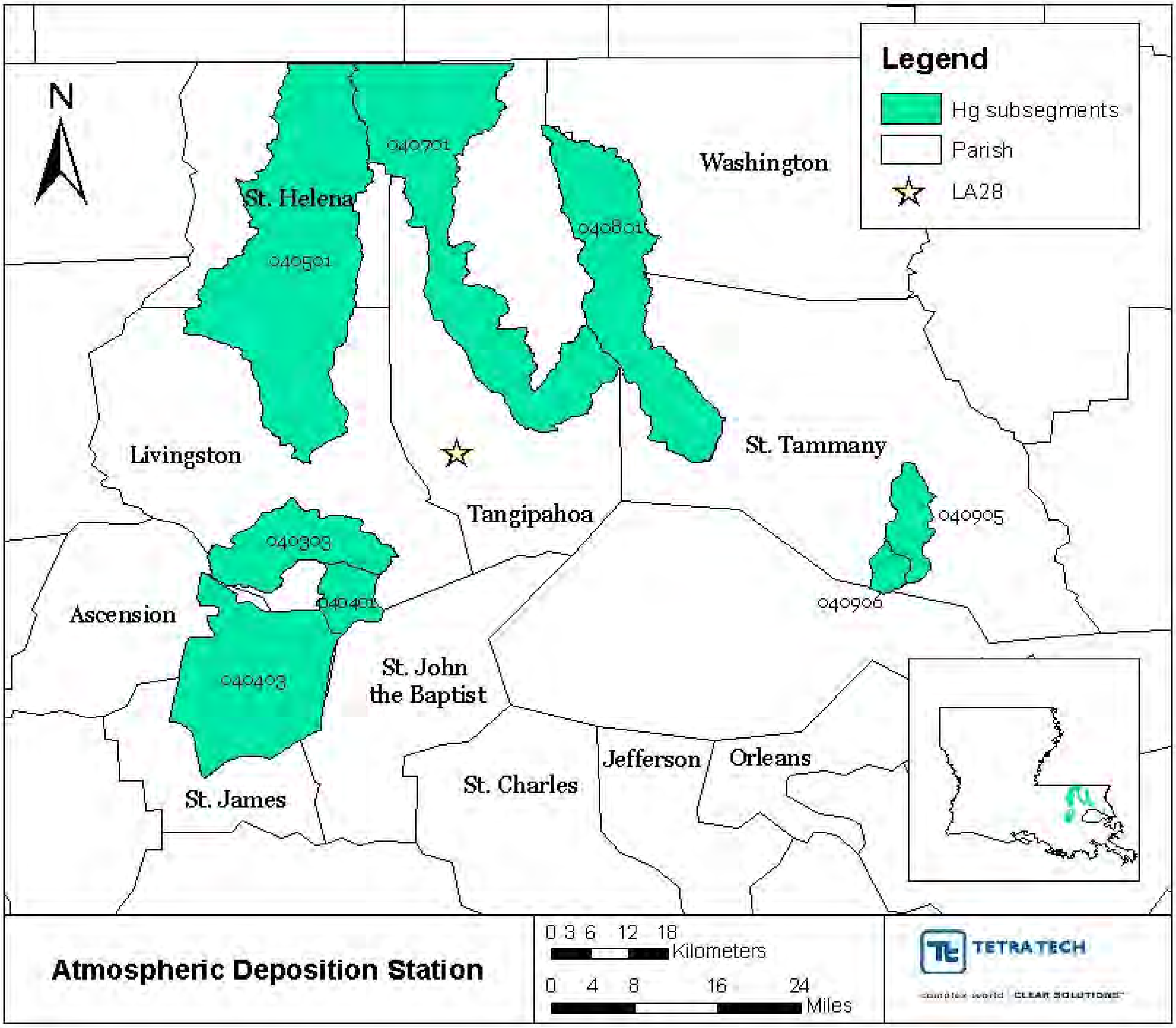

Figure 2-4. Location of the mercury atmospheric deposition station.

3. Characterization of Existing Water Quality

3.1 Comparison of Observed Data to Criterion

Water quality monitoring data for each listed subsegment were obtained from LDEQ. LDEQ mercury water quality data were available for 15 stations in 8 subsegments (Figure 3-1 and Table 3-1). Four of the stations had 100 or more data points; the remainder had fewer than 7. Many of the samples collected exceeded the water quality criterion, 12 ng/L (0.012 micrograms per liter [μg/L]). Appendix B contains a full list of the monitoring data.

Table 3-1. Summary of water column data in the Lake Pontchartrain Basin

Subsegment	Station	Station name	Period of record	No. of obs.	Mercury minimum (μg/L)	Mercury maximum (μg/L)	Mercury average (μg/L)
040303	0228	Amite River - Amite River at mile 6.5, at Clio, LA	9/18/01–3/7/06	5	0.01	0.2	0.064
040401	1102	Blind River near confluence with Lake Maurepas		No data			
040403	0117	Blind River near Gramercy, LA	4/13/81–4/14/98	103	0.05	1.3	0.192
	0538	Blind River near Gramercy, LA	7/24/96–2/2/99	4	0.05	0.05	0.05
	2846	Petite Amie River east of Sorrento, LA		No data			
	0156	Blind River northwest of Gramercy, LA		No data			
040501	0116	Tickfaw River at Springville, LA	4/13/81–3/1/05	116	0.01	1.6	0.19
040701	0108	Tangipahoa River at Arcola, LA	4/13/81–5/11/98	100	0.05	1	0.182
	0033	Tangipahoa River west of Robert, LA	4/21/99–7/26/04	2	0.05	0.2	0.125
040801	0107	Tchefuncte River west of Covington, LA	4/13/81–5/11/98	100	0.05	0.9	0.196
	0409	Tchefuncte River near Covington, LA	8/30/94–7/26/04	5	0.05	0.2	0.08
040905	0503	Bayou Liberty near Slidell, LA	8/24/95–4/19/99	3	0.05	0.05	0.05
	1077	Bayou Liberty at Hwy. 433 Bridge	7/24/01–9/13/04	1	0.05	0.05	0.05
	0422	Bayou Liberty west of Slidell, LA	7/23/07	2	0.01	0.01	0.01
040906	1076	Bayou Liberty at Bayou Paquet	9/19/01–12/19/01	No data			

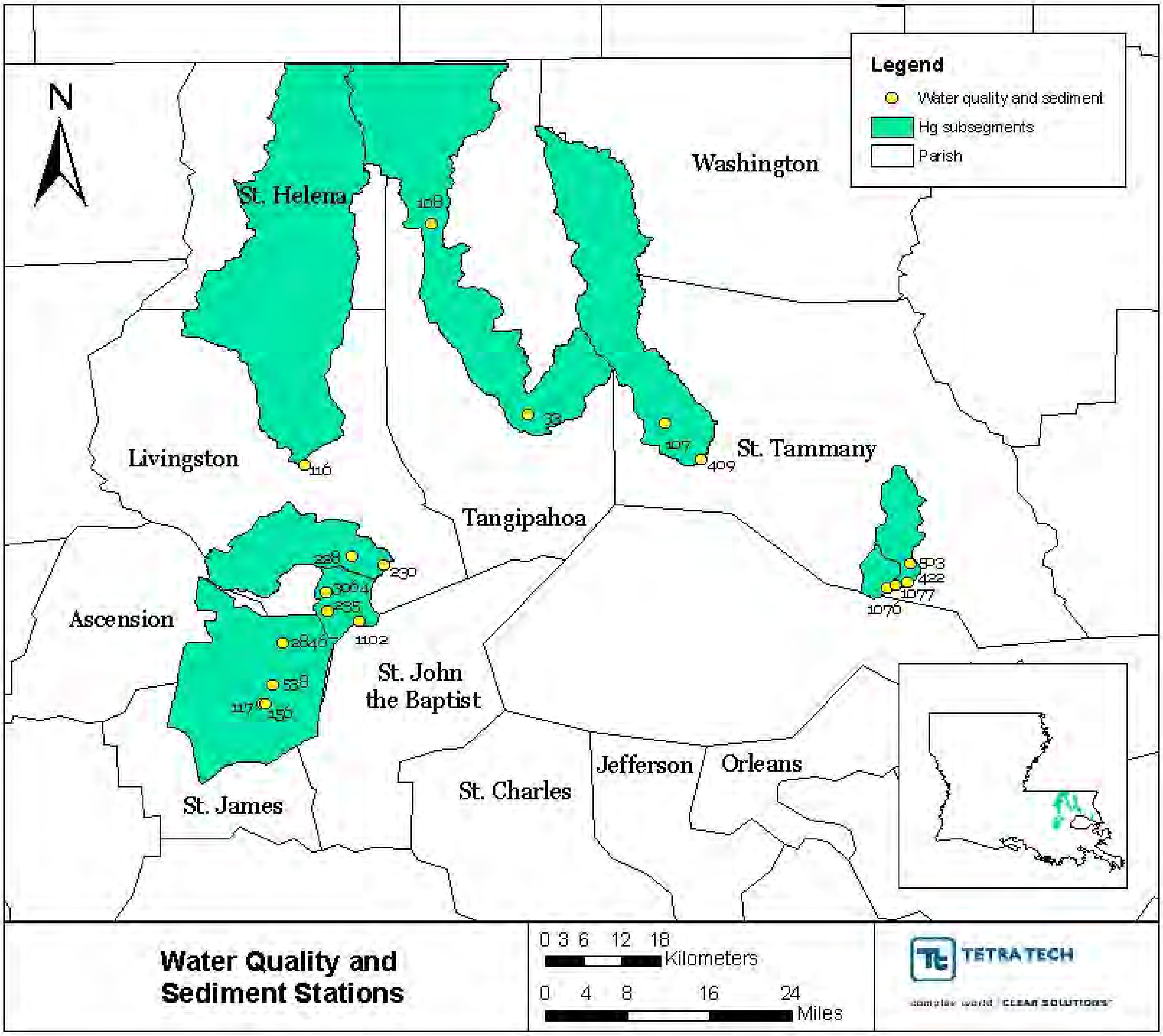

Figure 3-1. Locations of environmental sampling stations in Lake Pontchartrain Basin.

3.2 Analysis of Fish Sampling

Louisiana's guidance for issuing Mercury fish tissue advisories includes a comparative numeric value of 0.5 parts per million (ppm or mg/kg). EPA's criterion is 0.3 ppm. Louisiana's guidance value was used in these TMDLs. LDEQ sampled in the Lake Pontchartrain Basin from 1995 to 2008, using 17 monitoring locations in seven subsegment. During that period, 243 maximum concentrations exceeded the LDEQ criterion of 0.5 ppm, and 10 locations had an average concentration above the guidance value.

Two types of mercury—inorganic and organic—are present in the environment. The organic or methyl mercury form is the primary species of concern. Methyl mercury bioaccumulates in the proteins of fish and other organisms, resulting in increases through the various trophic levels. For example, young fish typically have lower concentrations than older fish. Appendix B contains a full list of the monitoring data.

3.3 Sediment Data

Additional information on mercury was obtained from LDEQ mercury monitoring events. Sediment concentrations were obtained for 12 monitoring locations in five subsegments for inorganic mercury (Table 3-2) and for 10 monitoring locations in five subsegments for organic mercury (Table 3-3). Most of the subsegments had only one to three data points for sediment. Two stations had five or six sampling events for inorganic mercury in sediment. Figure 3-1 shows the sediment sampling locations. Appendix B contains a full list of the monitoring data.

Table 3-2. Available inorganic mercury sediment data for the Lake Pontchartrain Basin

Subsegment	Station	Station name	Period of record	No. of obs.	Hg minimum (mg/kg)	Hg maximum (mg/kg)	Hg average (mg/kg)
040701	0033	Tangipahoa River west of Robert, LA	12/16/2002–7/26/2004	2	0.003	0.004	0.004
040403	0117	Blind River near Gramercy, LA	1/31/2000–1/11/2001	3	0.120	0.280	0.195
040403	0156	Blind River northwest of Gramercy, LA	1/9/2003–9/17/2007	3	0.063	0.424	0.184
040403	0228	Amite River at mile 6.5, at Clio, LA	1/18/2000–1/14/2008	5	0.000	0.160	0.089
040303	0230	Amite River at mile 6.5, at Clio, LA	7/14/2004	1	0.083	0.083	0.083
040401	0235	Blind River East of Sorrento, LA	1/21/2004–7/28/2008	3	0.000	0.070	0.037
040801	0409	Tchefuncte River near Covington, LA	8/30/1994–7/26/2004	5	0.000	0.098	0.057
040905	0422	Bayou Liberty west of Slidell, LA	7/23/2007	1	0.245	0.245	0.245
040905	0503	Bayou Liberty near Slidell, LA	8/24/1995–4/19/1999	3	0.030	0.820	0.297
040403	0538	Blind River near Gramercy, LA	7/24/1996–2/2/2009	3	0.000	0.520	0.327
040905	1077	Bayou Liberty at Hwy. 433 Bridge	7/24/2001–9/13/2004	3	0.047	0.151	0.096
040701	2139	Skulls Creek west of Robert, LA	3/24/2003	1	0.056	0.056	0.056
040403	2846	Petite Amie River east of Sorrento, LA	1/29/2004	1	0.116	0.116	0.116
040401	3064	Black Lake near Denson, LA	4/4/2005	1	0.114	0.114	0.114

Table 3-3. Available organic mercury sediment data for the Lake Pontchartrain Basin

Subsegment	Station	Station name	Period of record	No. of obs.	Methyl Hg minimum (µg/kg)	Methyl Hg maximum (µg/kg)	Methyl Hg average (µg/kg)
040701	0033	Tangipahoa River west of Robert, LA	7/26/2004	1	0.03	0.03	0.03
040403	0117	Blind River near Gramercy, LA	1/10/2002	1	2.19	2.19	2.19
040403	0156	Blind River northwest of Gramercy, LA	1/9/2003–9/17/2007	3	0.67	1.37	0.93
040403	0228	Amite River at mile 6.5, at Clio, LA	11/20/2002–7/14/2004	2	0.33	1.07	0.70
040303	0230	Amite River at mile 6.5, at Clio, LA	7/14/2004	1	0.30	0.30	0.30
040401	0235	Blind River East of Sorrento, LA	1/21/2004–8/1/2005	2	0.18	0.22	0.20
040801	0409	Tchefuncte River near Covington, LA	5/21/2002–7/26/2004	3	0.45	1.77	1.00
040905	0422	Bayou Liberty west of Slidell, LA	7/23/2007	1	0.38	0.38	0.38
040905	1077	Bayou Liberty at Hwy. 433 Bridge	7/29/2002–9/13/2004	2	0.10	0.19	0.15
040701	2139	Skulls Creek west of Robert, LA	3/24/2003	1	1.61	1.61	1.61
040403	2846	Petite Amie River east of Sorrento, LA	1/29/2004	1	0.59	0.59	0.59
040401	3064	Black Lake near Denson, LA	4/4/2005	1	0.81	0.81	0.81

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 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. The components of the TMDL calculation are illustrated using the following equation:

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

4.1 TMDL Analytical Approach

To estimate the mercury loading to the watershed, a two-step method was used. Point and nonpoint source loadings were estimated, and necessary reductions in fish tissue mercury concentrations were calculated.

4.1.1 Nonpoint Source Loading Estimates

Nonpoint source loads were estimated from regional atmospheric deposition. Data were obtained from the National Atmospheric Deposition Program (NADP). Station LA28 is in Tangipahoa Parish, which is just within the basin. Data obtained from that station were for wet deposition from 1999 through 2009. Dry deposition was calculated as 50 percent of the wet deposition; 40 to 60 percent of wet is an acceptable estimate for dry deposition (USEPA 2001b). Dry and wet deposition were combined to obtain total deposition.

Precipitation data were also available for the monitoring site. Those data were compared with precipitation data from National Climatic Data Center stations in and around the Lake Pontchartrain Basin. By dividing the average annual precipitation for the basin by the precipitation at station LA28, an atmospheric deposition correction factor was obtained. Multiplying the deposition at station LA28 by the deposition correction factor produced precipitation-corrected regional atmospheric deposition values for the Lake Pontchartrain Basin. Atmospheric deposition makes up 99.6 percent of the current load.

Only direct mercury loading was calculated in these TMDLs. For each subsegment the sum of the open water and wetland land use areas was used. Indirect loading by erosion and overland flow was considered minimal because there is very little agriculture and developed land in the basin.

4.1.2 Point Source Load Estimates

Information on point source discharges to the listed subsegments was obtained from LDEQ's EDMS. No permits specify a mercury limit. The water quality criterion maximum of 12 ng/L was assumed for the facility discharges in Table 2-4, and it was multiplied by the available flow to obtain a load. This methodology is consistent with the methodology in other EPA approved TMDLs, such as *Total Maximum Daily Loads (TMDLs) for Mercury in Fish Tissue for Coastal Bays and Gulf Waters of Louisiana* (USEPA 2005).

4.1.3 Load Reduction Estimates

EPA has a fish tissue mercury concentration maximum of 0.5 ppm. To establish a reduction in selected segments, the average of the worst-case species was used. The species average was divided by the target fish tissue concentration. Appendix C contains the TMDL calculations.

Equations Used for TMDL Calculation (USEPA 2001a):

$$RF = MC / SC \qquad \text{Equation 4-1}$$

where

RF = reduction factor
MC = measured tissue concentration of worst-case species
SC = safe tissue mercury concentration (0.5 ppm)

$$TMDL = (EL / RF) \times SF \qquad \text{(Equation 4-2)}$$

where

EL = existing load (nonpoint and point sources)
RF = reduction factor
SF = site-specific factor (assumed to be 1)

That TMDL calculation method relied on several assumptions. Point sources were assumed to discharge at a constant rate and at a constant mercury concentration equal to the water quality criterion. Factors affecting the site-specific factor were assumed negligible until more information is available. Atmospheric deposition was assumed to be significant only when applied directly to water or wetlands. A linear relationship was assumed between fish tissue concentrations and methyl mercury reductions, which is consistent with bioaccumulation factors and steady state assumptions.

The relationship between mercury loading to a watershed and the accumulation of mercury in fish tissue is complex and highly variable. A number of natural processes influence this relationship. This representation of mercury fate establishes a spatially varying relationship between point and atmospheric loadings, total mercury in soil, total mercury in water and sediment, methyl mercury in water and sediment, and mercury in fish tissue. This analysis assumes that reductions in loadings will lead to proportional mercury loading reductions in all media over time. Studies done throughout the country indicate methylation uptake rates of available mercury can widely vary with some studies confirming a linear relationship between loading and bioaccumulation in fish tissue. Modeling results from pilot studies in the Everglades (USEPA 2003) support that in the Everglades there is a linear relationship between mercury deposition and levels of mercury in fish. This relationship of fish mercury levels and deposition is almost linear. While it is not appropriate to transfer these results directly to other sites, it does provide support that this assumption is realistic and has been substantiated in at least one other location. The conservative assumption that 100 percent of the mercury loading is bioavailable is an implicit component of the margin of safety, which is a required element of a TMDL. This analysis assumes that reductions in loadings will lead to proportional mercury loading reductions in all media over time. It should be obvious that present concentrations in fish have resulted from loadings averaged over an appropriate time (as affected by transport, transformation, and bioaccumulation processes). Further, if all loadings could be completely eliminated, the mercury concentrations in all media and fish would eventually equilibrate to very low levels, below concentrations of concern relative to human health. We assume that methylation/demethylation rates and food web structure will be unaffected by future mercury load reductions. Therefore, predicted mercury concentrations in all media at a location (given sufficient time to re-equilibrate) will be related to load reductions in a roughly linear manner. This approach used the best technology we have available for developing a TMDL for mercury.

[1] Mercury loading capacity differs by waterbody depending on the physical and chemical variables. The site-specific factor might be based on measured sulfate, organic carbon, alkalinity, or pH values, as well as the influence of mercury methylation and bioaccumulation. Because of the complex nature of mercury bioaccumulation and other factors, the site-specific factor was assumed to be 1. In the future, better technologies and model refinements will allow other factors to be considered.

4.2 TMDLs, WLAs, and LAs

Table 4-1 presents the TMDLs and allocations for the subsegments in this report.

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

Subsegment	Existing load	Percent reduction	Total allowable loading	∑ WLAs	∑ LAs
	lb/yr		lb/day		
040303	6.65	15%	1.6E-02	0.0E+00	1.6E-02
040401	3.76	42%	5.9E-03	0.0E+00	5.9E-03
040403	19.97	30%	3.8E-02	0.0E+00	3.8E-02
040501	13.90	49%	1.9E-02	0.0E+00	1.9E-02
040701	9.60	31%	1.8E-02	3.1E-04	1.8E-02
040801	6.01	40%	9.9E-03	4.0E-04	9.5E-03
040905	0.49	38%	8.3E-04	0.0E+00	8.3E-04
040906	0.59	38%	9.9E-04	0.0E+00	9.9E-04

4.2.1 Wasteload Allocation

The WLA portion of the TMDL is the total loading of a pollutant that is assigned to point sources. While, the majority of the loadings identified in this TMDL are from atmospheric deposition and surface water, dischargers are not expected to cause significant impact. EPA believes that contributions from surface water dischargers should not be ignored. Of the point sources evaluated in these TMDLs, 10 were considered to have a reasonable potential to contain mercury in their discharge (Table 4-2). The point sources identified include municipal wastewater treatment facilities. Five MS4 municipalities discharge into the impaired subsegments. Urban stormwater runoff is not considered a significant source of mercury in the basins. No allocations were given to MS4s.

Table 4-2. Summary of WLAs for Lake Pontchartrain Basin

Agency interest (AI) #	Permit number	Outfall	Facility name	Facility outfall	Flow (gpd)	Type	Mercury load (lb/day)
040701							
19979	LA0038431	001	Amite City Town of - WWTP	Treated sanitary wastewater	1,300,000	Design	0.00013
33911	LA0042544	001	Independence Town of - WWTP	Treated sanitary wastewater	900,000	Design	0.00009
33972	LA0046051	001	Kentwood Town of - Sewerage Wastewater Treatment Facility	Treated sanitary wastewater	700,000	Design	0.00007
154673	LA0123897	001	Sewerage District #1 of Tangipahoa Parish - Nelson Development	Treated sanitary wastewater	250,000	Design	0.00003
040801							
18460	LA0084336	001	Covington City of – WWTP	Treated sanitary wastewater	2,630,000	Expected	0.00026
19208	LA0066567	001	Utilities of LA Inc - Green Brier Oxidation Pond	Treated sanitary wastewater	640,000	Expected	0.00006
31222	LA0105520	001	Artesian Utility Co Inc - Lake Ramsey Subdivision	Treated sanitary wastewater	120,000	Expected	0.00001
51671	LA0122645	001	Southeastern LA Water & Sewer Co LLC - Timber Branch II Subdivision	Treated sanitary wastewater	300,000	Design	0.00003
111355	LAR10C283	001	H2O Systems Inc - Penn Mill Lakes STF	Treated sanitary wastewater	190,000	Expected	0.00002
115894	LA0117927	001	Southeastern LA Water & Sewer Co LLC - Tallow Creek	Treated sanitary wastewater	146,000	Expected	0.00001

			STP				

Little is known about the potential to discharge mercury for most of the dischargers. EPA believes it is appropriate to assume that discharges from the municipal wastewater treatment plants (WWTPs) discharging greater than 100,000 gpd in the watersheds will contain mercury concentrations of less than 12.0 ng/L. This methodology is consistent with the methodology in other EPA approved TMDLs, such as *Total Maximum Daily Loads (TMDLs) for Mercury in Fish Tissue for Coastal Bays and Gulf Waters of Louisiana* (USEPA 2005).

LDEQ's policy is to assess discharges for the reasonable potential to contain mercury. LDEQ's position is that all point sources do not discharge at a constant rate or at a constant mercury concentration equal to the water criterion for mercury. Where reasonable potential exists or where effluent analyses demonstrate mercury at levels above 12 ng/L in the effluent, the Louisiana Pollutant Discharge Elimination System (LPDES) permit will require developing a mercury minimization program or a mercury limitation or both will be placed in the permit to ensure compliance with the TMDL. Only facilities that demonstrate a reasonable potential to discharge mercury may be required to develop a mercury minimization program or receive a mercury limit or monitoring requirement.

Until recently, EPA's approved method for the analysis of mercury was not sensitive enough to measure mercury at trace levels. Consequently, little reliable data are available on mercury loadings discharged from LPDES point sources. In 1998 EPA adopted a new analytical procedure that detects mercury at trace levels, allowing more exact data to be collected and used in determining compliance with applicable water quality standards. EPA has two approved analytical methods that can detect trace amounts of mercury: Method 1631 (0.5 ng/L) and Method 245.7 (5 ng/L). The approach used to estimate point source loads includes considering point source loads on the basis of mercury limits in existing permits and an assumption of 12 ng/L mercury in the discharge of WWTPs with flows greater than 100,000 gpd, EPA believes it is appropriate to assume that discharges from the municipal WWTPs (SIC 4952) discharging greater than 100,000 gpd in these watersheds contain mercury levels equal to 12.0 ng/L.

4.2.2 Load Allocation

The LA is the portion of the TMDL assigned to nonpoint sources such as atmospheric deposition and to natural background loadings. For these TMDLs, the LAs were calculated by subtracting the WLAs from the total TMDL allocation. LAs were not allocated to separate nonpoint sources because of the lack of available source characterization data. The LAs are presented in Table 4-1.

4.3 Margin of Safety

The MOS is the portion of the pollutant loading reserved to account for any uncertainty in the data. There are two ways to incorporate the MOS (USEPA 1991). One way is to incorporate it implicitly by using conservative model assumptions to develop allocations. The other way is to explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations.

For this analysis, the MOS is implicit. Conservative assumptions in the TMDL process are the following:

- Calculations for mercury concentrations associated with total suspended solids loading from soil erosion to the water column assumed no loss of mercury from any mechanism during transport.
- Mercury loading to the 303(d)-listed subsegment was considered 100 percent available for uptake, bioaccumulation, and biomagnification by fish.
- There was an implicit MOS because a tissue methyl mercury endpoint is used when fish tissue analysis is based on total mercury measurements.
- For facilities with mercury permit limits, the permit limits were used to establish the mercury loads from the facilities. The actual discharge of mercury from the facilities is probably less.
- For municipal WWTPs with flows greater than 100,000 gpd, it was assumed that 12.0 ng/L of mercury was discharged from each facility. The actual discharge of mercury from the facilities might be less than that value.

- The REMSAD model overestimates the actual input based on a comparison to available Mercury Deposition Network (MDN) data.

5. Future Activities

5.1 Pollution Prevention

The key element of pollution prevention is *source reduction* through product substitution and innovation. From 1988 to 1997 the U.S. industrial demand for mercury dropped 75 percent (USEPA 2007a). Reductions in mercury use have been driven by voluntary efforts and by increasingly strict federal and state regulations such as the increasing regulation of mercury in products or outright bans on its use in products for which alternatives are available. For example, in 1996 EPA eliminated the use of mercury in most batteries under the Mercury Containing and Rechargeable Battery Management Act. Other voluntary measures, such as a commitment by the American Hospital Association to reduce the use of mercury-containing products, will continue to decrease the amount of mercury in the waste stream. Next to source reduction, *recycling* is fundamental to mercury pollution prevention. When mercury must be used and recycling is not possible, *proper disposal* is critical to reducing the potential for dispersion to the environment.

5.2 National Assurances

EPA estimates that 60 percent of the total mercury deposited in U.S. waterbodies, which contaminates fish, comes from domestic anthropogenic air emission sources (USEPA 1997). The largest emitters of mercury to the atmosphere are coal-fired power plants. Under the Clean Air Act Amendments of 1990, EPA issued stringent regulations to dramatically reduce and cap air pollutant emissions. Mercury emissions nationwide were reduced by 45 percent by the year 1999 compared to 1990 mercury emissions (USEPA 2007b). The benefit of the existing regulations resulted in a decrease of both mercury deposition and mercury concentration in fish tissue in the Florida Everglades in the past 10 years. Mercury emissions in south Florida have declined from a high of 3,000 kg/yr in 1991 to 250 kg/yr in 2000, with a corresponding reduction in mercury deposition from a high in 1998 of 26 $\mu g/m^2$-yr to 17 $\mu g/m^2$-yr and a corresponding decline in tissue concentrations of mercury in largemouth bass from 1.7 mg/kg in 1991 to 0.4 mg/kg in 2000 (USEPA 2003).

Section 112 of the Clean Air Act and 40 CFR Parts 61 and 63 (maximum achievable control technology [MACT] rules) will also continue to ensure reductions in air emissions over the next decade. MACT standards require sources to meet specific emissions limits on the basis of emissions levels already being achieved by many similar sources in the country. EPA also applies a risk-based approach to assess how those technology-based emissions limits are reducing risks to human health and the environment (USEPA 2007c).

Other emissions limitations issued by EPA include the following:

- **Municipal Waste Combustors (MWCs):** In 1995 EPA issued emission limits for MWCs based on MACT. The implementation date for new and existing MWCs was December 2000. Overall mercury emissions from MWCs were estimated to be 54 tons per year in 1990, and the regulation is expected to reduce mercury emissions from such facilities by at least 90 percent.
- **Medical Waste Incinerators (MWIs):** In August 1997 EPA issued emission limits for MWIs. The implementation date for new and existing MWIs was September 2002. Overall mercury emissions from MWIs are estimated to be reduced by 94 percent or more because of this regulation.
- **Hazardous Waste Combustors (HWCs):** In 1999 EPA issued emissions standards for HWCs, including cement kilns and lightweight aggregate kilns that burn hazardous waste. Overall mercury emissions from HWCs were estimated to be 2.5 percent of the total national mercury emissions in 1990. The regulation has not been implemented, pending final resolution of a lawsuit. Once it is fully implemented, mercury emissions from HWCs are expected to be reduced by at least 50 percent.
- **Chlor-alkali Plants:** Late in 2003 EPA issued a final regulation to reduce mercury emissions from chlorine production plants that rely on mercury cells. When the rule first became effective, 20 such plants were in the United States; today there are 9. The regulation, which requires a combination of controls for

point sources (such as vents) and management practices to address fugitive emissions will reduce mercury emissions from chlor-alkali plants by about 50 percent.

- **Industrial Boilers:** In September 2004 EPA issued a regulation to reduce emissions of mercury and other toxic air pollutants from industrial boilers that burn coal or other substances, such as wood, to produce steam. The steam is used to produce electricity or mechanical energy or to provide heat. The boilers are used at facilities like refineries, chemical and manufacturing plants, and paper mills, or they stand alone to provide heat for shopping malls and university heating systems. It is expected that the rule will reduce mercury emissions by one-third.

On March 15, 2005, EPA issued the first-ever federal rule to permanently cap and reduces mercury emissions from coal-fired power plants. The Clean Air Mercury Rule (CAMR) would have made the United States the first country in the world to regulate mercury emissions from coal-fired power plants. However, on February 8, 2008, the D.C. Circuit vacated CAMR and EPA's rule, removing power plants from the Clean Air Act list of sources of hazardous air pollutants. On May 3, 2011, EPA proposed the Mercury and Air Toxics Standards. The proposed standard was designed for power plants to limit mercury, acid gases, particles, and other toxic pollution from being released to the air, thus keeping an estimated 91 percent of the mercury in coal from being released. Currently, there are no national limits on the amount of mercury and other toxic air pollution released from power plant smokestacks (USEPA 2011a). The proposed standards are based on available control technologies and other practices that are already in use by the other electric generating units (EGUs) (USEPA 2011b).

In December 2008, a court decision temporarily maintained Clean Air Interstate Rule (CAIR) but directed EPA to issue a new rule to implement Clean Air Act requirements concerning the transport of air pollution across state boundaries. As a result on July 6, 2011, EPA finalized a rule that helps states reduce their air pollution to attain clean air standards. The Cross-State Air Pollution Rule requires 27 states to significantly improve air quality by reducing emissions from power plants pollution, such as ozone or fine particle pollution, to other states. The rule replaces EPA's 2005 CAIR (USEPA 2011c).

In March 2007 EPA provided guidance to states, territories, and tribes on listing waters impaired by atmospheric mercury under Clean Water Act section 303(d), also known as *subcategory 5m.* EPA provides information to states, territories, and tribes regarding a voluntary approach for listing waters impaired by mercury mainly from atmospheric sources. The approach uses Clean Water Act tools to encourage comprehensive state and regional mercury control programs. EPA recommends the voluntary approach for states that have in place a comprehensive mercury reduction program with elements recommended by EPA. Such states may separate their waters impaired by mercury primarily from atmospheric sources into a specific subcategory (5m) of their Clean Water Act section 303(d) lists. States using that approach may also defer development of TMDLs for mercury-impaired waters as a result of having implemented mercury-reduction programs. Rather than deferring action, the 5m approach recognizes states that are already taking action in advance of TMDLs to address their mercury sources and achieve environmental results earlier than required (USEPA 2007a).

5.3 State-level Assurances: LDEQ Statewide Mercury Program

EPA and LDEQ have taken key steps nationally and regionally toward reducing mercury emissions and the environmental and human health risks associated with mercury exposure. State and federal mercury air emission rules apply to facilities in Louisiana (LAC 33: III. Chapter 51). EPA expects that a combination of ongoing and future activities under the Clean Air Act will achieve reductions in air deposition of mercury that will enable progress toward achieving water quality standards.

If a facility is found to discharge mercury at levels above 12 ng/L, a mercury minimization plan may be required. EPA expects that Louisiana, as the duly authorized permitting authority, will determine any additional necessary elements of a mercury characterization/minimization plan, considering the size and nature of the affected facility. Local characteristics like water velocity, bed substrate, oxygen content, and microbial community structure all contribute to methylation potential. Because those characteristics have not been defined for each of the dischargers in each subsegment, there is a possibility that effluent containing mercury can cause localized exceedances of the criteria. Therefore, minimization plans, numeric limits, or both might be necessary to ensure that the discharge does not cause or contribute to an exceedance of the applicable water quality standards. Finally, because of the uncertainty in the TMDL analysis, mercury minimization plans, numeric limits, or both might be necessary to ensure compliance with the water quality standards. Considering the large number of NPDES dischargers in the study area, LDEQ should develop a prioritization strategy for determining the need for additional permit requirements within each coastal basin. Through those actions, over the long term, it can be demonstrated that WLAs are being met.

LDEQ has identified mercury as one of its priorities. On June 2, 2006, it enacted the Louisiana Mercury Risk Reduction Act (Chapter 23 of Subtitle II of Title 30 of the *Louisiana Revised Statutes of 1950*, consisting of R.S. 30: 2571 through 2588). LDEQ intends to assess all sources of mercury to the environment in the state and to develop strategies to reduce public health risks associated with mercury. Before the act was developed, a series of public meetings were held with participation from various industry sectors and nongovernmental organizations. In addition, meetings on risk communication have been and continue to be conducted for enhancing public awareness of mercury and the risks of mercury exposure.

The approach of the Louisiana Mercury Reduction Act is intended to be exhaustive and comprehensive, looking at all sources of mercury along with methods of controlling releases to the environment. Action items are as follows:

- Restrictions on the sale of certain mercury-added products
- Labeling of mercury-added products
- Disposal ban and proper management of mercury in scrap metal facilities
- Phase-out of nonessential mercury-containing devices
- Collection of mercury-added products
- Disclosure for mercury-containing formulated products used in health care facilities
- Limitations on the use of elemental mercury
- Existing inventories
- State procurement preference for non-mercury-added products
- Only limited use of mercury-added devices by water and wastewater systems
- Enhanced public outreach to educate the public on efforts that can be conducted locally and within the home to support the mercury reduction initiative

LDEQ continues its aggressive commitment to implementing a comprehensive statewide mercury program. The following excerpts from the LDEQ publication, *Resource Guide to Understanding Mercury in Louisiana's Environment: 2003 Mercury Report*, highlight some of the management strategies that continue to advance attainment of the reduction goals defined by these TMDLs (LDEQ 2003):

- Design and construction regulations for landfills help to ensure that mercury-laden materials do not leak from them.
- Historically, electrical switches in some natural gas meters contained mercury. Spills from such meters contaminated the ground and became sources of mercury to the environment. Since 1991 several natural gas pipeline companies, with oversight from LDEQ, voluntarily cleaned the mercury from the environment around contaminated natural gas meter sites. As of 2005 approximately 5,000 sites had been checked for mercury contamination and 2,500 that had been contaminated were cleaned.
- Recycling played a large part in reducing not only the amount of mercury used by industries, but also the amount released to the environment. LDEQ's Recycling Section maintains a list of all recyclers in the state, sorted by commodity.

These TMDLs focus on the facilities likely to discharge mercury. Although every discharger has been assigned an individual WLA or is covered by the group WLA, EPA expects LDEQ to systematically identify any dischargers that are significant sources of mercury. EPA will work with LDEQ to establish mechanisms for demonstrating that the WLAs are being met. Mechanisms that could be used to demonstrate compliance include a certification process demonstrating that there are no known or suspected operations that could reasonably be expected to discharge mercury. Effluent sampling might be necessary for dischargers that cannot meet the certification requirement. Sampling requirements, if applicable, should include sampling and analysis using clean methods. EPA Method 1631, which has a detection limit of 0.0002 μg/L or 0.2 ng/L, is available. In addition, EPA Method 1669 should be used for sampling guidance. Mercury monitoring to meet the requirements of these TMDLs should follow the procedures outlined in EPA Method 1631. With the additional data, EPA and LDEQ could consider the possibility of revising the TMDL at some point in the future if warranted.

5.4 Environmental 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. LDEQ's Surveillance Section collects surface water samples at various locations using appropriate sampling methods and procedures to ensure the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, 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 monitoring program are used to develop the state's biennial section 305(b) report (*Water Quality Inventory*) and the section 303(d) list of impaired waters (*Draft 2010 Integrated Report*).

LDEQ has implemented a rotating approach to surface water quality monitoring. Through that 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 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 sites are located where they are considered 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. For more information, see *Louisiana's Water Quality Assessment Method and Integrated Report Rationale: 2010 Water Quality Integrated Report* (LDEQ 2010aOver the past several years, LDEQ has worked to expand its statewide mercury monitoring program. The program's primary objective is to determine statewide mercury contamination levels of fish commonly eaten in Louisiana and mercury concentrations in sediments, water, and epiphytic plant material and mercury loadings from aerial deposition. LDEQ adheres to well-defined sampling procedures when collecting mercury data. The program is an important tool for LDEQ in evaluating the progress of the mercury reductions prescribed by the TMDLs. LDEQ's targeted data collection efforts in subsegments with fish consumption advisories will provide the data necessary to ultimately remove the fish consumption advisory or revise the TMDLs at some point in the future, if warranted. LDEQ has also implemented fish tissue and sediment monitoring. LDEQ periodically samples for mercury throughout the state at 400 sites. Areas that show elevated levels of mercury are sampled more frequently.

LDEQ's sampling site selection continues to evolve and is based on several needs. New sites are sampled to expand the number of waterbodies tested. Sites continue to be selected in basin subsegments in which no previous sampling occurred. Nearly all waterbodies with fish populations sufficient to support human health risk assessment inputs have been sampled for mercury contamination. Waterbodies that are under an advisory for mercury are resampled annually. Some waterbodies are resampled if the Louisiana Department of Health and Hospitals (LDHH) determines that additional samples are needed to make a decision regarding fish consumption advisories. Continued fish tissue data collection provides input for analyses of risks to human health from consuming mercury-contaminated fish. That also allows LDHH and LDEQ to address public concerns regarding the safety of fish consumption from many waterbodies.

Epiphytic plant material is used to help further define the significance of atmospheric sources of mercury. The results of epiphytic plant material analyses, together with fish tissue, water, and sediment concentration information, will continue to help address questions regarding sources of mercury. Additional local and statewide remedial actions can be more effectively targeted to reduce mercury sources by combining data generated from this and previous projects and the knowledge of LDEQ field personnel. The project will also provide baseline data that can be used for ongoing trend analysis.

Since October 1998, LDEQ has implemented an air monitoring program designed to assess the geographical extent and quantity of atmospheric mercury deposition. Monitors are at the Southeastern University Campus in Hammond, Louisiana; at McNeese State University in Lake Charles, Louisiana; at the Louisiana State University in Chase, Louisiana; and in Alexandria, Louisiana, in Rapides Parish. Samples are tested for wet deposition of total mercury during rainfall events. If rainfall occurs, samples are collected weekly. In addition, LDEQ will be able to track progress with atmospheric deposition through the MDN, which is part of the NADP. The program measures only wet deposition, but a goal of one working group is to measure dry deposition as well. LDEQ operates and sponsors a site in Tangipahoa Parish. The site has been collecting information since October 7, 1998.

The objective of the MDN is to develop a national database of weekly concentrations of total mercury in precipitation and the seasonal and annual flux of total mercury in wet deposition. The data will be used to develop information on spatial and seasonal trends in mercury deposited to surface waters, forested watersheds, and other sensitive receptors. The MDN began as a transition network of 13 sites in 1995. Beginning in 1996, MDN became an official network in NADP with 26 sites in operation. Now more than 85 sites are in operation. The network uses standardized methods for collection and analysis. Three stations in Louisiana (Lake Charles, Chase, and Hammond) have provided weekly data since October 1998, while the Alexandria station began collecting data in February 2001. The data show that mercury levels are being regularly detected in rainwater. NADP staff members analyze the data, and NADP will publish any future reports concerning deposition data (NADP–MDN 2007).

5.5 TMDL Implementation Strategies

Reasonable assurance is needed that the water quality criterion will be met. WLAs will be implemented through LPDES permit procedures. Part of the LAs might be implemented through LDEQ's 305(b) program. Most of the nonpoint source mercury load addressed by the LA is likely from atmospheric deposition.

TMDL implementation for atmospheric deposition will differ from traditional TMDL implementation. The implementation plan will include different strategies and regulatory controls, most likely on a national scale. Regulatory controls under the Clean Air Act will assume that reductions in mercury emissions will reduce mercury loadings. Because air emissions regulations are implemented gradually, reductions are expected to take a number of years. Progress could be measured by mercury wet deposition concentrations and mercury concentrations in the water column, sediment, and fish tissue.

Implementation of the TMDLs will follow LDEQ policy, which is to evaluate dischargers for the reasonable potential to discharge mercury. Where reasonable potential exists or where effluent analyses demonstrate mercury at levels above 12 ng/L in the effluent, the LPDES permit will require developing a mercury minimization program or a mercury limitation will be placed in the permit (or both) to ensure compliance with the TMDL.

The Clear Skies Initiative was first introduced in February 2002, but it has not yet been enacted. This mandatory federal program would reduce emissions from power plants. Clear Skies would reduce mercury by 69 percent over 1999 levels and have caps of 26 tons of emissions in 2010 and 15 tons in 2018 (USEPA 2007d). The initiative goes beyond the provisions of the Clean Air Act. The New Source Review section of the Clean Air Act requires only that power plants and manufacturing facilities ensure that modifications to their plants do not increase emissions. The Clear Skies Initiative, on the other hand, would require them to improve the quality of the emissions (USEPA 2007d).

During implementation of these TMDLs, EPA expects the following activities to occur:

- NPDES dischargers will develop and implement mercury minimization plans, as appropriate.
- Air emissions of mercury will be reduced by implementing the Clean Air Act regulation.
- LDEQ will collect additional ambient data on mercury concentrations in water, sediment, fish, and soil.
- LDEQ will develop and implement a mercury risk reduction plan that assesses all sources of mercury.

Two watershed coordinators have been hired to work with the Lake Pontchartrain Basin Foundation (LPBF) on stakeholder involvement for watershed plans. LDEQ's nonpoint source staff is also working with them to implement the plans and will be assigned additional watersheds to work on through the planning and implementation process. To address some of the known problems that exist in the basin, LDEQ has been implementing programs that address fecal coliform, dissolved oxygen, and mercury, which are the primary water quality problems that have been identified in these waterbodies. The LPBF has implemented many programs to restore water quality and will be an important partner for LDEQ as TMDLs are implemented in the basin. Since much of the basin is included within the Coastal Zone Boundary, Louisiana Department of Natural Resources – Coastal Management Division will be working with LDEQ and LPBF on implementing management measures required through the Coastal Nonpoint Source Pollution Control Program (LDEQ 2010b).

6. Public Participation

Federal regulations require EPA to notify the public and seek comments concerning TMDLs that the Agency 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, LPBF, and St. Tammany Parish. EPA reviewed the comments and referred to them while revising and finalizing this TMDL document, as necessary. Full comment text is included in Appendix D. Responses to the comments are in Appendix E.

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

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