2014
LOUISIANA WATER QUALITY INVENTORY: INTEGRATED REPORT

FULFILLING REQUIREMENTS OF THE FEDERAL CLEAN WATER ACT, SECTIONS 305(b) AND 303(d)

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Acronyms and Abbreviations

ADB	Assessment Database
AGR	Agriculture
AL	Action Level
AOI	Area of Interest
ASSET	Aquifer Sampling and Assessment Program
AWQMN	Ambient Water Quality Monitoring Network
BCOID	Business and Community Outreach and Incentives Division
BEP	Beneficial Environmental Projects
BFI	Browning-Ferris Industries
BMP	Best Management Practices
BP	British Petroleum
CALM	Consolidated Assessment and Listing Methodology
CAP	Corrective Action Plan
CEI	Compliance Evaluation Inspections
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFDA	Catalog of Federal Domestic Assistance
CFR	Code of Federal Regulations
CM	Continuous Monitoring
CSGWPP	Comprehensive State Ground Water Protection Program
CSI	Compliance Sampling Inspections
CWA	Clean Water Act
DL	Detection Limit
DNAPLs	Dense Non-Aqueous Phase Liquids
DO	Dissolved Oxygen
DWS	Drinking Water Supply
EDMS	Electronic Document Management System
EQIP	Environmental Quality Incentive Program
ERMA	Environmental Response Management Application
EWOCDS	Early Warning Organic Compound Detection System
FDA	Food and Drug Administration
FWP	Fish and Wildlife Propagation
GOMA	Gulf of Mexico Alliance
GRN	Gulf Restoration Network
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HUC	Hydrological Unit Code
ID	Inspection Division
IR	Integrated Report
IRC	Integrated Report Category
LAC	Louisiana Administrative Code
LAIS	Louisiana Aquatic Invasive Species
LAL	Limited Aquatic Life and Wildlife
LCH	Liquid Chlorinated Hydrocarbons
LDAF	Louisiana Department of Agriculture and Forestry
LDCRT	Louisiana Department of Culture, Recreation and Tourism

Acronyms and Abbreviations

LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LEAN	Louisiana Environmental Action Network
LED	Louisiana Economic Development
LEQA	Louisiana Environmental Quality Act
LOSP	Louisiana Office of State Parks
LOT	Louisiana Office of Tourism
LPBF	Lake Pontchartrain Basin Foundation
LPDES	Louisiana Pollution Discharge Elimination System
LSP	Louisiana State Police
LSU	Louisiana State University
LSUS	Louisiana State University Shreveport
LTSA	Louisiana Tourism Satellite Account
LUMCON	Louisiana Universities Marine Consortium
MBWQS	Municipal, Biosolids, and Water Quality Section
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MSU	McNeese State University
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
NCP	National Contingency Plan
ND	Non-Detect
NGO	aquatic invasive species
NISA	National Invasive Species Act of 1996
NISC	National Invasive Species Council
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	Nonpoint Source Pollution
NRCS	Natural Resources Conservation Service
NRDA	Natural Resource Damage Assessment
NTU	Nephelometric Turbidity Unit
OEC	Office of Environmental Compliance
OES	Office of Environmental Services
ONR	Outstanding Natural Resource Waters
OPA	Oil Pollution Act of 1990
OYS	Oyster Propagation
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCR	Primary Contact Recreation
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RECAP	Risk Evaluation/Corrective Action Program

Acronyms and Abbreviations

RES	Rollins Environmental Services
ROD	Record of Decision
RPP	Remedial Project Plan
SARA	Superfund Amendments and Reauthorization Act
SCAT	Shoreline Cleanup Assessment Team
SCR	Secondary Contact Recreation
SEAFWA	Southeastern Association of Fish and Wildlife Agencies
SMCL	Secondary Maximum Contaminant Level
SONRIS	Strategic Online Natural Resources Information System
SPOC	Single Point of Contact
sVGP	Small Vessel General Permit
SVOC	Semi-Volatile Organic Compound
SWCC	Soil and Water Conservation Commission
SWPP	Source Water Protection Program
TDS	Total Dissolved Solids
TGP	Tennessee Gas Pipeline
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TRI	Toxics Release Inventory
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
UNO	University of New Orleans
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USGS	United States Geological Survey
VGP	Vessel General Permit
VOC	Volatile Organic Compound
WHIP	Wildlife Habitat Incentive Program
WIC	Water Body Impairment Combination
WIP	Watershed Implementation Plan
WLA	Wasteload Allocation
WQU	Water Quality Unit
WRP	Wetland Reserve Program

PART I: EXECUTIVE SUMMARY/OVERVIEW

Summary of Louisiana's Water Quality Assessment Program

Louisiana, well known for its abundance of water resources, contains over 66,294 miles of rivers and streams, 1,078,031 acres (1,684 square miles) of lakes and reservoirs, 5,550,951 acres (8,673 square miles) of fresh and tidal wetlands, and 4,899,840 acres (7,656 square miles) of estuaries. These figures, some of which are taken from the U.S. Environmental Protection Agency's (USEPA) River Reach 3 file, are known to be low in comparison to the actual total area of Louisiana's rivers, lakes, wetlands, and estuaries. It is the responsibility of the Louisiana Department of Environmental Quality (LDEQ) to protect the chemical, physical, biological, and aesthetic integrity of the water resources and aquatic environment of Louisiana. This responsibility is undertaken through the use of public education, scientific endeavors, water quality management, wastewater permitting and inspections, and regulatory enforcement in order to provide the citizens of Louisiana with clean and healthy water now and in the future.

The 2014 Integrated Report (IR) documents LDEQ's progress toward meeting this responsibility. Louisiana's IR is produced, in part, to meet requirements of the Federal Water Pollution Control Act commonly known as the Clean Water Act (CWA) (U.S. Code 1972, 1987). The primary CWA sections addressed by the 2014 IR are §303(d) and §305(b). Section 303(d) states that each State shall identify water quality-limited segments still requiring Total Maximum Daily Loads (TMDL) within its boundaries for which: (1) Technology-based effluent limitations required by sections 301(b), 306, 307 or other sections of the Act; (2) More stringent effluent limitations (including prohibitions) required by either State or local authority preserved by section 510 of the Act or Federal authority (law, regulation, or treaty); and (3) Other pollution control requirements (e.g., best management practices) required by local, State, or Federal authority are not stringent enough to implement any water quality standards applicable to such waters.

Section 305(b) of the CWA requires each state to provide, every two years, the following information to the Administrator of the USEPA:

- A description of the water quality of all navigable waters in the state
- An analysis of the status of waters of the state with regard to their support of recreational activities and fish and wildlife propagation
- An assessment of the state's water pollution control activities toward achieving the CWA goal of having water bodies that support recreational activities and fish and wildlife propagation
- An estimate of the costs and benefits of implementing the CWA
- A description of the nature and extent of nonpoint sources of pollution and recommendations for programs to address Nonpoint Source (NPS) pollution

For the 2014 IR, LDEQ used USEPA's *Consolidated Assessment and Listing Methodology* (CALM) (USEPA 2002), which contains the IR guidance, as well as USEPA's guidance document, *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* (USEPA 2005). In addition to the previous two documents, USEPA issues updates to the IR guidance in the form of memoranda prior to each Integrated Reporting period (USEPA 2006). Louisiana's water quality regulations (Louisiana Administrative Code (LAC), Title 33:IX.1101 et seq. (LAC 2011)) were used to determine water quality uses, criteria, and assessment procedures. One of the primary focuses of

USEPA's IR guidance is on the use of categories to which water bodies or water body/impairment combinations may be assigned. A water body/impairment combination is a single parameter (e.g., low dissolved oxygen (DO)) or other impairment assigned to a water body subsegment for assessment purposes. Subsegments are watersheds or portions of watersheds delineated as management units for water quality monitoring, assessment, permitting, inspection, and enforcement purposes. Categorization under IR guidance allows for a more focused approach to water quality management by clearly determining which actions are required to protect or improve individual waters of the state. The eight IR categories used by LDEQ can be found in Table 1.1.1.

Table 1.1.1

U.S. Environmental Protection Agency Integrated Report Methodology guidance categories used to categorize water body/impairment combinations for the *Louisiana 2014 Integrated Report*; includes IRC 5RC developed by LDEQ and approved by U.S. Environmental Protection Agency.

IR Category (IRC)	IR Category Description
IRC 1	*Specific Water body Impairment Combination* (WIC) cited on a *previous* §303(d) list is now attaining all uses and standards. Also used for water bodies that are fully supporting all designated uses.
IRC 2	Water body is meeting some uses and standards but there is insufficient data to determine if uses and standards *associated with the specific WIC* cited are being attained.
IRC 3	There is insufficient data to determine if uses and standards *associated with the specific WIC* cited are being attained.
IRC 4a	WIC exists but a TMDL has been completed for the *specific WIC* cited.
IRC 4b	WIC exists but control measures other than a TMDL are expected to result in attainment of designated uses *associated with the specific WIC* cited.
IRC 4c	WIC exists but a pollutant (anthropogenic source) does not cause the *specific WIC* cited.
IRC 5	WIC exists for one or more uses, and a TMDL is required for the *specific WIC* cited. **IRC 5 and its subcategories represent Louisiana's §303(d) list.**
IRC 5RC (Revise Criteria)	WIC exists for one or more uses, and a TMDL is required for *the specific WIC* cited; LDEQ will investigate revising criteria due to the possibility that natural conditions may be the source of the water quality criteria impairments.

On April 20, 2010, British Petroleum's (BP's) Deepwater Horizon drilling rig operating in the Gulf of Mexico approximately 50 miles off the Mississippi River Delta exploded and sank. The resulting oil spill affected a large portion of Louisiana's coastline.

During development of the 2014 IR, LDEQ reviewed Louisiana Department of Wildlife and Fisheries (LDWF) and Louisiana Department of Health and Hospitals (LDHH) fishing and oyster closure areas to determine if Deepwater Horizon oil spill-related closures remain in place. This review identified four partial subsegments that remain affected by LDWF and LDHH commercial fishing closures for finfish and oysters. Therefore, the suspected impairments of fish and wildlife propagation (FWP) and oyster propagation (OYS) uses associated with the oil spill and originally reported in the 2012 IR remain in effect for these four partial subsegments.

LDEQ also evaluated the latest Shoreline Cleanup Assessment Team (SCAT) and monitoring plans for the region. Based on this review, a total of 23 limited portions of subsegments have been assessed as being potentially and/or temporarily impaired for primary contact recreation (PCR). Unlike with the 2012 IR, these new assessments represent only specific and limited portions of full subsegments. This process is similar to what is done for some fish consumption advisory-based assessments that do not affect the entire subsegment. The portions of subsegments identified are areas found to still have oil, tar mats, or tar balls present.

LDEQ and other agencies continue to analyze the impact of the spill on Louisiana's coastal waters. Results of this analysis will be presented in future reports by LDEQ as well as by other national and state agencies and academic researchers. Additional information regarding assessments related to the Deepwater Horizon oil spill can be found in Part III, Chapter 2.

Summary of Overall Water Quality in Louisiana

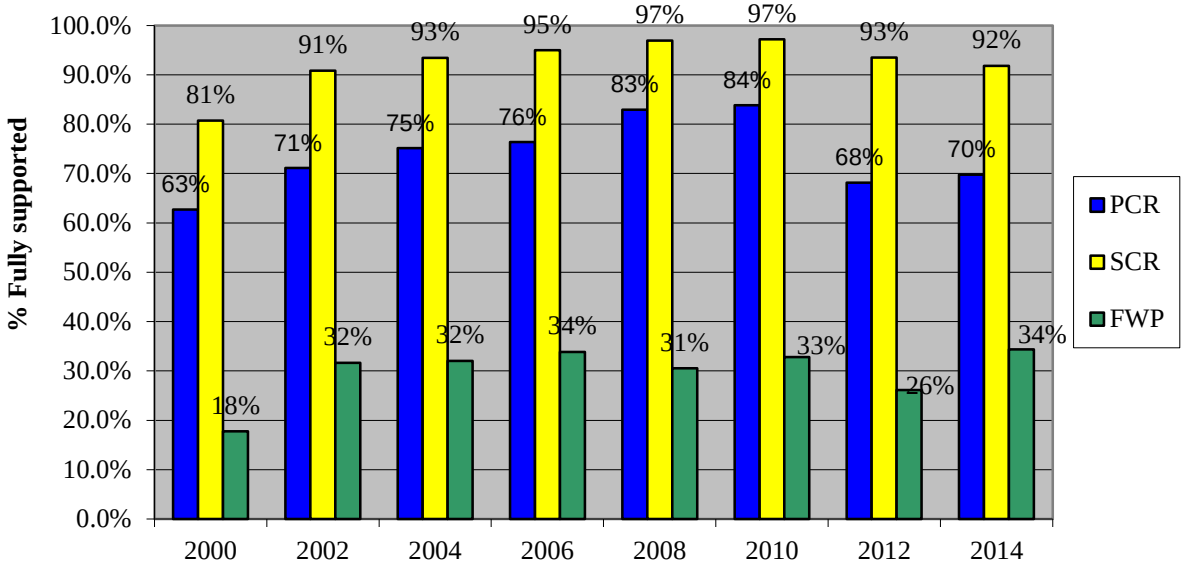
For the 2014 IR the designated uses of both primary contact recreation (PCR or "swimming") and fish and wildlife propagation (FWP or "fishing") showed slight improvements in designated use support (Figure 1.1.1). Support of the PCR use increased from 68% of assessed water body subsegments showing full support to 70% fully supporting the use. Of the 30% of subsegments still showing impairment of the PCR use, over 90% are due solely to elevated fecal coliform densities.

Fish and wildlife propagation use support increased from 26% to 34% of assessed water body subsegments, matching the pre-spill percentage of 33% in 2010. Much of this improvement can be attributed to a change in assessments for subsegments affected by the 2010 Deepwater Horizon oil spill. These changes are described in Part III, Chapter 2.

Support of secondary contact recreation (SCR or "boating") declined slightly from 93% to 92%. Over 97% of SCR impairments are due solely to elevated fecal coliform densities.

Low FWP use support is due in part to the large number of water quality parameters and information used to assess the use. LDEQ currently analyzes DO, chlorides, sulfates, total dissolved solids (TDS), turbidity, non-native aquatic plants, pH, oil/tar/grease, seven different metals, and dozens of organic compounds including pesticides when assessing water quality for this designated use. In addition to these monitored parameters, the presence of fish consumption advisories due to mercury or organic chemicals also results in impairment to this designated use.

Figure 1.1.1
Comparison of the percentage of water body subsegments in Louisiana fully supporting the three primary designated uses, 2014 Louisiana Integrated Report



Summary of Suspected Causes of Impairment to Water Quality

Table 1.1.2 lists all suspected causes of impairment for all designated uses. Low DO, used to determine support of the FWP use, continues to be the most frequently cited suspected cause of impairment with 177 subsegments affected. Fecal coliform ranks second in terms of the number of subsegments impacted (134). This suspected cause of impairment is used to assess the designated uses of PCR and SCR, as well as drinking water supply (DWS) and OYS. Mercury is third in frequency of impairments with 103 subsegments affected (Table 1.1.2). Turbidity is the fourth-most-cited suspected cause of water quality impairment. Highly turbid waters can cause problems for aquatic life and aesthetic concern for human recreation.

Nutrient listings were first reported many years ago based on qualitative evaluative assessments rather than on data analysis. Remaining nutrient listings are closely associated with low DO impairments.

The suspected impairment causes of TDS, sulfates, and chlorides are all related to the concentration of certain minerals and other natural substances in the water.

Suspected causes of impairment related to pesticides are also a concern. These include Carbofuran, DDT, Fipronil, Toxaphene, arsenic, atrazine, Methoxychlor, and methyl parathion. Fortunately, with the exception of Carbofuran, DDT, and fipronil, these are generally limited to one or two reported occurrences. Many of the pesticides included in the IR assessments have short half-lives, and have been banned or not used in Louisiana for many years. As a result, it is likely they are no longer present.

Finally, chemicals commonly associated with industrial activities are reported infrequently (Table 1.1.2). These include lead; polychlorinated biphenyls (PCBs); hexachlorobenzene (HCB);

hexachlorobutadiene (HCBD); oil and grease; polycyclic aromatic hydrocarbons (PAHs); 1,1,1,2-tetrachloroethane; 1,2-dichloroethane; bromoform; 2,3,7,8-TCDD; 2,3,7,8-TCDF; and phenols. LDEQ currently tests for 35 volatile organic compounds (VOCs) on a quarterly basis at all ambient monitoring sites. In addition, three Mississippi River sites are tested monthly for 31 VOCs, 29 PCBs and pesticides, and 54 semi-volatiles and phenols. Between October 6, 2009 and September 10, 2013, 58,620 organic chemical analyses were recorded by LDEQ. Of these, only 421 results recorded detectable concentrations of the chemical analyzed. The 421 detections resulted in one aquatic life criteria exceedance, but there were no incidents of a parameter with two exceedances within a three-year period. All remaining organic chemical detections were either below Louisiana water quality criteria, or occurred only once during the last three years. More information on procedures for assessing organic compounds can be found in Part III, Chapter 2.

Table 1.1.2

Number of water body subsegments impacted by each suspected cause of impairment; includes all designated uses, *2014 Louisiana Integrated Report* assessment.

Suspected Causes of Impairment	River	Lake	Estuary	Wetland	Total
Oxygen, Dissolved	144	25	5	3	177
Fecal Coliform	115	8	10	1	134
Mercury in Fish Tissue	73	20	9	1	103
Turbidity	60	19	1		80
Total Dissolved Solids	63	6	1	1	71
Sulfates	45	5	1	1	52
Nitrate/Nitrite (Nitrite + Nitrate as N)	39	6			45
Non-Native Aquatic Plants	27	16	1		44
Phosphorus (Total)	37	6			43
Chloride	32	1	1	1	35
Carbofuran	23	1	1		25
Lead	15	1			16
Temperature, water	8	2		1	11
Color	6	1			7
DDT	6				6
Fipronil	6				6
pH, High	1	5			6
pH, Low	3	3			6
Polychlorinated biphenyls	3	3			6
2,3,7,8-Tetrachlorodibenzofuran	2				2
2,3,7,8-Tetrachlorodibenzo-p-dioxin (only)	2				2
Benzo(a)pyrene (PAHs)	2				2
Copper	2				2
Hexachlorobenzene	1	1			2
Hexachlorobutadiene	1	1			2

Table 1.1.2

Number of water body subsegments impacted by each suspected cause of impairment; includes all designated uses, *2014 Louisiana Integrated Report* assessment.

Suspected Causes of Impairment	River	Lake	Estuary	Wetland	Total
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	2				2
Toxaphene	2				2
1,1,1,2-Tetrachloroethane	1				1
1,2-Dichloroethane	1				1
Arsenic		1			1
Atrazine	1				1
Bromoform	1				1
Methoxychlor	1				1
Methyl Parathion	1				1
Oil and Grease		1			1
Phenols	1				1

Summary of Suspected Sources of Impairment to Water Quality

Table 1.1.3 provides a list of all suspected sources of subsegment impairment across all designated uses. The large number of subsegment listings for *source unknown* and *atmospheric deposition-toxics* is largely due to the high number of mercury-related fish consumption advisories in Louisiana. *Natural sources* were reported for 145 subsegments. This single suspected source was primarily related to low DO, chlorides, sulfates, TDS, and turbidity; however, three other suspected causes also included natural sources as the suspected source. In addition to the 145 subsegments specifically reported for natural sources, another 94 subsegments were reported for other suspected sources of impairment related to natural conditions.

Table 1.1.3

Number of water body subsegments impacted by each suspected source of impairment; includes all designated uses. *2014 Louisiana Integrated Report* assessment.

Suspected Source of Impairment	River	Lake	Estuary	Wetland	Total
Source Unknown	123	26	9	1	159
Natural Sources	120	19	5	1	145
Atmospheric Deposition - Toxics	73	19	9	1	102
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	81	1	4		86
Agriculture	65	12	1	1	79

Table 1.1.3

Number of water body subsegments impacted by each suspected source of impairment; includes all designated uses. *2014 Louisiana Integrated Report* assessment.

Suspected Source of Impairment	River	Lake	Estuary	Wetland	Total
Introduction of Non-native Organisms (Accidental or Intentional)	27	16	1		44
Package Plant or Other Permitted Small Flows Discharges	36	2	4		42
Wildlife Other than Waterfowl	21		5	1	27
Sewage Discharges in Unsewered Areas	17	7			24
Drought-related Impacts	19	3	1		23
Municipal Point Source Discharges	23				23
Livestock (Grazing or Feeding Operations)	19	1			20
Waterfowl	11	4	4	1	20
Industrial Point Source Discharge	14	2			16
Sanitary Sewer Overflows (Collection System Failures)	12	2	2		16
Rural (Residential Areas)	11	2			13
Sediment Resuspension (Clean Sediment)	8	4			12
Silviculture Activities	11	1			12
Runoff from Forest/Grassland/Parkland	9	1			10
Discharges from Municipal Separate Storm Sewer Systems (MS4)	6	2	1		9
Upstream Source	5	1	3		9
Marina/Boating Sanitary On-vessel Discharges	7				7
Site Clearance (Land Development or Redevelopment)	5	2			7
Algae Bloom	1	5			6
Freshets or Major Flooding	5			1	6
Naturally Occurring Organic Acids	3	3			6
Sources Outside State Jurisdiction or Borders	6				6
Flow Alterations from Water Diversions	5				5
Forced Drainage Pumping	5				5
Impacts from Hydrostructure Flow Regulation/modification	2	1		1	4
Contaminated Sediments	2	1			3
Residential Districts	3				3
CERCLA NPL (Superfund) Sites	2				2
Drainage/Filling/Loss of Wetlands	2				2

Table 1.1.3

Number of water body subsegments impacted by each suspected source of impairment; includes all designated uses. *2014 Louisiana Integrated Report* assessment.

Suspected Source of Impairment	River	Lake	Estuary	Wetland	Total
Industrial/Commercial Site Stormwater Discharge (Permitted)		2			2
Municipal (Urbanized High Density Area)	2				2
Petroleum/Natural Gas Activities	2				2
Changes in Tidal Circulation/Flushing	1				1
Dairies (Outside Milk Parlor Areas)	1				1
Dredging (e.g., for Navigation Channels)	1				1
Managed Pasture Grazing	1				1
Non-irrigated Crop Production	1				1
Pesticide Application		1			1
Seafood Processing Operations	1				1
Streambank Modifications/Destabilization		1			1
Transfer of Water from an Outside Watershed	1				1
Unspecified Land Disturbance		1			1
Urban Runoff/Storm Sewers		1			1
Wet Weather Discharges (Non-Point Source)			1		1

The high number of low DO impairments reported in Table 1.1.2 are due in part to natural conditions but may also be related to high loadings of material that lead to the reduction of oxygen levels in the water. These materials come from a variety of sources including sewage, fertilizers, some sediments, and naturally high levels of plant material in swampy areas.

Twenty different categories were reported as suspected sources of subsegment impairment by fecal coliform. Some categories are tied for numbers of impaired subsegments; in rank order they include: (1) on-site treatment systems; (2) package plant or other permitted small flows discharges; (3) wildlife other than waterfowl; (4) waterfowl; (5) sewage discharges in unsewered areas and livestock (grazing or feeding operations); (6) natural sources; (7) sanitary sewage overflows and drought-related impacts; (8) municipal point source discharges; (9) rural residential areas; (10) source unknown and runoff from forest/grassland/parkland; (11) marina/boating sanitary on-vessel discharges; (12) discharges from municipal separate storm sewer systems (MS4); and (13) agriculture, dairies, managed pasture grazing, upstream source, and municipal (urbanized high density areas).

Mercury in Louisiana water bodies is largely derived from atmospheric deposition by natural sources and coal-fired power plants, as opposed to direct discharges to water from land based facilities. Pirrone et al. (2010) estimated that global natural sources are responsible for 5,207 Mg

(Mg = 1,000 kg or 1 metric ton) of mercury released to the atmosphere annually. Roughly half of this naturally released mercury derives from ocean emissions, with the remainder coming primarily from (1) lakes, soil and plant emissions; (2) biomass burning; and (3) volcanoes and geothermal areas. An estimated 2,320 Mg of mercury is emitted directly from anthropogenic sources. Of this total, approximately 810 Mg (35%) is from coal and oil combustion. Artisanal gold mining accounts for 400 Mg (17%), while 310 Mg (13.4%) is from non-ferrous metal production. The eight remaining individual sources collectively account for approximately 35% of total anthropogenic sources (Pirrone et al. 2010). Based on the preceding estimates, approximately 69% of all annual worldwide mercury emissions to the atmosphere are derived from natural sources. Taking this into account, the primary sources of mercury in Louisiana waters are most likely national or international in origin and, therefore, largely outside the scope of LDEQ control. More information on mercury in Louisiana can be found at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=287.

High turbidity, the fourth most frequently cited cause of impairment may be caused by poor farming and forestry practices, as well as runoff from construction sites. It can also be naturally occurring in some areas. Chlorides, sulfates, and TDS are also frequently cited as suspected causes of FWP impairment. Many cases in Louisiana of these reported criteria failures may be due to saltwater intrusion in coastal areas. Saltwater from the Gulf of Mexico has naturally higher concentrations of these substances than the freshwater flowing into coastal areas. Water quality criteria for these substances were in some areas originally based on more freshwater conditions; therefore, as coastal areas erode and saltwater intrudes, areas with normally fresher water are now experiencing more brackish (salty) conditions. This results in more criteria exceedances.

A large percentage of the reported suspected sources of impairment are related to what is collectively known as *nonpoint source pollution* (NPS). NPS pollution is caused by the runoff of stormwater from land such as agricultural fields, forestry areas, construction sites, and urban areas. In contrast, Point Sources (PS) of water pollution are those from a discrete pipe such as a small or large industrial discharger or municipal sewage treatment plant. With this distinction in mind, the majority of water body impacts are due to NPS, with 264 reported subsegments impaired by sources suspected to be related to NPS (see Table 1.1.3). A total of 128 subsegment source listings were possibly related to point source discharges. Forty-four subsegments were suspected to be impaired by sources related to aquatic invasive species, while a variety of naturally occurring conditions accounted for 271 suspected subsegment impairments. Each subsegment may be impaired by multiple sources. Part II, Chapter 2 provides more information on NPS pollution and Louisiana's efforts to control it.

Although Louisiana has a large industry sector, only 27 subsegments out of 478 have reported suspected sources of impairment related to industrial activities. Of these, five subsegment impairments are directly related to the Gulf of Mexico oil spill, leaving 22 related to more common industrial activities. Many of these suspected industrial sources are the result of legacy pollutants which have been or are in the process of being remediated (Part III, Chapter 2 Integrated Report Category 4b Documentation). While industrial activities are factors impacting Louisiana's water quality, assessments indicate it is not as prevalent as is frequently believed by the public. This is due in large part to stringent CWA and Louisiana Environmental Quality Act (LEQA 1995) permitting and enforcement directed at point source dischargers to Louisiana's

water bodies. Part II, Chapter 2 contains more information on water quality permitting and enforcement in Louisiana.

Summary of River Quality in Louisiana

Figures 1.1.2 through 1.1.4 summarize support of the three most common designated uses for Louisiana rivers. The uses are PCR, SCR, and FWP. Each subsegment may have more than one designated use. Other uses are established for selected water bodies in Louisiana. The status of these uses can be found in Part III, Chapter 3. Summary tables for the suspected causes and sources of impairment to Louisiana's rivers can also be found in Part III, Chapter 3. Water quality assessments for all subsegments in Louisiana can be found in Appendix A.

Figure 1.1.2.

Support for primary contact recreation (swimming) for Louisiana rivers, 2014 Integrated Report assessment. (Based on 333 assessed rivers)

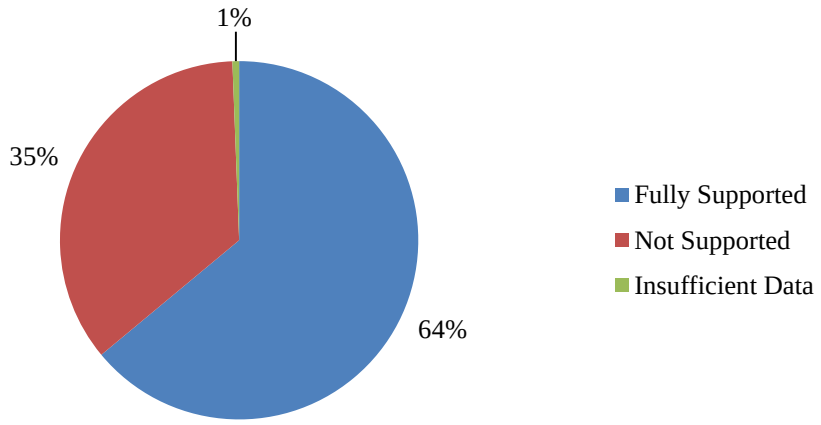


Figure 1.1.3.

Support for secondary contact recreation (boating) for Louisiana rivers, 2014 Integrated Report assessment. (Based on 345 assessed rivers)

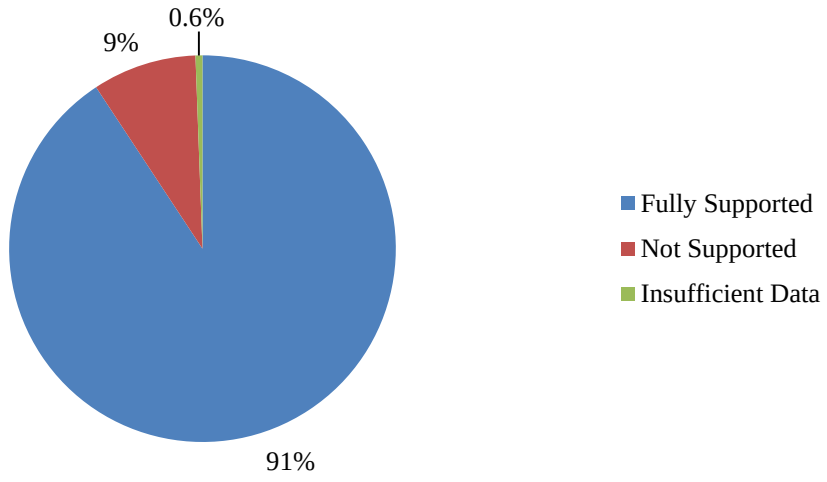
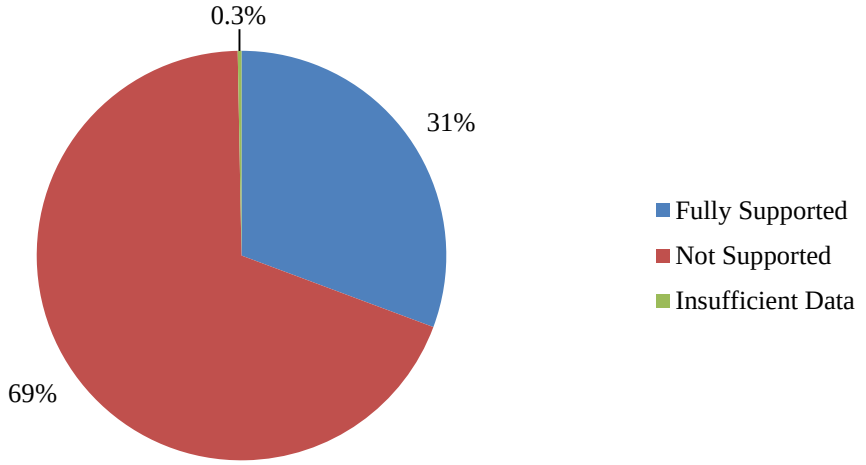


Figure 1.1.4.

Support for fish and wildlife propagation (fishing) for Louisiana rivers, 2014 Integrated Report assessment. (Based on 339 assessed rivers)



Summary of Lake Quality in Louisiana

Figures 1.1.5 through 1.1.7 summarize support of PCR, SCR, and FWP in Louisiana lakes. Other uses are established for selected water bodies in Louisiana, and each water body subsegment may have more than one designated use. The status of these other uses can be found in Part III, Chapter 4. Summary tables for the suspected causes and sources of impairment to Louisiana's lakes can also be found in Part III, Chapter 4. Water quality assessments for all subsegments in Louisiana can be found in Appendix A.

Figure 1.1.5.

Support for primary contact recreation (swimming) for Louisiana lakes, 2014 Integrated Report assessment. (Based on 65 assessed lakes)

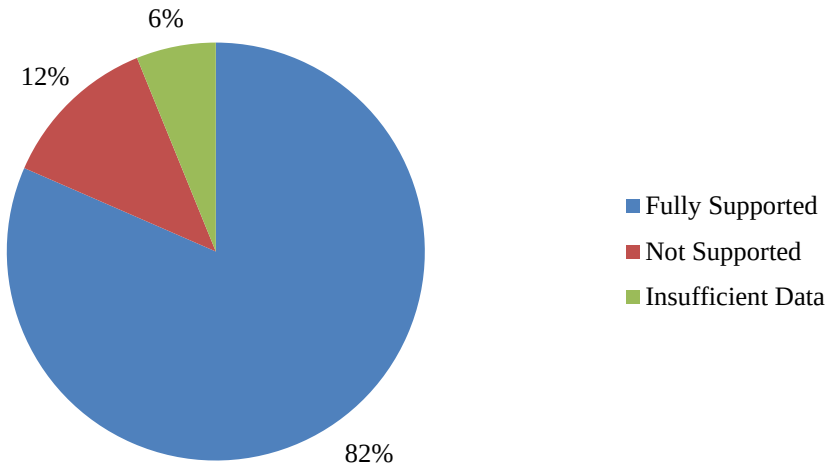


Figure 1.1.6.

Support for secondary contact recreation (boating) for Louisiana lakes, 2014 Integrated Report assessment. (Based on 65 assessed lakes)

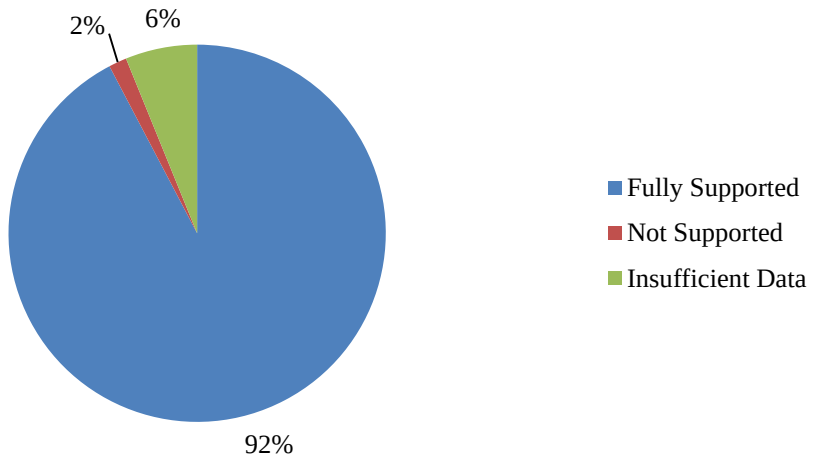
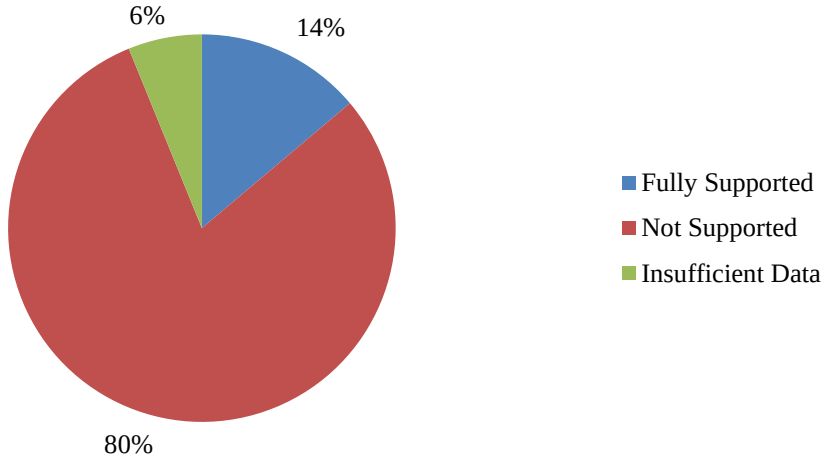


Figure 1.1.7.

Support for fish and wildlife propagation) for Louisiana lakes, 2014 Integrated Report assessment. (Based on 65 assessed lakes)



Summary of Estuary Quality in Louisiana

Figures 1.1.8 through 1.1.10 summarize support of PCR, SCR, and FWP for Louisiana estuaries. Other uses are established for selected water bodies in Louisiana, and each water body subsegment may have more than one designated use. The status of these uses can be found in Part III, Chapter 5. Summary tables for the suspected causes and sources of impairment to Louisiana's estuaries can also be found in Part III, Chapter 5. Water quality assessments for all subsegments in Louisiana can be found in Appendix A.

Figure 1.1.8.

Support for primary contact recreation (swimming) for Louisiana estuaries, 2014 Integrated Report assessment (based on 52 assessed estuary subsegments)

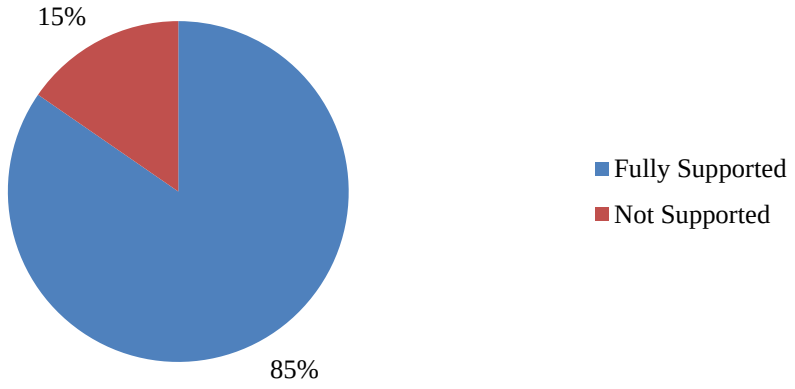


Figure 1.1.9.

Support for secondary contact recreation (boating) for Louisiana estuaries, 2014 Integrated Report assessment (based on 52 assessed estuary subsegments)

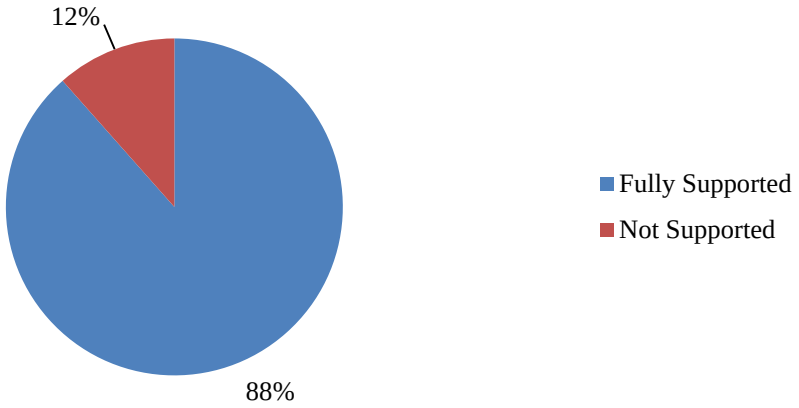
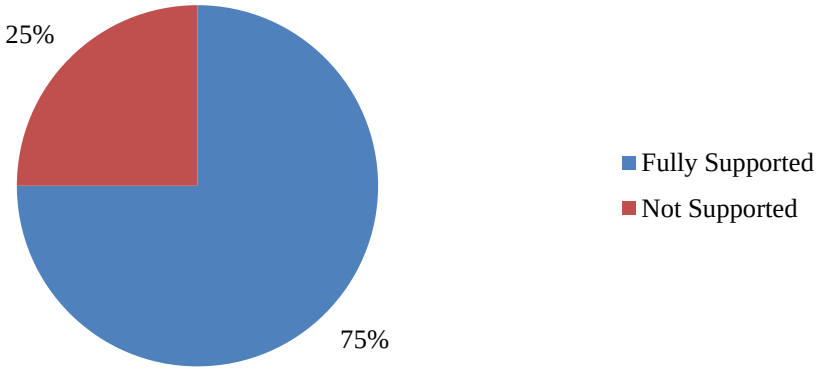


Figure 1.1.10.

Support for fish and wildlife propagation (fishing) for Louisiana estuaries, 2014 Integrated Report assessment. (Based on 52 assessed estuaries)



Summary of Wetland Quality in Louisiana

Figures 1.1.11 through 1.1.13 summarize support of PCR, SCR, and FWP in Louisiana wetlands. Other uses are established for selected water bodies in Louisiana, and each water body subsegment may have more than one designated use. The status of these uses can be found in Part III, Chapter 6. Summary tables for the suspected causes and sources of impairment to Louisiana's wetlands can also be found in Part III, Chapter 6. Water quality assessments for all subsegments in Louisiana can be found in Appendix A.

Figure 1.1.11.

Support for primary contact recreation (swimming) for Louisiana wetlands, 2014 Integrated Report assessment (based on 6 assessed wetland subsegments)

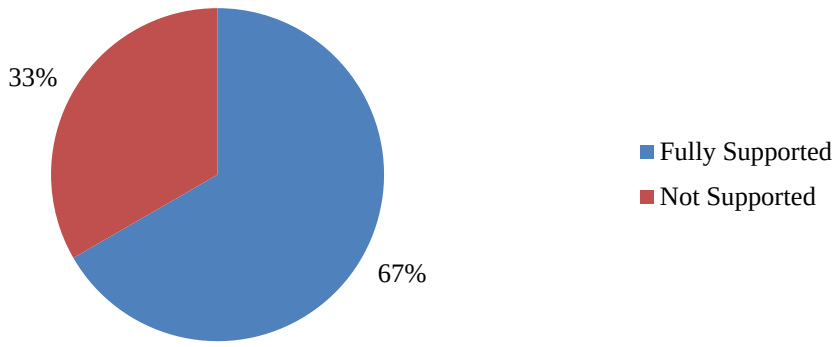


Figure 1.1.12.

Support for secondary contact recreation (boating) for Louisiana wetlands, 2014 Integrated Report assessment. (Based on 16 assessed wetlands)

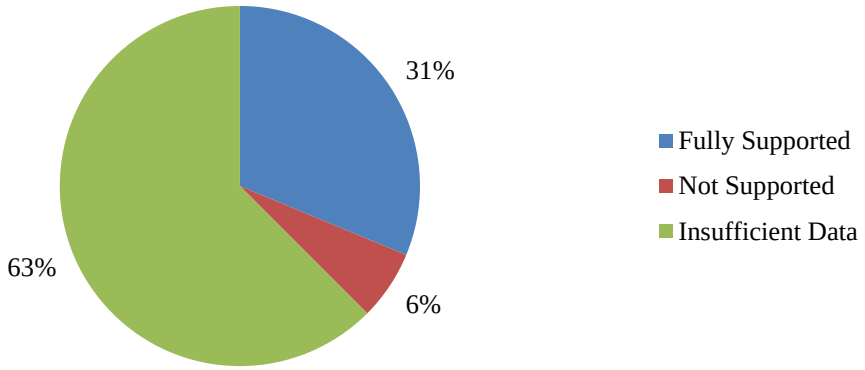
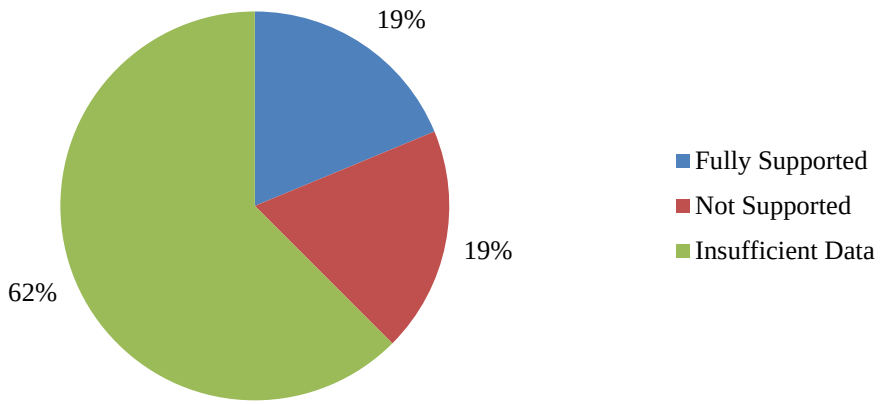


Figure 1.1.13.

Support fish and wildlife propagation (fishing) for Louisiana wetlands, 2014 Integrated Report assessment. (Based on 16 assessed wetlands)



Surface Water Pollution Control Programs

LDEQ has the responsibility of managing the quality of Louisiana's surface waters by implementing pollution control measures and protecting the integrity of those waters where good quality exists. Water pollution controls employed by the agency include establishing water quality standards, conducting intensive surveys, developing TMDLs, writing municipal and industrial wastewater discharge permits, inspecting facilities, responding to complaints and incidents, enforcing permit requirements, reviewing and certifying projects affecting water quality, promoting use of best management practices (BMPs) for NPS pollution, and regular water quality monitoring and assessment of the state's surface waters. More information on LDEQ's surface water pollution control programs can be found in Part II, Chapter 2.

Groundwater Quality in Louisiana

The Nonpoint Source Pollution Control and Aquifer Evaluation and Protection Section, Aquifer Sampling and Assessment Program, or ASSET Program, provides water quality data from freshwater aquifers around the state. Wells producing from a common aquifer are sampled in a narrow time frame. The smaller aquifers can be sampled in one or two days, and the larger aquifers may take several months to complete.

For the 2014 IR, 2012 and 2013 ASSET Program monitoring data from the Sparta aquifer system is presented. This aquifer system consists of three Miocene age stratigraphic members: the Williamson Creek aquifer, the Dough Hills confining unit, and the Carnahan Bayou aquifer. The data derived from the Williamson Creek and Carnahan Bayou aquifers are presented in this report collectively as the Jasper aquifer system.

Data derived from monitoring the Sparta aquifer system for the 2014 IR show that the groundwater produced from this aquifer system is soft. The data also show that the groundwater produced from this aquifer is of good quality when considering short term or long-term health-based risk exposure limits and taste, odor, or appearance guidelines; no primary Maximum Contaminant Levels (MCLs) were exceeded, and only six Secondary Maximum Contaminant Levels (SMCLs) were exceeded in four of the 15 wells sampled. Details regarding the Sparta aquifer system can be found in Part IV of this report.

PART II: BACKGROUND

Chapter 1: Louisiana Resources

Louisiana Geography and Climate

Louisiana lies entirely in the Gulf Coastal Plain physiographic province and can be divided into five natural physiographic regions: Coastal Marsh, Mississippi Alluvial Valley, Red River Valley, Terraces, and Hills. The state has 12 major watershed basins, which are described in Appendix A (Figure 2.1.1). Maximum elevations in Louisiana are located in the hills of the northwest, where the state's oldest geologic formations are found. The highest elevation in the state is only 535 feet. The lowest elevations in the state are found in the Coastal Marsh area, which extends across the southern portion of Louisiana and represents a valuable fisheries and wildlife resource. Due to levee construction, marsh filling, and subsidence, portions of south Louisiana are below sea level. Because Louisiana's coastal resources differ significantly in physical, chemical, and hydrological characteristics from inland resources, the atlas information provided below for lakes and wetlands has been broken down into two categories: inland and coastal (Table 2.1.1). Those categorized as coastal receive some tidal influx, even though some of the coastal lakes and wetlands are characterized by freshwater vegetation.

Louisiana has a humid subtropical climate influenced by the extensive landmass to the north, the Gulf of Mexico to the south, and the subtropical latitude. Prevalent winds from the south/southeast bring in warm, moist air from the Gulf, resulting in abundant rainfall. The statewide annual average precipitation varies from 48 inches in the northwestern part of the state near Shreveport to 64 inches in the southeastern coastal plains near Thibodaux.

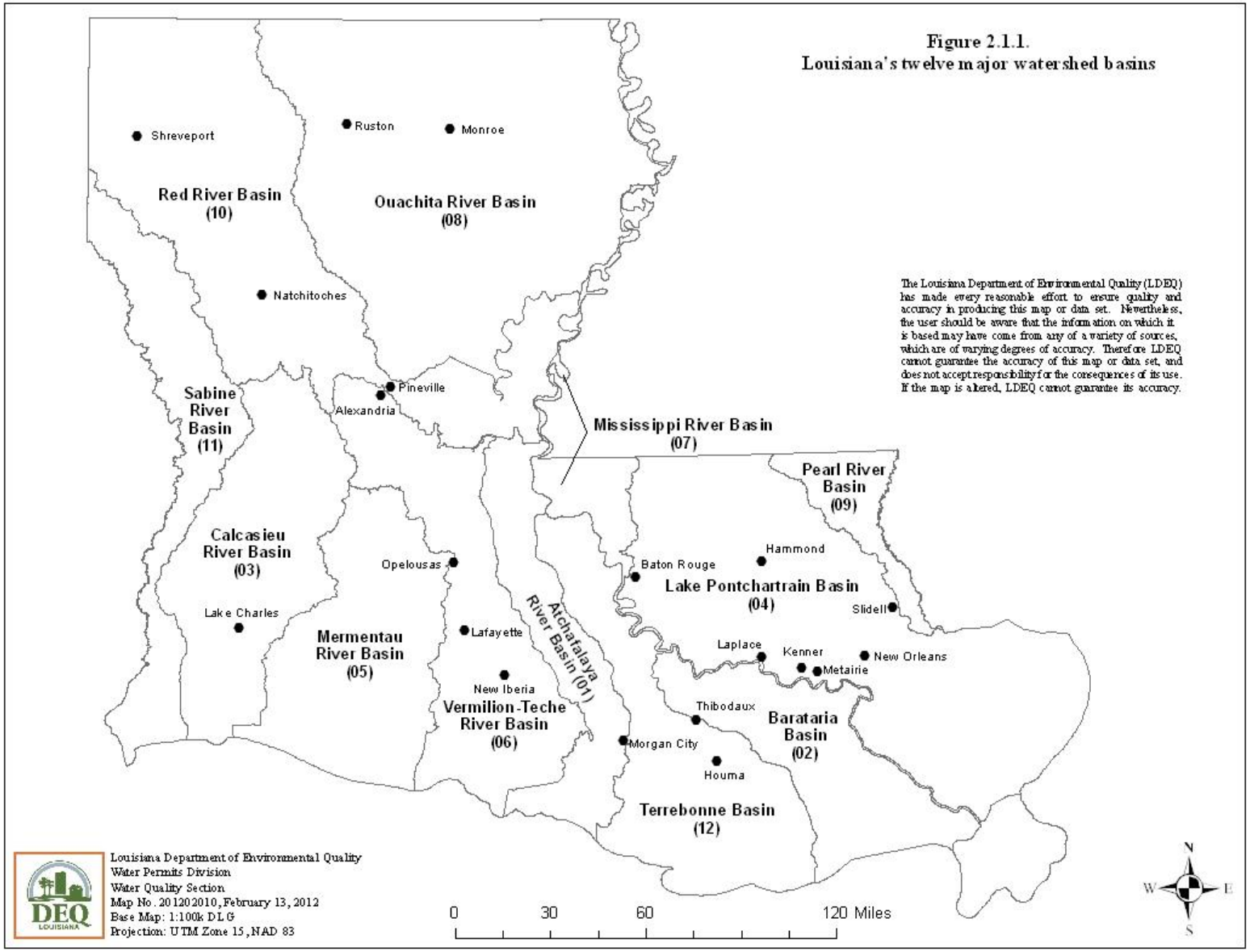


Figure 2.1.1.
Louisiana's twelve major watershed basins
Shreveport
Ruston
Monroe
Red River Basin
(10)
Ouachita River Basin
(08)
Natchitoches
Pineville
Alexandria
Sabine
River
Basin
(11)
Mississippi River Basin
(07)
Pearl River
Basin
(09)
Calcasieu
River Basin
(03)
Opelousas
Baton Rouge
Hammond
Lake Pontchartrain Basin
(04)
Slidell
Lake Charles
Mermentau
River Basin
(05)
Lafayette
Atchafalaya
River Basin (01)
Laplace
Kenner
Metairie
New Orleans
New Iberia
Vermilion-Teche
River Basin
(06)
Thibodaux
Barataria
Basin
(02)
Morgan City
Houma
Terrebonne Basin
(12)
The Louisiana Department of Environmental Quality (LDEQ) has made every reasonable effort to ensure quality and accuracy in producing this map or data set. Nevertheless, the user should be aware that the information on which it is based may have come from any of a variety of sources, which are of varying degrees of accuracy. Therefore LDEQ cannot guarantee the accuracy of this map or data set, and does not accept responsibility for the consequences of its use. If the map is altered, LDEQ cannot guarantee its accuracy.
Louisiana Department of Environmental Quality
Water Permits Division
Water Quality Section
Map No. 20120201 0, February 13, 2012
Base Map: 1:100k DLG
Projection: UTM Zone 15, NAD 83
DEQ
LOUISIANA
0
30
60
120 Miles
N
W
E
S

Table 2.1.1

Geophysical data for Louisiana.

State Population (2012 population estimate http://quickfacts.census.gov/qfd/states/22000.html)	4,601,893
State Surface Area (Land)[1]	43,199 square miles
Percent Land	84%
State Surface Area (Water)[1]	8,789 square miles
Percent Water	16%
Major River Basins	12
Rivers:	
Total River Miles	66,294 miles
Perennial	32,955 miles
Intermittent	20,667 miles
Ditches/Canals	12,672 miles
Border Miles:	
Names and Mileage of Border Rivers	
Total Mileage	484 miles
Pearl River	74 miles
Mississippi River	200 miles
Sabine River (includes Toledo Bend Reservoir)	210 miles
Lakes:	
Total Number of Fresh Water Lakes/Reservoirs	6,603
Total Acres of Fresh Water Lakes/Reservoirs	1,078,031 acres
Number of Inland Fresh Water Lakes/Reservoirs > 1 sq. mi.	62
Acres of Inland Fresh Water Lakes/Reservoirs > 1 sq. mi.	474,506 acres
Number of Coastal Fresh Water Lakes/Reservoirs	39
Acres of Coastal Fresh Water Lakes/Reservoirs	239,213 acres
Wetlands:	
Fresh Water Inland Wetlands	3,000,130 acres
Coastal Wetlands (LDWF 2001)	4,088,789 acres
Swamp	467,821 acres
Fresh Marsh	1,215,656 acres
Intermediate Marsh	901,441 acres
Brackish Marsh	812,334 acres
Salt Marsh	691,537 acres
Estuaries/Bays:	7,656 square miles
Coastal Miles:	397 miles
Total Miles of Shoreline: (includes islands, bays, rivers and bayous up to head of tide water)	7,721 miles

[1] *Source:* 2011 U.S. Census Bureau. http://www.infoplease.com/ipa/A0108355.htm

Chapter 2: Water Pollution Control Program

Watershed Approach

LDEQ reports on water quality in the state by basin subsegment. Subsegments are smaller watersheds or portions of watersheds within the 12 larger basins of the state. Louisiana is divided into 12 major watershed basins (Figure 2.1.1), and each basin is further divided into water body subsegments. This subsegment approach divides the state's waters into discrete hydrologic units. The plan for this approach was presented in the 1978 Water Quality Management Plan and underwent a major revision in 1985 to increase hydrologic consistency within each named subsegment. The final draft of the Louisiana Basin and Subsegment Boundaries plan was completed in 1990 and is reviewed periodically to ensure that subsegments are distinct and consistent representations of the state's hydrology. The current version was completed in December 2008. The water body subsegment system within each watershed basin provides a workable framework for evaluation of the state's waters. Subsegments are periodically added or removed as water quality standards related to a subsegment or group of subsegments are revised. Adding or removing subsegments requires detailed analysis and justification prior to revision in LAC 33:IX.1123.

Water Quality Standards Program

Louisiana's water quality standards are the foundation of LDEQ's water quality management and pollution control programs. Water quality standards are based on national goals outlined in the CWA (formally referred to as the 1972 Federal Water Pollution Control Act), Sections 101 and 102, and are authorized by Section 303 of the CWA and subsequent amendments, the Louisiana Water Control Law (Title 30, Chapter 4 of Louisiana's revised statutes) and the supporting federal regulations found in Title 40, Part 131 of the Code of Federal Regulations (CFR) (40 CFR 131). Louisiana's water quality standards are adopted as state regulations applicable to surface waters of the state and are contained in Title 33 of the LAC, Part IX, Chapter 11 (LAC 33:IX.1101 et seq., as amended). The water quality standards provide the basis for implementing the state's CWA programs, including water quality assessments and TMDL determinations outlined in the CWA, Sections 303(d) and 305(b), water discharge permitting conducted in conformance with Section 402, NPS pollution management strategies conducted under Section 319, and certification of federal activities in state waters as outlined in Section 401.

The minimum federal regulatory requirements for state water quality standards (40 CFR 131.6) are: (1) the designation of uses consistent with the CWA; (2) the methods and analyses used to revise standards; (3) criteria sufficient to support the designated uses; (4) an antidegradation policy; (5) certification by the appropriate state legal authority that water quality standards revisions are adopted in accordance with state law; and (6) general information concerning the acceptability of the scientific basis for standards and policies not covered under the CWA (e.g., variances).

Designated Uses and Water Quality Criteria

Section 101 of the CWA outlines a national goal of water quality that provides for the protection and propagation of fish, shellfish, and wildlife, provides for recreation in and on the water, and

prohibits the discharge of toxic pollutants in toxic amounts. Section 102 of the CWA further outlines that water quality protection programs consider the use of waters for public water supply, agricultural, industrial, and other purposes, including navigation. These goals are also outlined in the federal regulations (40 CFR 131.2).

To achieve the national goals, all Louisiana water bodies were originally assigned or designated uses consistent with CWA mandates that were applied statewide. Criteria to support these designated uses were also assigned statewide in response to federal regulations promulgated to achieve CWA goals. The designated uses adopted for Louisiana's surface waters are: primary contact recreation; secondary contact recreation; fish and wildlife propagation (including a subcategory for limited aquatic life and wildlife); drinking water supply; oyster propagation; agriculture; and outstanding natural resource waters (LAC 33:IX.1111.A).

These uses, along with the total size for each use and water body type combination are shown in Table 2.2.1. Designated uses are established in LAC 33:IX.1123 et seq. The sizes found in Table 2.2.1 are not reflective of the total size for water bodies listed in the Table 2.1.1, above. Rather, these sizes are only for the named water bodies listed as "subsegments" in LAC 33:IX.1123 et seq. Subsegments are watersheds or portions of watersheds delineated as management units for water quality standards, monitoring, assessment, modeling, permitting, surveying, and enforcement purposes.

Table 2.2.1

Total sizes of Louisiana water bodies classified for various designated uses (Louisiana Environmental Regulatory Code 33:IX.1123).

	Water Body Type			
Classified Uses	**Rivers (miles)**	**Lakes (acres)**	**Estuaries (sq. miles)**	**Wetlands (acres)**
Primary Contact Recreation	9,193	658,210	4,954	1,025,280
Secondary Contact Recreation	9,357	658,210	4,954	1,077,053
Fish and Wildlife Propagation	9,267	658,210	4,954	1,077,053
Drinking Water Supply	1,069	262,414	-0-	464,000
Outstanding Natural Resource Waters	1,587	-0-	-0-	-0-
Oyster Propagation	470	-0-	4,268	72,320
Agriculture	2,044	425,998	-0-	-0-
Limited Aquatic Life and Wildlife Use	90	-0-	-0-	-0-

Water quality criteria are elements of state water quality standards expressed as constituent concentrations, levels, or narrative statements representing the quality of water protective of the designated use(s). Louisiana adopted general (narrative) and numeric criteria to protect the designated uses of state waters (LAC 33:IX.1113). General criteria are expressed in a narrative form and include descriptions for aesthetics, color, suspended solids, taste and odor, toxic substances, oil and grease, foam, nutrients, turbidity, flow, radioactive materials, and biological and aquatic community integrity. Numeric criteria are generally expressed as concentrations (e.g., weight measured per liter) or scientific units and include pH, chlorides, sulfates, TDS, DO, temperature, bacteria, and specific toxic substances. USEPA published guidance or national

criteria recommendations for a number of substances, and a state may incorporate these without modification into its water quality standards.

Human health criteria provide guidelines that specify the potential risk of adverse effects to humans due to substances in the water. Factors considered include body weight, risk level, fish consumption, drinking water intake, and incidental ingestion while swimming. Categories of criteria are then developed for each toxic substance for drinking water supplies and non-drinking water. Primary and secondary contact recreation exposures are protected under both drinking water supplies and non-drinking water criteria.

Aquatic life criteria are designed to protect fish and wildlife propagation use, including plants and animals. There are two types of criteria: "acute" for short-term exposure, and "chronic" for long-term exposure. Separate criteria are also developed for fresh and salt waters. Listings of specific toxic criteria for protection of human health and aquatic life for Louisiana are found in LAC 33:IX.1113.C.6.Table 1.

The development of national aquatic life and human health criteria is a dynamic process that takes into consideration the most recent and best defensible, scientific information available. Since the establishment of designated uses and criteria based on national goals, state and federal agencies have recognized the need to establish site-specific or regional standards that may account for a state's unique water quality. A state may make a determination on whether the designated uses are attainable. A designated use that is not an existing use may be removed if it is demonstrated through a Use Attainability Analysis (UAA) that the designated use is not feasible due to one or more of the following reasons (LAC 33:IX.1109.B.3):

1. Naturally occurring pollutant concentrations prevent the attainment of the use.
2. Natural, ephemeral, intermittent, or low flow conditions prevent the attainment of the use.
3. Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place.
4. Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the original conditions.
5. Physical conditions related to the natural features of the water body (e.g., proper substrate) preclude attainment of aquatic life use protection.
6. Controls more stringent than those required by Sections 301(b) or 306 of the CWA would result in substantial and widespread economic and social impact.

According to the regulations, a UAA is defined as a "structured scientific assessment of the factors affecting the attainment of a use that may include physical, chemical, biological, and economic factors" (see also LAC 33:IX.1105 and 40 CFR 131.3(g)). The UAA process entails the methodical collection of data that is scientifically analyzed, summarized, and used to make recommendations for site-specific uses, and the criteria to support the uses. Acceptable methods used in conducting the UAA process are described in USEPA guidance documents. Several water bodies in Louisiana have site-specific criteria and uses based on UAAs developed in coordination with USEPA (see endnotes in LAC 33.IX.1123.Table 3).

Additionally, a state may determine that, while all original designated uses may be supported, the water quality criteria adopted to protect those uses may not be appropriate. In such instances, a state may compile technical documentation to justify a criteria change while not conducting a

comprehensive UAA. A state is allowed the flexibility to develop, adopt and implement state-specific criteria provided there is sufficient justification and technical documentation to support the criteria refinements.

Technical support documentation and/or UAAs for site-specific criteria and/or uses may be developed for a specific water body, water body type (e.g., wetlands), ecological region (ecoregion), or watershed. LDEQ recently used an ecoregion and "least-impacted" reference water body approach to establish water quality criteria on a water body type basis within an ecoregion.

1. Ecoregional UAAs for Dissolved Oxygen Criteria Refinements

When adopting water quality criteria modified to reflect or establish site-specific conditions, a determination of attainable uses and criteria for a specific water body may be based on comparisons made between the water body of interest and a "least-impacted" control or "reference" water body, or on the basis of natural background conditions of reference water bodies. USEPA has provided guidance that supports an approach to forming ecoregions, management units which are spatially grouped ecological regions with similar physical, chemical, and biological characteristics. Because of the similarity and homogeneity of ecological characteristics such as climate, land use, soil type, land surface form, flora, fauna and hydromodification within an ecoregion, watersheds may be managed on an ecoregional level. Specifically, the ecoregion-based approach may be used to develop regional or even site-specific water quality criteria, management strategies, and implementation plans for water resources.

To refine or establish appropriate DO criteria on a more regional basis in Louisiana, LDEQ has investigated and USEPA has supported the use of least-impacted reference sites and an ecoregional approach. Criteria for the different water body types (e.g., streams, lakes, bays, canals, etc.) will be established while accounting for the natural characteristics of Louisiana's ecoregions.

In 2008, LDEQ adopted revised DO criteria on an ecoregional basis for several water body types throughout the Barataria and Terrebonne Basins (LDEQ 2008a). LDEQ is continuing the ecoregional approach to revising DO criteria in other ecoregions throughout the state. Additionally, LDEQ is collecting ecoregion-based data to inform the nutrient criteria development efforts (see Nutrient Criteria Development, below).

2. Nutrient Criteria Development

The *Clean Water Action Plan*, a federal initiative announced in 1998, outlines development of numerical nutrient criteria as an action item. Louisiana continues to work with USEPA to collect information that will inform nutrient criteria development and implementation. USEPA recognizes that "one size fits all" nutrient criteria are not appropriate and recommends that each state's nutrient criteria be water body-specific (e.g., lakes, rivers and streams, estuaries, etc.) and applicable within an appropriate ecoregional framework.

USEPA published a series of guidance documents that outlined approaches to setting nutrient criteria; the approaches included deriving criteria based on an ecoregion-water body type approach or using stressor-response studies to derive protective levels. In November 2001, USEPA issued guidance in the form of a memorandum that clarified the flexibility that states have in development of defensible nutrient criteria.

LDEQ is proceeding in its efforts to develop scientifically defensible and appropriate criteria for Louisiana's water bodies. By working closely with the academic community, the U.S. Geological Survey (USGS) and others, LDEQ is able to incorporate the latest scientific research into defensible approaches to nutrient criteria development, including collecting and evaluating data from nutrient stressor-response studies. LDEQ also continues to inform and seek input from stakeholders about nutrient management for Louisiana's water bodies through implementation of the state's multi-agency Nutrient Management Strategy efforts. LDEQ is currently an active member on USEPA's Hypoxia Task Force, participates in Gulf of Mexico Alliance (GOMA) activities, and is working with USEPA to address elements outlined in USEPA's National Nutrient Framework. More information on the National Nutrient Strategy is available at http://www.epa.gov/ost/standards/nutrient.html.

3. Wetland Water Quality Standards

The assimilation of treated effluent discharges into natural wetlands, called the wetland assimilation process, has been successfully implemented in Louisiana since 1992 through the use of regulations and implementation procedures. The release of controlled levels of nutrients from treated municipal wastewater into the wetlands benefits the receiving wetlands. The benefits have been documented in peer-reviewed, published scientific papers and in UAA studies. The program as implemented:

- Benefits subsiding wetlands by enhanced productivity and vertical accretion
- Improves water quality by reducing nutrient discharges and loads that would otherwise have gone into rivers and streams
- Provides a scientific basis (i.e., data) for developing water quality standards to protect Louisiana's unique wetlands environment, including vegetative criteria and guidance for nutrient loading rates

Water quality standards for the protection of wetland areas that may receive treated wastewater effluent can be found in LAC 33:IX.1105, 1109.J, and 1113.B.12. Water quality standards revisions for wetland assimilation are also supported by implementation procedures outlined in the department's current Water Quality Management Plan, Volume 3, which is subject to USEPA oversight and approval. These procedures are cited in the water quality standards. For more information on wetland assimilation see:
http://www.deq.louisiana.gov/portal/tabid/2960/Default.aspx.

Methods and Analyses Used to Revise Standards

Section 303(c) of the CWA requires a state to hold public hearings at least once every three years for the purpose of reviewing its water quality standards and to revise or adopt standards as needed. The CWA also requires USEPA to ensure that a state's standards are consistent with the CWA.

Louisiana's Surface Water Quality Standards provide that "standards are not fixed for all time, but are subject to future revision…" (LAC 33:IX.1109.H). Revision to the water quality standards occurs routinely as new data and information become available. Water quality standards are reviewed to ensure criteria remain protective of existing conditions and uses and for future water quality management goals.

Part of the review process includes an assessment of the state's numeric water quality criteria for toxic pollutants and the occurrence of toxic pollutants in state waters. Technical sources of information are reviewed in order to establish the appropriate criteria for pollutants. The review takes into consideration many factors, including the state's current water quality condition, designated uses, violation summaries, wastewater discharge summaries, toxics release inventory (TRI) data, survey data, and other pertinent information. LDEQ has adopted numeric water quality criteria for toxic pollutants based on known or suspected occurrence of the substances in Louisiana waters and potential threat to attainment of designated uses.

Based on LDEQ's review of the existing water quality standards, recent USEPA guidance and policies, and public comments, revisions may include, but are not limited to:

- New toxic or other criteria
- Modifications to designated uses
- Subsegment delineations and/or description revisions (e.g., corrections and changes)
- Clarifications to regulatory language
- Updates to water quality policies

The water quality standards revision process involves procedures for thorough technical review of USEPA-recommended policy and criteria, review by state and federal agencies and the public, final approval by USEPA, promulgation of the revisions into regulations, and certification by the state legal authority (see Certification of Standards by State Legal Authority, below) that the standards revision and regulation development process meets all applicable state laws and regulations.

Antidegradation Policies

The CWA and federal regulations require all states to have an antidegradation policy and to identify the methods for implementing the policy (40 CFR. 131.12). Louisiana's Antidegradation Policy (the Policy) and Implementation Plan (the Plan) are contained in the water quality standards (LAC 33:IX.1109.A and 1119). The Policy and Plan provide the basis for the protection of state waters from activities that may cause degradation of the water quality and impairment of the existing and designated uses. The Antidegradation Policy and Implementation Plan have been approved by USEPA-Region 6 and meet the requirements of the federal regulations. LAC 33:IX.1119 specifies that implementation procedures and methods will be included in the Continuing Planning Process, with additional Water Quality Management Plan documentation developed as needed. LDEQ has been working with USEPA-Region 6 to develop more detailed implementation procedures, in part, to fulfill federal and state regulatory requirements, as well as to provide specific guidance to permit applicants and consolidate all specific procedures related to antidegradation into one document.

Certification of Standards by State Legal Authority

In accordance with Section 303(c) of the CWA and the certification process outlined in 40 CFR 131.21, an official copy of the final regulation, as published in the *Louisiana Register*, is submitted, by LDEQ's Executive Counsel, to USEPA-Region 6. USEPA will either approve or disapprove the state-adopted water quality standard, and only a USEPA-approved standard is suitable for CWA implementation.

Basis for Standards and Policies Not Covered by the CWA

The Louisiana Water Quality Standards, in addition to meeting minimum federal and state water quality protection requirements, contain standards and policies that are not driven by federal statute or regulation. The additional standards and policies include, but are not limited to: allowance for compliance schedules, variances, and short term activity authorizations; classification of non-perennial and other water body types such as manmade water bodies; establishment of critical flows for water quality assessments and permitting activities; allowance of mixing zones for permitted dischargers; and implementation policies and procedures for general criteria.

Water Quality Monitoring and Assessment Program

LDEQ conducts extensive surface and groundwater sampling throughout Louisiana in order to obtain information regarding the quality of Louisiana's surface water and groundwater resources. Data obtained from this program is used to develop reports, including the *2014 Water Quality Inventory: Integrated Report*, in order to inform the public, state agencies, and federal agencies about the quality of Louisiana water. More information on this program can be found in Part III of this report.

Point Source Control Program

Introduction

Louisiana's water pollution control program is carried out primarily by LDEQ. LDEQ operates to preserve the integrity of Louisiana's waters through the use of various point source and NPS programs. All offices within LDEQ have some responsibility for implementing water pollution control programs. These offices include the Office of the Secretary (regulatory development and NPS program), the Office of Management and Finance (grants and contracts, information services, clean water state revolving fund), the Office of Environmental Services (OES) (municipal and industrial wastewater discharge permitting; water quality certification program; water quality standards, assessment and TMDL development), the Office of Environmental Compliance (OEC) (surveillance and enforcement of permit requirements and pollution control regulations, investigation of complaints and spills, water quality assessment, and review/recommendation of standards). An overview of LDEQ's organizational structure for all activities can be found at: http://www.deq.louisiana.gov/portal/tabid/2367/Default.aspx. The following sections address various facets and recent activities of the point source water pollution control program.

Clean Water State Revolving Fund Program

The Clean Water State Revolving Fund Program provides financial assistance for the construction of projects to enhance and improve water quality in Louisiana. Loans are below market rate and may be used for water quality improvement projects in Louisiana communities. Monies for the Revolving Loan Program originated with the 1987 amendments to the CWA. A new authority was created, allowing USEPA to make grants to capitalize State Water Pollution Control Revolving Funds. On the state level, this authority is granted by, R.S. 30:2011(D)(4) and

R.S. 30:2301-2306 (Act 296 of the 2010 Regular Session of the Louisiana legislature). This statute established a state revolving loan fund capitalized by federal grants (Capitalization Grants for Clean Water State Revolving Funds, Catalog of Federal Domestic Assistance (CFDA) 66:458), by state funds when required or available, and by any other funds generated by the operation of the clean water revolving loan fund. Loans are made for no longer than 20 years and may be repaid through sales taxes, user fees, ad valorem taxes, or a combination of funds. An interest payment on the amount drawn begins within six months of the loan closing and is billed every six months until the loan is paid in full. After a two-year construction period, loan recipients begin repayment of principal to LDEQ. That money is then available for loans to other communities. Thus, the revolving loan fund is a permanent source of funds for Louisiana municipalities.

As of December 2013, USEPA, through LDEQ, has awarded $424,419,923 in fund capitalization grants to Louisiana communities. With the required 20% state match of $76,837,527, less 4% for administration fees, there is a total of $484,280,653 available for loans to communities. In addition, a total of $260,042,619 of repaid "recycled" loan monies has been made available for loans.

As of December 2013, 200 loans to communities totaling $877,931,915 have been closed utilizing USEPA grants, state match, and recycled payments from previous loans. Another 18 requests for loans totaling $134,981,248 have been received and are in the application process. For more information on the Clean Water State Revolving Fund refer to: http://www.deq.louisiana.gov/portal/tabid/2148/Default.aspx.

Water Discharge Permits

Water discharge permits are official authorizations developed and issued by the OES of LDEQ. The LPDES permit establishes the effluent limitations and conditions for wastewaters discharged into waters of the state. The permitting process allows the state to control the amounts and types of wastewaters discharged into its surface waters. A permit is required for the discharge of pollutants from any point source discharge into waters of the state of Louisiana. In 1996, LDEQ assumed responsibility for administering the permitting, compliance, and enforcement activities of the NPDES from the USEPA. USEPA retained responsibility for the sewage sludge disposal program and authority for offshore discharges past the three-mile territorial seas limit. More information on LDEQ's water discharge permits program can be found at: http://www.deq.louisiana.gov/portal/tabid/63/Default.aspx.

From October 1, 2011 through September 30, 2013, the following permits were issued:

Table 2.2.2

Louisiana Pollutant Discharge Elimination System water discharge permits and modifications issued from October 2011 through September 2013.

State Permit	Number of Permits	Number of Permits (including modifications)
Minor Sanitary	110	114
Major Sanitary	27	32
Minor Industrial	241	267
Major Industrial	33	46
Major MS4[1]	2	2
Stormwater General[2]	1,133	1,133
Non-Stormwater General[3]	998	1,677
Totals	**2,544**	**3,271**

[1]Major Municipal Separate Storm Sewer System Permits
[2] Does not include 1,503 permits re-authorized when stormwater master general permit was reissued
[3] Does not include 1,504 permits re-authorized when master general permits were reissued

Inspection Division Compliance Assurance Inspections

Municipal, industrial, federal, and agricultural point source dischargers are monitored to verify compliance with permitted effluent limitations and compliance schedules. The information derived from this program can also be applied to the interpretation of state water quality data and can be used as input to water quality plan development.

The types of compliance inspections undertaken by the Inspection Division (ID) that are reported here include:

- Compliance Evaluation Inspections (CEI): Non-sampling inspections are designed to verify permittee compliance with applicable LPDES permit requirements and compliance schedules.
- Compliance Sampling Inspections (CSI): Samples of the influent and/or effluent are collected and analyzed to determine permit compliance, in addition to the inspection activities performed in the CEIs.

The following reported numbers do not include complaint or release/spill-related inspections. The following compliance inspection activities were conducted from October 2011 through September 2013:

Table 2.2.3

Louisiana Department of Environmental Quality, Office of Environmental Compliance, Inspection Division Water Quality Compliance Inspections performed October 2011 through September 2013.

Inspection Type	Number of Inspections
Compliance Evaluation Inspections	2,174
Compliance Sampling Inspections	35
Total WQ Compliance Inspections	**2,209**

Inspection Division Incident Investigations

The ID of the OEC received 14,541 Incident Notifications (Complaints or Release/Spills) across all media (air, water, hazardous waste, underground storage tanks, etc.) from October 2011 through September 2013. Each notification requires an investigation and an incident report. If action is deemed necessary following the initial investigation, the investigator refers the situation to the appropriate division for enforcement action, permit action, or remedial action. The division receives notifications that include reports of oil spills, sewage overflows, bypasses, water permit excursions, chemical spills, fish kills, unusual coloring in a stream, and illegal discharges. Environmental complaints are made to LDEQ's Single Point of Contact (SPOC). Notifications of emergencies and spill and release notifications are reported to the Louisiana State Police (LSP). LSP then notifies the LDEQ staff person on-call. More information on DEQ's Inspection Division can be found at: http://www.deq.louisiana.gov/portal/tabid/66/Default.aspx.

Table 2.2.4

Louisiana Department of Environmental Quality, Office of Environmental Compliance, Inspection Division incident investigations performed October 2011 through September 2013.

Notification Type	Number of Notifications
Complaint Notifications	6,400
Release/Spill Notifications	8,141
Total Notifications	**14,541**

Water Quality Certification

Water quality certification is an activity of the Municipal, Biosolids and Water Quality Section of LDEQ. Certification is required for any federal license or permit that results in a discharge of fill material or causes a potential change to the waters of the state. Such changes include land clearance for residential and commercial development, oil and gas activities, and municipal infrastructure projects. Section 401 of the CWA requires water quality certification for all §404

permits administered by the Corps of Engineers and certain federal licenses administered through FERC (Federal Energy Regulatory Commission). From October 1, 2011 through September 30, 2013, 618 water quality certifications were issued by LDEQ. More information on LDEQ's water quality certification program can be found at: http://www.deq.louisiana.gov/portal/tabid/2268/Default.aspx.

Enforcement

The enforcement activities of the LDEQ Water Enforcement Section are designed to ensure that all possible infringements of water quality standards, rules, and regulations are handled in a rapid and consistent manner. To prevent pollution of the waters of the state and to ensure remediation in the event of pollution, the Water Enforcement Section coordinates its enforcement activities with other sections in LDEQ, especially the Water Permits Division in the OES and the ID of the OEC. Field investigations, file reviews, permit noncompliances, and reviews of discharge monitoring reports (DMRs) are all used to initiate enforcement actions. The Water Enforcement Section initiates all formal enforcement actions and follows the actions through all appropriate levels to ensure full compliance with state laws and regulations. LDEQ seeks to provide a clean, healthy environment through protection of the state's water resources by the reduction of pollution, education of the public, and consistent, open, and accountable application of standards, rules, and regulations. More information on LDEQ's Water Enforcement Section can be found at: http://www.deq.louisiana.gov/portal/tabid/67/Default.aspx.

From October 2011 through September 2013, the following enforcement activities were recorded:

Table 2.2.5

Louisiana water quality environmental enforcement actions issued from October 2011 through September 2013.

Enforcement Actions	Number
Notice Of Corrected Violations	27
Compliance Orders (CO)[1]	192
Notice of Potential Penalty (NOPP)	37
Administrative Orders	13
Penalties	58
Settlement Agreements	22

[1]Includes CO and Consolidated CO/NOPP

Table 2.2.6

Louisiana water quality environmental penalties issued from October 2011 through September 2013.

Penalties	Dollar Value
Penalties Issued	$1,806,037
Penalties Paid	$1,788,472
Penalties Appealed	
Cash From Settlement Agreements	$1,898,178
Total Value of BEPs[1]	$100,000

[1]Beneficial Environmental Projects

Nonpoint Source Program

Section 319 of the Clean Water Act

Section 319 of the CWA required the governor of each state to develop an NPS Assessment Report and an NPS Management Plan to identify NPS pollutants and describe management strategies and a timeline for implementation http://water.epa.gov/polwaste/nps/index.cfm. In response to this federal law, the Louisiana Legislature passed Revised Statute 30:2011, signed by the governor in 1987 as Act 272. This law directed LDEQ, designated as lead agency for the NPS program, to develop and implement an NPS Management Program. The NPS Management Program was developed to facilitate coordination with appropriate state agencies including, but not limited to LDNR, LDWF, LDAF, and Louisiana State Soil and Water Conservation Commission (SWCC), in areas pertaining to their respective jurisdictions.

Nonpoint Source Management Program

Section 319(b) required states to prepare an NPS Management Plan, including these elements (all references to sections, subsections, paragraphs, and subparagraphs are from CWA §319):

- An identification of BMPs and measures which will be undertaken to reduce pollutant loadings resulting from each category, subcategory, or particular NPS designated under paragraph (1)(B), taking into account the impact of the practice on groundwater quality.
- An identification of programs (including, as appropriate, non-regulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects) to achieve implementation of BMPs by categories, subcategories, and particular nonpoint sources designated under subsection (A).
- A schedule containing annual milestones for (a) utilization of program implementation methods identified in subparagraph (B); and (b) implementation of BMPs identified in subparagraph (A) by the categories, subcategories or particular nonpoint sources designated under paragraph (1)(B). Such schedule shall provide for utilization of the BMPs at the earliest practicable date.
- A certification of the attorney general of the state or states (or the chief attorney of any state water pollution control agency which has independent legal counsel) that the

laws of the state or states, as the case may be, provide adequate authority to implement such management program or, if there is not such adequate authority, a list of such additional authorities as will be necessary to implement such management program, and a schedule and commitment by the state or states to seek such additional authorities as expeditiously as practicable.

- Sources of federal and other assistance and funding (other than assistance provided under subsections (h) and (i)) which will be available in each of such fiscal years for supporting implementation of such practices and measures and the purposes for which such assistance will be used in each of such fiscal years.
- An identification of federal financial assistance programs and federal development projects for which the state will review individual assistance applications or development projects for their effect on water quality pursuant to procedures set forth in Executive Order 12372 as in effect on September 17, 1983, to determine whether such assistance applications or development projects would be consistent with the program prepared under this subsection; for the purposes of this subparagraph, identification shall not be limited to the assistance programs or development projects subject to Executive Order 12372 but may include any programs listed in the most recent Catalog of Federal Domestic Assistance which may have an effect on the purposes and objectives of the state's NPS pollution management program.

In 1993, USEPA approved Louisiana's NPS Assessment Report and Management Plan. In November 2012, USEPA-Region 6 approved Louisiana's revised NPS Management Plan. LDEQ recently updated the NPS Management Plan to include statewide and watershed implementation tasks to partially and/or fully restore NPS-impaired waters from 2011 to 2016. It can be viewed at http://nps.ldeq.org/docs/000002_NPS_Management_Plan_1.pdf.

Watershed Planning and Management

USEPA and LDEQ developed a watershed approach as a geographically-based, systematic process to reduce NPS pollution and improve water quality. Watershed planning can be an effective management strategy to protect healthy waters and/or restore impaired waters. Through watershed assessment, water quality data is analyzed; if the water body is impaired, a TMDL and/or watershed implementation plan (WIP) are developed and implemented. WIPs prioritize NPS problems in the watershed, focusing resources and technical assistance to improve water quality. If the water body is a healthy water body, a WIP can be developed, based on existing or future NPS problems in the watershed. USEPA published information on the Healthy Watershed Initiative on its national website: Healthy Watersheds | Healthy Watersheds | US EPA.

USEPA outlined a set of nine key elements for an acceptable WIP, and LDEQ utilizes this outline as a guide in partnering with stakeholders on protection and/or restoration of NPS waters. These nine key elements include:

- An identification of geographic extent of the watershed, measurable water quality goals, causes, and sources to be controlled to restore water quality
- A description of NPS management practices to achieve estimated load reductions
- A description of agencies and programs to implement NPS management practices
- An identification of sources and amounts of financial and technical assistance to implement NPS management practices

- An educational outreach component to implement the WIP
- A reasonably expeditious schedule for implementing the WIP
- A description of interim, measurable milestones for determining whether NPS management practices or other control actions are being implemented
- An adaptive implementation process that includes a set of criteria that can be used to determine (1) whether NPS load reductions are being achieved; (2) whether substantial progress is being made toward attaining or assuring continued attainment of water quality standards and, if not, the criteria for determining whether WIPs should be revised; and (3) where an NPS TMDL has been established, whether an NPS TMDL needs to be revised or a new TMDL developed
- A monitoring component to evaluate effectiveness of WIPs in restoring water quality and designated uses in NPS waters

Implementation

NPS pollutants are typically undiscernible or unconfined discharges that enter a water body during rainfall events. Land-use activities identified as contributing to NPS pollution include agriculture, forestry, urban, home sewage treatment systems, construction, hydromodification, and resource extraction (sand and gravel mining). The type of NPS pollution associated with land-use activities includes sediment, nutrients, metals, organic material, and bacteria. Some of these pollution sources are managed through stormwater permits, and others are managed through NPS programs.

LDEQ's NPS Program focuses on improving water quality in impaired waters and protecting healthy waters from becoming impaired. The primary objective of the NPS Management Program is to implement BMPs as well as educational outreach programs to reduce NPS pollution. The watershed planning process relies on many partners to provide information on water quality conditions and land-use activities. As water quality improves, a water body can be removed from the state's §303(d) impaired list, and a success story can be published. For more information on the state's NPS Management Plan refer to: http://nonpoint.deq.louisiana.gov/.

Louisiana Administrative Code (LAC 33:IX.1105. Definitions) defines NPS pollution as "a diffuse source of water pollution that does not discharge through a point source, but instead, flows freely across exposed natural or manmade surfaces such as agricultural or urban runoff and runoff from construction, mining, or silviculture activities that are not regulated as point sources."

Through partnerships and collaborative efforts of the NPS Program, water quality has improved and water bodies have been removed from the state's §303(d) list of impaired waters. Success stories have been written for restored waters in Louisiana and published on USEPA's NPS website http://www.epa.gov/owow/nps/Success319/. LDEQ initiated a statewide educational outreach program about NPS pollution called "Be the Solution." For more information about the LDEQ "Be the Solution" outreach program refer to: http://www.deq.louisiana.gov/portal/tabid/2953/Default.aspx. LDEQ has set a goal to partially or fully restore 40 water bodies from 2011 to 2016.

Through the NPS Program, six watershed coordinators have partnered with stakeholders to reduce NPS pollutants and improve water quality. LDEQ provides watershed coordinators with water quality data, land-use information, and other relevant watershed data to assist with

planning and implementation activities. Through watershed planning and implementation, water bodies should be restored and removed from the state's §303(d) list.

An important partner in Louisiana's NPS Program is LDAF; this agency implements the agricultural component of the program. LDAF currently applies directly to USEPA for the incremental portion of Section §319 funds and utilizes those funds for BMP implementation in watersheds where TMDLs and WIPs have been developed. LDEQ and LDAF prioritize impaired watersheds and exchange information on water quality data and land-use practices.

Two more important partners in Louisiana's NPS Program are the Source Water Protection Program (SWPP) and the ASSET Program. SWPP partners with local communities in Louisiana to protect drinking water supplies from existing and potential contamination from NPS pollution. One of SWPP's priorities has been reducing bacterial problems from home sewage treatment systems for many communities in Louisiana. Since bacterial problems cause water bodies to be listed on the §303(d) list, SWPP has focused its efforts on water bodies designated as drinking water supplies, such as Bayou Lafourche, Sibley Lake, and Big Creek. The ASSET Program is an ambient groundwater sampling and analysis program that monitors Louisiana's major freshwater aquifers. These aquifers, such as the Sparta, Chicot, and Southern Hills Aquifer System, are also sources of drinking water that could be contaminated by NPS pollution.

One of the remaining challenges in Louisiana is partnering with urban areas on their NPS pollution problems. Many cities are now required to manage pollutants through stormwater permits. Innovative technologies such as rain gardens, porous pavements, green roofs, and small wetland detentions, or swales, could be effective in retaining nutrients on site rather than discharging them to water bodies. LDEQ will continue to provide information to cities and rural communities on innovative solutions for reducing urban NPS pollutants.

Chapter 3: Cost/Benefit Assessment

Cost Information

A true cost/benefit assessment for the water quality management efforts of LDEQ is very difficult to obtain because research on the economic value of incremental improvements in water quality is not currently available. While recent economic research has begun to place monetary values on otherwise intangible environmental benefits such as wilderness for nonconsumptive recreation, such efforts have not taken place in the area of water quality. In lieu of a formal cost/benefit assessment of water quality improvements, LDEQ is providing information on pollution abatement capital expenditures and operating costs. To place these expenditures in perspective, financial information on activities that benefit from this investment is also provided.

Much of LDEQ's water quality-related budget is self-generated through permit fees and enforcement actions; however, a portion is derived through federal grants. The grants include the CWA §319 grant for NPS management activities, the §604 grant for state water quality management planning activities, and the §106 grant for water pollution control activities. Money from each of the grants programs is divided throughout the water quality-related program areas and provides funding for personnel, equipment, survey work, TMDL development, water quality management planning, monitoring, assessment, surveillance, and enforcement. See Table 2.3.1 for an illustration of LDEQ's approximate yearly costs to implement the CWA. Described below are a few of the programs and activities supported by each of these federal grants and state funds.

Under the §319 grant for NPS management issues, LDEQ continues to work with a number of partners on projects targeting NPS pollutants from urban runoff, forestry, agriculture, sand and gravel operations, and home sewage treatment systems. Other agency and funding programs that are also aimed at improving water quality through implementation of BMPs and cost incentives include Environmental Quality Incentive Program (EQIP), Wildlife Habitat Incentive Program (WHIP), and the Wetland Reserve Program (WRP). During FY2012 and FY2013, the U.S. Department of Agriculture (USDA) obligated $42,128,318 in federal funds through the EQIP/National Resources Conservation Service program to implement agricultural BMPs on 347,827 acres of land in order to reduce the amount of NPS pollutants entering water bodies in the state. During this same time period, an additional $1,268,058 in federal funds was utilized to implement the WHIP on 5,035.5 acres of private lands. During FY2012 and FY2013, the WRP enrolled 37,820.7 acres of land in wetland protection programs totaling $70,561,351 in federal funds. These programs, along with LDEQ's NPS Program, are intended to reduce water quality impacts from agricultural production in Louisiana. In Part II, Chapter 2, the Nonpoint Source Program section has more information on this topic as well as other efforts by the NPS Program at LDEQ. For more information on LDEQ's NPS Program refer to: http://nonpoint.deq.louisiana.gov/.

Section 604 grant monies are used to support the development and revisions of TMDLs. Section 303(d) of the CWA requires the identification and listing of impaired waters and prioritization of the impaired waters for TMDL development. For more information on LDEQ's TMDL program refer to: http://www.deq.louisiana.gov/portal/tabid/130/Default.aspx.

Table 2.3.1.

Approximate yearly costs (FY2012) to implement the Clean Water Act by the Louisiana Department of Environmental Quality and its contractors.

Description	Amount
Federal Funds	
CWA Section 106	$6,479,000
CWA Section 106 supplemental (estimate)	$170,000
CWA Section 604(b)	$164,000
CWA Section 319	$2,647,000
FY12 LDEQ Nutrient Criteria Project	$87,391
Clean Water State Revolving Loan Fund (Administrative Costs)	$588,774
Total Federal Funds	**$10,136,165**
State Funds	
Environmental Trust Fund and Other Fees	$10,073,000
General Fund	$0
Total State Funds	**$10,073,000**
Grand Total	**$20,209,165**

The §106 grant provides funding support for the entire water pollution control/water quality management program. Activities supported by the §106 grant include ambient water quality monitoring, assessment of ambient water quality data, development of the Water Quality Inventory (now known as the IR), revision of Louisiana's Water Quality Management Plan, development and revision of surface water quality standards, development and issuance of wastewater discharge permits, compliance inspections, complaint investigations, and development of enforcement actions. §106 grant funding for FY 2012 was approximately $6,479,000.00.

The Clean Water State Revolving Fund Program provides financial assistance to communities for the construction of projects to enhance and improve water quality in Louisiana. Loans are below market rate and may be used for water quality improvement projects in Louisiana communities. Monies for the Revolving Loan Program originated with the 1987 amendments to the CWA. A new authority was created, allowing USEPA to make grants to capitalize State Water Pollution Control Revolving Funds. On the state level, R.S. 30:2011(D)(4) and R.S.

30:2301-2306 (Act 296 of the 2010 Regular Session of the Louisiana legislature) were enacted. These statutes established a state revolving loan fund capitalized by federal grants (Capitalization Grants for Clean Water State Revolving Funds, CFDA 66:458), by state funds when required or available, and by any other funds generated by the operation of the clean water revolving loan fund. Loans are made for no longer than 20 years and may be repaid through sales taxes, user fees, ad valorem taxes, or a combination of funds. An interest payment on the amount drawn begins within six months of the loan closing and is billed every six months until the loan is paid in full. After a two-year construction period, loan recipients begin repayment of principal to LDEQ. That money is then available for loans to other communities. Thus, the revolving loan fund is a permanent source of funds for Louisiana municipalities.

As of December 2013, USEPA, through LDEQ, has awarded $424,419,923 in fund capitalization grants to Louisiana. With the required 20% state match of $76,837,527, less 4% for administration fees, this makes $484,280,653 available for loans to communities. In addition, a total of $260,042,619 of repaid "recycled" loan monies has been made available for loans. As of December 2013, 200 loans to communities totaling $877,931,915 have been closed, utilizing USEPA grants, state match, and recycled payments from previous loans. Another 18 requests for loans totaling $134,981,248 have been received and are in the application process. For more information on the Clean Water State Revolving Fund refer to: http://www.deq.louisiana.gov/portal/tabid/2148/Default.aspx.

Data on pollution abatement capital expenditures and operating costs from the U.S. Census Bureau publication *Pollution Abatement Costs and Expenditures: 2005* has been included to provide estimates of costs to industry related to water quality protection and improvement. For 2005, the most recent year for which data is available, industry in Louisiana spent $89.2 million in capital expenditures to protect water quality, with the petroleum industry ($61.2 million), chemical industry ($25.3 million), and paper industry ($0.8 million) leading in dollars spent. For the same period, water quality-related pollution abatement operating costs for Louisiana industry totaled $530.4 million with spending led by the chemical sector ($301 million), petroleum industry ($173.1 million), and paper industry ($40.6 million). This represents a $619.6 million outlay for water pollution control-related expenses (U.S. Census Bureau 2008).

In an attempt to place state and industry expenditures in perspective and to provide an approximation of a cost/benefit assessment, information is provided below on the size of Louisiana's water resource base and its direct and indirect economic benefits to the state.

Benefits Information

Louisiana's water resources occupy 8,789 square miles of the total state surface area of 43,199 square miles.[1] LDEQ is thus directly or indirectly responsible for protecting the water quality of approximately 20% of the total surface area of the state. In many instances, protection of surface waters also involves the management of stormwater runoff from land-based activities such as farming, aquaculture, forestry, and suburban/urban areas. This greatly increases the effective water quality protection area for which LDEQ is either directly or indirectly responsible.

[1] http://www.infoplease.com/ipa/A0108355.html

Many Louisiana citizens depend on good water quality, not only for drinking water sources and consumptive/nonconsumptive recreation, but also for commercial purposes, and these activities produce revenue for the state through license sales. *The LDWF 2011-2012 Annual Report* (LDWF 2012) states that the agency issued 72,175 commercial fishing licenses, generating in excess of $3.6 million in revenue from license sales. Boat registration/title transactions for 2011-2012 numbered 190,628, bringing in over $4.2 million in revenue. Over 233,000 commercial fishing trips were reported, producing more than 155 million pounds of seafood. The total 2011 economic effect of the commercial fisheries industry in Louisiana was $2.2 billion (NOAA 2012).

LDWF also reports that the shrimp fishery is Louisiana's most valuable commercial fishery. Louisiana continued to lead the nation in shrimp landings with approximately 92 million pounds landed in 2011. The dockside value was about $130 million. Additionally, Louisiana blue crab landings for 2011 totaled 43.8 million pounds, bringing in $36.8 million dockside, second only to Maryland.

Louisiana regularly leads the U.S. in oyster production, averaging approximately 1/3 of the nation's oyster landings. Oysters routinely have a total annual economic impact on the Louisiana economy of roughly $300 million. In 2011, Louisiana provided over 11 million pounds of oysters, with a dockside value of more than $41 million (NOAA 2012). Louisiana consistently ranks #1 in landings among Gulf of Mexico states, bringing in over 50% of all oysters landed (LDWF 2012).

Louisiana's commercial crawfishing industry also depends on good water quality. The LSU Agricultural Center estimates commercial harvest figures of $152.8 million for aquaculture crawfish and $9.3 million in wild-caught crawfish for 2012. Gross value of Louisiana aquaculture for 2011 was $257.4 million, reported by the LSU AgCenter. Fur animal and alligator harvesting also added nearly $12 million to the 2011 total (LSU AgCenter 2012).

Recreational fishing made an important contribution to Louisiana's economy with a total 2011 economic impact of approximately $2.9 billion (NOAA 2012). In 2011-2012, anglers took over 5 million marine recreational fishing trips (LDWF 2012). A survey presented in the *2009-2013 Louisiana Statewide Comprehensive Outdoor Recreation Plan* revealed that "Fishing/Crabbing" was #1 out of the Top 10 2008 Important Outdoor Recreational Activities Among Households, and "Public Access to State Waters" was #4 (LOSP 2009).

Both recreational and commercial fishing have an obvious relationship to Louisiana's water resources. Not so obvious is the connection between high quality water resources and hunting/nonconsumptive wildlife activities. Hunting is popular in Louisiana, and it is widely acknowledged that terrestrial wildlife and especially waterfowl are dependent on the availability of high quality waters. Over 158,600 deer hunters participated in hunting activities during the 2011-2012 deer season. There were also 97,500 duck hunters, 33,300 dove hunters, 1,100 quail hunters, 4,300 woodcock hunters, and 19,100 turkey hunters (LDWF 2012).

The total retail sales figure associated with hunting in Louisiana in 2011 was $564 million (USFWS 2013). In 2011, an estimated 1,010,000 participants engaged in wildlife watching (nonconsumptive recreation), resulting in a total economic effect of $542.7 million to the state (USFWS 2013).

In 2006, the most recent year for which these figures are available, fishing, hunting, and wildlife activities generated an estimated $4.61 billion in retail sales, $6.75 billion in total economic effect, $446.2 million in state and local tax revenues, and supported 76,700 jobs after adjusting for multiple counting of boat purchases (Southwick and Assoc. 2008). In fiscal year 2011/2012, LDWF sold more than 2.1 million recreational hunting, fishing, trapping, and nonconsumptive use licenses to more than 800,000 customers, generating in excess of $19.3 million in revenue (LDWF 2012).

The wildlife, fishing, and boating resources of Louisiana generate substantial economic benefits to state residents and to the common good. Industry investment in water pollution abatement capital expenditures and operating costs protects a multibillion-dollar industry. This financial outlay typically amounts to less than 10% of the value of the annual benefits. Moreover, hunters and nonconsumptive users alike are less likely to participate in their preferred activities in areas of questionable water and aesthetic quality. An all-encompassing approach to environmental and resource management requires that consideration be given to all wildlife, aquatic and terrestrial, because all require clean water for their survival. While the total contribution of fishing, hunting, and nonconsumptive recreation cannot be directly related to water resources, almost all of it can be associated with the need for clean water. In a 2005 survey of 403 Louisiana citizens by the Southeastern Association of Fish and Wildlife Agencies (SEAFWA), "Polluted water/water quality" was named the second most important fish and wildlife issue, led only by "Habitat loss" (SEAFWA 2005).

Clean water is also important to the tourism industry. Travel statistics indicate that 17% of resident visitors participate in some sort of outdoor activity during their visit, as do 6% of international visitors. The number of visitors statewide continues to exceed 2004 levels (pre-Hurricane Katrina), with 26.3 million people visiting the state in 2012 (LOT 2013). According to *The 2011 Louisiana Tourism Satellite Account (LTSA): An Update* (Terrell and Bilbo 2013), in 2011, tourists in Louisiana spent $10 billion, surpassing pre-Hurricane Katrina levels. Travel and tourism now account for 8.2% of state government revenues (Terrell and Bilbo 2013). 147,000-plus people (8% of the state workforce) work directly in the Louisiana travel industry; the LTSA report also states that 56,034 additional Louisiana jobs were created as an indirect effect of travel and tourism expenditures.

In FY 2010-11, over two million visitors came to Louisiana State Parks and Historic sites (LDCRT 2012). State recreational areas cover over 1,510,298 acres. Out-of-state visitors to state parks spend almost $12 million in Louisiana annually. The Louisiana DCRT estimates that visitor spending at state parks returns $3.23 in state taxes for every dollar spent on park operation and maintenance (UNO, LSU, MSU, LSUS 2006). In the *Louisiana Office of State Parks* (LOSP) *Strategic Plan for FY 14-15—18-19*, program objectives include sustaining the number of visitors served by the park system at an annual minimum of 2,200,000 by the end of FY 2018-2019, and sustaining a level of 175,000 individuals annually participating in interpretive programs and events by the end of fiscal year 2018-2019. LOSP has three strategies directly dependent on water quality to meet these objectives (LDCRT 2013):

- Strategy 2.1 – Maintain and operate all state park sites and facilities according to the highest national and international standards of quality
- Strategy 2.8 – Introduce new initiatives such as…the American Wetlands Program and participation in other tourism programs in order to further enhance visitation

- Strategy 2.17 – Increase the focus on native resources

For summaries of recent improvements to state parks, many involving waterfront and wetland sites, see the *2012 Sunset Report* (LDCRT 2012, 34-37).

There are also 23 National Wildlife Refuges in the state, all-encompassing some portion of Louisiana waterways. People use the U.S. Forest Service (USFS) refuges for hunting, fishing, birding, photography, and environmental education while spending money in localities near these sites. For more information on the USFS refer to: http://www.fws.gov/refuges/refugeLocatorMaps/Louisiana.html.

As one of the top five production destinations in the world, Louisiana is also seeing increasing economic benefit from the entertainment industry. According to an economic impact study commissioned by Louisiana Economic Development (LED), more than $1.1 billion in sales were generated in Louisiana in 2012 from film and TV industry projects, and some of these productions utilized natural settings.[2] In 2013, 18 of the 108 major studio movies released in the U.S. had a significant number of their scenes shot in Louisiana. The Best Picture Oscar winner of 2013, *12 Years a Slave*, was filmed throughout rural south Louisiana. According to the LOSP (S. Broussard, pers. comm.), nine movies, seven documentaries, three TV shows, one TV movie, one TV pilot, and two music videos were filmed at State Parks sites in 2012-13, creating further national and international interest in Louisiana and its beautiful natural environment.

Although not all of Louisiana's outdoor recreational and scenic opportunities are water-based, water quality is an important consideration in the overall environmental perception of travelers. Because water quality often plays an important part in this recreation, it is imperative that it be enhanced and protected. Along with other quality-of-life parameters, environmental perception is a factor when Louisiana is contemplated as a place to relocate or start a business.

Louisiana invests a great deal of money in its efforts to enhance and maintain its water quality. In return, the citizens of Louisiana and visitors derive a number of benefits, both financial and aesthetic, from the state's abundance of water bodies. With the combined efforts of LDEQ, federal and state agencies, industry, and the citizens of Louisiana, our waters will continue to provide abundant recreational and commercial benefits for everyone.

[2] http://louisianaentertainment.gov/docs/main/2013_OEID_Program_Impact_Report_(FINAL).pdf

PART III: SURFACE WATER MONITORING AND ASSESSMENT

Chapter 1: Surface Water Monitoring Program

The surface water monitoring programs of the OEC of LDEQ are designed to provide data for the following objectives:

- Measure progress toward achieving water quality goals at state and national levels
- Establish and review the state water quality standards
- Determine the assimilative capacity of the waters of the state
- Establish permit limits for wastewater discharges

The surface water monitoring program is composed of an Ambient Water Quality Monitoring Network (AWQMN), intensive surveys, special studies, and wastewater discharge compliance sampling. Some components of the state water monitoring program are briefly described below.

Ambient Water Quality Monitoring Network

The primary use of the data from the AWQMN is to determine if water quality standards are being attained. To accomplish this, core indicators are monitored and used to determine designated use support (Table 3.1.1). Data may also be used for/by other programs within LDEQ (e.g., standards/criteria determination, modeling, permitting, project planning) and external entities.

Data will be collected systematically to obtain water quality monitoring data on selected water subsegments defined in the Surface Water Quality Standards (LAC 33:IX Chapter 11). The current approach to ambient surface water monitoring consists of a four-year rotating sampling plan with approximately one-fourth of the selected subsegments in the state sampled each year. Long-term monitoring sites are located in 10 of the 12 basins and will be sampled every year throughout the four-year cycle. Under this plan LDEQ conducts a complete census of selected subsegments identified in LAC 33:IX.1123, Table 3 during the four-year rotation. There are, however, some subsegments that are difficult to sample within the physical and time constraints imposed upon the regional staff. These difficult-to-monitor subsegments will be evaluated individually to determine what type of monitoring and assessment can best be performed to assess the water quality of that subsegment.

Beginning with the 2009-2010 AWQMN sample site rotation, the number of sites being sampled was reduced due to state budget constraints. As budget restrictions eased, LDEQ resumed AQWMN sampling at the level described in this report and the ambient monitoring quality assurance project plan (QAPP).

ID personnel conduct the ambient network sampling. At each sampling site, the sample collector takes *in situ* field measurements and collects water samples for laboratory analysis for the parameters outlined in Table 3.1.1.

Table 3.1.1

Designated uses for Louisiana water bodies and the core indicators used to determine water quality standards attainment

Designated Use	Core Indicators	Basis for Use Support Decision
Fish and Wildlife Propagation	Dissolved Oxygen (mg/L) (Routine grab ambient)	Percent exceedance[1]
	Dissolved Oxygen (mg/L) (Continuous Monitoring)	Percent exceedance[1]
	Temperature	Percent exceedance
	pH	Percent exceedance
	Chloride	Percent exceedance
	Sulfate	Percent exceedance
	Total Dissolved Solids	Percent exceedance
	Turbidity	Percent exceedance
	Toxic Substances	Less than two exceedances in three years[2]
	Metals	Less than two exceedances in three years[2]
Limited Fish and Wildlife Use	Dissolved Oxygen	Percent exceedance[1]
	Dissolved Oxygen (mg/L) (Continuous Monitoring)	Percent exceedance[1]
Primary Contact Recreation	Fecal Coliform	Percent exceedance
	Temperature	Percent exceedance
	Toxic Substances	Less than two exceedances in three years[2]
Secondary Contact Recreation	Fecal Coliform	Percent exceedance
	Toxic Substances	Less than two exceedances in three years[2]
Drinking Water Supply	Color	Percent exceedance
	Fecal Coliform	Percent exceedance
	Toxic Substances	Less than two exceedances in three years[2]
	Metals	Less than two exceedances in three years[2]
Outstanding Natural Resource Waters	Turbidity	Percent exceedance
Agriculture	None (indicated by support of other designated uses)	
Oyster Propagation	Fecal Coliform	Percent exceedance

1. LDEQ's AWQMN Dissolved Oxygen (DO) routine grab samples are used as an initial screening for DO criteria assessments. In the event the criterion is not met, continuous monitoring for DO may be initiated.
2. LDEQ has adopted a screening approach for water quality assessment decisions based on metals and toxics (also referred to in this document as organic compounds) data.

Mercury Monitoring Program / Fish Tissue Monitoring Activities

Due to budget constraints, LDEQ discontinued its mercury monitoring program for fish tissue evaluation. A mercury monitoring program was utilized in the past to determine the need for fish consumption advisories due to mercury. More information on Louisiana's mercury monitoring program can be found at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=287. More information on Louisiana's fish tissue and advisory program can be found at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=1631.

Intensive Water Quality Surveys

The Water Surveys Section of LDEQ conducts intensive stream surveys to provide physical, chemical, and some biological data necessary to define water quality problems; to calibrate and verify mathematical models for development of TMDLs and wasteload allocations (WLAs); and to provide additional data for assessments, permitting purposes, the revision of water quality standards, natural resource damage assessment and restoration projects, and the development and revision of the state water quality management plan. One intensive stream survey to collect data for Pearl River modeling was conducted by LDEQ from October 1, 2011 through September 30, 2013. Additional projects conducted by the Water Surveys Section can be found in Table 3.1.2.

Table 3.1.2.

Water quality sampling and other projects conducted by the Water Surveys Section of the Louisiana Department of Environmental Quality.

Water Quality Planning and Assessment Sampling Efforts
Pearl River Sampling
Nutrient Gradient Sampling
Clean Metals Sampling
Nonpoint Source Program Sampling Efforts
Marsh Bayou
Bayou Chene/Lacassine
Big Creek
Que de Tortue
Bayou Lafourche(South) – Fecal Coliform Study + Dye TOT Study
Bayou Lafourche(North)
Boston Canal
Bayou Louis
Six Mile Creek
Comite River
Caney Lake (Planning)
Turkey Creek (2011? Survey + Current Monthly BMP Monitoring)
Pesticide Sampling (Planning done – Sampling starting July 2014)

Table 3.1.2.

Water quality sampling and other projects conducted by the Water Surveys Section of the Louisiana Department of Environmental Quality.

Incident Response
BP Oil (SCAT and NRDA)
Seafood Safety (Part of LDWF grant - BP Response)
Exxon Torbert
Dune Energy
Swift Oil
Bayou Corne

Total Maximum Daily Load Development Program

Total Maximum Daily Load Status

Between April 2002 and March 2012, USEPA was under a Court Ordered Consent Decree for completion of TMDLs. During that time the TMDL Unit of LDEQ focused on TMDL development for water body impairment combinations and schedules outlined in Attachments A and B of the Consent Decree. While under the Consent Decree LDEQ's TMDL unit concentrated on development of TMDLs for low DO, nutrients, and metals. During this time TMDLs were developed by LDEQ and/or LDEQ contractors. Based upon an agreement between LDEQ and USEPA, some TMDLs were developed by USEPA and/or USEPA contractors; these TMDLs were submitted to LDEQ for review. Louisiana completed its Consent Decree commitments as of March 6, 2012.

Following completion of these commitments ongoing TMDL development has been focused on revising existing TMDLs where the criteria have been revised. TMDL progress is shown in Tables 3.1.3 and 3.1.4. More information on USEPA's TMDL program can be found at: http://www.epa.gov/waters/ir/index.html.

Table 3.1.3

Louisiana Department of Environmental Quality Total Maximum Daily Load progress from January 01, 2012 to December 31, 2013.

TMDLs Developed by LDEQ and Approved by USEPA					
Water Body	**Subsegment Number(s)**	**Basin**	**Date Finalized**	**TMDL Parameters**	**TMDL Status**
Bayou Lacombe	040901 040902	Lake Pontchartrain	3/2/2012	Dissolved Oxygen	Final

Table 3.1.3

Louisiana Department of Environmental Quality Total Maximum Daily Load progress from January 01, 2012 to December 31, 2013.

TMDLs Developed by LDEQ and Approved by USEPA					
Water Body	**Subsegment Number(s)**	**Basin**	**Date Finalized**	**TMDL Parameters**	**TMDL Status**
Lower Tchefuncte River	040802 040803	Lake Pontchartrain	3/6/2012	Dissolved Oxygen	Final

Table 3.1.4

Total Maximum Daily Loads developed by USEPA and reviewed by LDEQ.

Water Body	Subsegment	Basin	Date Finalized	TMDL Parameters	TMDL Status
Devil's Swamp Lake and Bayou Baton Rouge	070203	Mississippi River	3/7/2011	Fecal Coliform	Final
Comite River--Wilson-Clinton Hwy to entrance of White Bayou (East Baton Rouge Parish) (Scenic)	040102	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Comite River--Entrance of White Bayou to Amite River	040103	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Bayou Manchac--Headwaters to Amite River	040201	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Amite River--LA Hwy 37 to Amite River Diversion Canal	040302	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Grays Creek--Headwaters to Amite River	040304	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Colyell Creek System (includes Colyell Bay)	040305	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Natalbany River--Headwaters to Tickfaw River	040503	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final

Table 3.1.4

Total Maximum Daily Loads developed by USEPA and reviewed by LDEQ.

Water Body	Subsegment	Basin	Date Finalized	TMDL Parameters	TMDL Status
Yellow Water River--Origin to Ponchatoula Creek	040504	Lake Pontchartrain	3/28/2012	Fecal Coliform, TDS	Final
Ponchatoula Creek and Ponchatoula River	040505	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Selsers Creek--Origin to South Slough	040603	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Big Creek and Tributaries--Headwaters to confluence with Tangipahoa River	040703	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
W-14 Main Diversion Canal--From its origin in the north end of the City of Slidell to its junction with Salt Bayou	040909	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Salt Bayou--Headwaters to Lake Pontchartrain (Estuarine)	040910	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Lake Pontchartrain Drainage Canals	041302	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
New Orleans East Leveed Water Bodies (Estuarine)	041401	Lake Pontchartrain	3/28/2012	Fecal Coliform	Final
Tickfaw River--From MS State Line to LA Hwy 42 (Scenic)	040501	Lake Pontchartrain	3/28/2012	TDS, Mercury	Final
Amite River--MS State Line to LA Hwy 37 (Scenic)	040301	Lake Pontchartrain	3/28/2012	TSS, Turbidity	Final
Blind River--From Amite River Diversion Canal to mouth at Lake Maurepas (Scenic)	040401	Lake Pontchartrain	3/28/2012	Sediments, Turbidity, Mercury	Final
Bayou Cane--Headwaters to U.S. Hwy 190 (Scenic)	040903	Lake Pontchartrain	3/28/2012	Turbidity	Final
Amite River--Amite River Diversion Canal to Lake Maurepas	040303	Lake Pontchartrain	3/28/2012	Mercury	Final

Table 3.1.4

Total Maximum Daily Loads developed by USEPA and reviewed by LDEQ.

Water Body	Subsegment	Basin	Date Finalized	TMDL Parameters	TMDL Status
Blind River--Source to confluence with Amite River Diversion Canal (Scenic)	040403	Lake Pontchartrain	3/28/2012	Mercury	Final
Tangipahoa River--MS State Line to Interstate Hwy I-12 (Scenic)	040701	Lake Pontchartrain	3/28/2012	Mercury	Final
Tchefuncte River and Tributaries--Headwaters to confluence with Bogue Falaya River (Scenic)	040801	Lake Pontchartrain	3/28/2012	Mercury	Final
Bayou Liberty--Headwaters to LA Hwy 433	040905	Lake Pontchartrain	3/28/2012	Mercury	Final
Bayou Liberty--LA Hwy 433 to confluence with Bayou Bonfouca (Estuarine)	040906	Lake Pontchartrain	3/28/2012	Mercury	Final
Bayou Labranche	041201	Lake Pontchartrain	3/28/2012	Dissolved Oxygen	Final
Violet Canal	041805	Lake Pontchartrain	3/28/2012	Dissolved Oxygen	Final
Ponchatoula Creek and Ponchatoula River	040505	Lake Pontchartrain	3/28/2012	Dissolved Oxygen	Final
New Orleans East Leveed Water Bodies	041401	Lake Pontchartrain	3/28/2012	Dissolved Oxygen	Final

Early Warning Organic Compound Detection System

The Early Warning Organic Compound Detection System (EWOCDS) is a cooperative agreement between LDEQ, potable water works, and industries along the river. The main objective of this system is to provide warnings of possible contamination of drinking water supplies to interested parties. Currently, there are seven locations hosted by seven entities along the lower Mississippi River where ambient river water samples are collected and analyzed for the EWOCDS. For more information on EWOCDS, see http://www.deq.louisiana.gov/portal/tabid/285/Default.aspx.

Chapter 2: Water Quality Assessment Method and Integrated Report Rationale

Introduction

Statutes and Regulations

The LDEQ prepared reports to meet the requirements outlined in §303(d) and §305(b) of the federal Water Pollution Control Act (United States Code, Title 33, §1251 et seq., 1972) (also known as the CWA) and supporting federal regulations found in Title 40 of the Code of Federal Regulations, Parts 130.7 and 130.10 (40 CFR 130.7, 130.10). Section 303(d) of the CWA and supporting regulations requires each state to identify water quality-limited segments (i.e., Louisiana subsegments that do not meet water quality standards) requiring development of TMDLs and to prioritize the water quality-limited segments for TMDL development. States are required to assemble and evaluate existing and readily available water quality-related data and information to develop the list. Additionally, each state must provide documentation to support listing decisions, including: a description of the method used to develop the list; a description of the data and information used to identify (i.e., list) waters; a rationale for any decision not to use existing and readily available data and information; and other information to demonstrate "good cause" for not including waters on the §303(d) list pursuant to 40 CFR 130.7(b)(6).

Section 305(b) of the CWA and supporting regulations requires states to report on the quality of state waters every two years; the biennial reports are due April 1 of even-numbered years. Section 305(b) requires a description of all navigable waters in each state and the extent to which these waters provide for the protection and propagation of fish and wildlife and allow for recreational activities in and on the water.

Guidance

The United States Environmental Protection Agency (USEPA) issued guidance for the assessment, listing, and reporting of states' water quality to meet the requirements of CWA §303(d) (impaired waters list) and §305(b) (water quality inventory) (USEPA various dates). USEPA guidance outlines the compilation and reporting of state water quality in a combined report—the Integrated Report (IR). USEPA's guidance further outlines the use of categories to classify the quality of watersheds in each state. Integrated Report categories are outlined in Table 3.2.1.

Table 3.2.1.

USEPA Integrated Report categories used by LDEQ to categorize water body/pollutant combinations for the *Louisiana 2014 Integrated Report.*

IR Category (IRC)	IR Category Description
IRC 1	*Specific Water body Impairment Combination* (WIC) cited on a *previous* §303(d) list is now attaining all uses and standards. Also used for water bodies that are fully supporting all designated uses.

Table 3.2.1.

USEPA Integrated Report categories used by LDEQ to categorize water body/pollutant combinations for the *Louisiana 2014 Integrated Report.*

IR Category (IRC)	IR Category Description
IRC 2	Water body is meeting some uses and standards but there is insufficient data and/or information to determine if uses and standards *associated with the specific WIC* cited are being attained.
IRC 3	There is insufficient data and/or information to determine if uses and standards *associated with the specific WIC* cited are being attained.
IRC 4a	WIC exists but a TMDL has been completed for the *specific WIC* cited.
IRC 4b	WIC exists but control measures other than a TMDL are expected to result in attainment of designated uses *associated with the specific WIC* cited.
IRC 4c	WIC exists but a pollutant (anthropogenic source) does not cause the *specific WIC* cited.
IRC 5	WIC exists for one or more uses, and a TMDL is required for the *specific WIC* cited. **IRC 5 and its subcategories represent Louisiana's §303(d) list.**
IRC 5RC (Revise Criteria)	WIC exists for one or more uses, and a TMDL is required for *the specific WIC* cited; LDEQ will investigate revising criteria due to the possibility that natural conditions may be the source of the water quality criteria impairments.

Integrated Report Development

The 2014 IR contains new assessments for subsegments in all 12 Louisiana basins: Atchafalaya (01), Barataria (02), Calcasieu (03), Pontchartrain (04), Mermentau (05), Vermilion/Teche (06), Mississippi (07), Ouachita (08), Pearl (09), Red (10), Sabine (11), and Terrebonne (12).

Water Quality Assessment Methods

The following outlines the description of the methods LDEQ used to develop the CWA §303(d) list and water body categorizations found in the 2014 IR. LDEQ used assessment procedures developed and updated over a number of years. Procedures followed USEPA guidance documents for §305(b) reports and §303(d) lists and USEPA's Consolidated Assessment and Listing Methodology (CALM) guidance (USEPA various dates). LDEQ based water quality assessments and §303(d) listings on specific water body subsegments as defined in Louisiana's Surface Water Quality Standards (LAC 33:IX.1101-1123). Louisiana surface water quality standards define eight designated uses for surface waters: primary contact recreation (PCR), secondary contact recreation (SCR), fish and wildlife propagation (FWP) (with "subcategory" of limited aquatic and wildlife use (LAL)), drinking water supply (DWS), oyster propagation

(OYS), agriculture (AGR), and outstanding natural resource waters (ONR). Designated uses have specific suites of ambient water quality parameters used to assess their support. Links between designated uses and water quality parameters, as well as water quality assessment procedures, can be found in Table 3.2.2. Additional details of Louisiana's IR assessment process can be found in Louisiana's Standard Operating Procedures for Production of Water Quality IR (LDEQ 2013a).

Table 3.2.2.

Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's *2014 Integrated Report.*[1]

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting[2]	Not Supporting
Primary Contact Recreation (PCR) (Designated swimming months of May-October, only)	Fecal coliform[3]	0-25% do not meet criteria	-	>25% do not meet criteria
	Enterococci[4]	0-25% of single exceedances do not meet criteria; overall geometric mean ≤ 35 MPN/100 ml		>25% of single exceedances do not meet criteria; overall geometric mean > 35 MPN/100 ml
	Temperature	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Metals[5,6,7] and Toxics	<2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters	-	≥2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters

Table 3.2.2.

Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's *2014 Integrated Report.*[1]

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting[2]	Not Supporting
Secondary Contact Recreation (SCR) (All months)	Fecal coliform[3]	0-25% do not meet criteria	-	>25 % do not meet criteria
	Metals[5,6,7] and Toxics	<2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters	-	≥2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters

Table 3.2.2.

Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's *2014 Integrated Report.*[1]

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting[2]	Not Supporting
Fish and Wildlife Propagation (FWP)	Dissolved oxygen (routine ambient monitoring data)[8]	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria
	Dissolved oxygen (follow-up continuous monitoring data, if needed)[8]	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria
	Temperature, pH, chloride, sulfate, TDS, turbidity	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Metals[5,6,7] and Toxics	<2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters	-	≥2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters

Table 3.2.2.

Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's *2014 Integrated Report.*[1]

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting[2]	Not Supporting
Drinking Water Source (DWS)	Color	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Fecal coliform[3]	0-30% do not meet criteria	-	>30 % do not meet criteria
	Metals[5,6,7] and Toxics	<2 exceedances of drinking water criteria in most recent consecutive three-year period, or one-year period for newly tested waters	-	≥2 exceedances of drinking water criteria in the most recent consecutive three-year period, or one-year period for newly tested waters
Outstanding Natural Resource Waters (ONR)	Turbidity	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria
Agriculture (AGR)	None	-	-	-
Oyster Propagation (OYS)	Fecal coliform[3]	Median fecal coliform ≤ 14 MPN/100 mL; and ≤ 10% of samples > 43 MPN/100 mL	-	Median fecal coliform > 14 MPN/100 mL; and > 10% of samples > 43 MPN/100 mL
Limited Aquatic and Wildlife (LAL)	Dissolved oxygen[8]	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria

Table 3.2.2.

Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's *2014 Integrated Report.*[1]

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting[2]	Not Supporting

Footnotes

1. Where deviations from the decision process described in Table 2 occur, detailed information will be given to account for and justify those deviations. For instance, circumstances that may not be accounted for in the plain electronic analysis of the data will be explored and may be used to either not list the water body or to put the Water body Impairment Combination (WIC) into a different category. Those circumstances will be fully articulated.
2. While the assessment category of "Partially Supporting" is included in the statistical programming, any use support failures were recorded in the Assessment Database (ADB) as "Not Supporting." This procedure was first adopted for the 2002 §305(b) cycle because "partially supported" uses receive the same TMDL treatment as "not supported" uses.
3. For most water bodies, criteria are as follows: PCR, 400 colonies/100 mL; SCR, 2,000 colonies/100 mL; DWS, 2,000 colonies/100 mL; OYS, 43 colonies/100 mL (see LAC 33:IX.1123).
4. For enterococci, LDHH's single sample criterion for beach monitoring is 104 MPN/100 ml. For marine waters, the geometric mean criterion over the period of record is 35 MPN/100 ml. LDHH beach data only applies to the LDHH monitored beaches. Refer to section II.f for details.
5. Determination of the application of marine or freshwater metals criteria was made based on LAC 33:IX.1113.C.6.d.
6. Parameters collected quarterly (metals and organics) required a minimum of three samples.
7. Beginning in April 2013, LDEQ resumed ultra-clean metals sampling at selected sites across the state. Sites were selected based on previous Water Quality IR assessments showing impairment for one or more metals. Ultra-clean metals sampling is conducted by the Water Surveys Section under QAPP_1031_00 (LDEQ 2013b). The QAPP is available on the LDEQ QAPP/SOP Intranet at: http://intranet/sop/index/index.htm.
8. In the event that analysis of routine ambient monitoring data for dissolved oxygen results in partial- or non-support, continuous monitoring (CM) data, where available, was used for follow-up assessment. CM data runs were approximately 48-72 hours in duration. CM data was evaluated as follows: All of the 15-minute interval dissolved oxygen observations from a CM sample run were analyzed to determine if more than 10% of the data points were below minimum criteria. Water bodies that fell below the criteria greater than 10% of the time were reported as IRC 5 or IRC 5RC and are therefore on the §303(d) list. Water bodies that fell below the criteria less than or equal to 10% of the time were placed in IRC 1, fully supported. If ambient monitoring indicated impairment and CM data was not available for analysis, the water body was placed in IRC 5 or IRC 5RC until such time as CM data can be collected during the critical season of May 1 through October 31.

Water Quality Data and Information

LDEQ prepared assessments using existing and readily available water quality data and information in order to comply with rules and regulations under §303(d) of the CWA (33 U.S.C. §1313 and 40 CFR 130.7). LDEQ used monitoring procedures and data for the 2014 IR that remained essentially the same as those used to collect data for the 2012 IR. However, some extraordinary events and/or non-routine activities resulted in modifications to routine monitoring procedures. LDEQ discontinued collection of ambient monitoring after the oil spill in April 2010 due to shifts in resources and/or event-driven impacts to waters. LDEQ resumed monitoring based on availability of resources and/or a determination that water bodies had returned to pre-oil spill condition. Therefore, no data potentially impacted by the oil spill were used for the 2014 assessments.

LDEQ primarily relied on data and information supplied through the LDEQ routine ambient monitoring program to conduct water quality assessments for the 2014 IR. LDEQ conducts monitoring on nearly all water quality subsegments on a four-year statewide monitoring cycle. Approximately one-quarter of the state's subsegments were monitored each year; a limited number of subsegments were monitored (and continue to be monitored) every year (i.e., long-term monitoring stations). Each monitoring cycle or "water-year" begins in October and ends in September of each year; concluding the monitoring cycle in September allows time to process data and generate the IR by April 1 of even-numbered years. LDEQ collected monthly and quarterly (metals and organics) water quality data (LDEQ 2010a; LDEQ 2010b; LDEQ 2013a; LDEQ 2013b; LDEQ 2013c); ambient water quality data are available on LDEQ's website at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=2421.

LDEQ compiled and assessed data from the Ambient Water Quality Monitoring Network (AWQMN) collected between October 1, 2009 and September 30, 2013; up to four years (48 samples) of data were available for subsegments with long-term monitoring sites (LDEQ 2013a).

1. Subsegments with Downstream or Upstream Monitoring Sites

LDEQ used ambient monitoring data and information collected from within or immediately downstream or upstream of a water body subsegment to evaluate each of the subsegment's designated uses, using the decision processes shown in Table 2 ("immediately downstream" typically means within approximately 600 yards (0.34 miles) or less of the subsegment boundary). Four subsegments used for the 2014 IR had sites immediately downstream or upstream of the subsegment boundary; in each case there were no known inputs between the subsegment boundary and the sample site. One subsegment had a site immediately upstream of the subsegment boundary (0.28 mile). Six subsegments had sample points between one and five miles downstream from the subsegment boundary. One subsegment had a site located in the coastal waters, and the flow would be largely influenced by tidal activity. One subsegment had a sample point 6.7 miles downstream. In each case, there were no reasonable alternatives for sampling at or above the subsegment boundary, and each site was determined to be representative of the assessed subsegment.

2. Subsegments with Long-Term Monitoring Sites

LDEQ collected data at 21 sites in subsegments with long-term monitoring stations. LDEQ applies assessments for a monitoring station indicating use impairment to the entire subsegment, even if a second monitoring station did not indicate use impairment.

3. Metals

Beginning in April 2013, LDEQ resumed ultra-clean metals sampling at selected sites across the state. Sites were selected based on previous Water Quality IR assessments showing impairment for one or more metals. Ultra-clean metals sampling is conducted by the Water Surveys Section under QAPP_1031_00 (LDEQ 2013b). The QAPP is available on the LDEQ QAPP/SOP Intranet at: http://intranet/sop/index/index.htm. Metals data was assessed using the decision processes shown in Table 3.2.2.

4. Dissolved Oxygen

Beginning in 2008, LDEQ from time to time collected two sets of data to conduct dissolved oxygen (DO) assessments. If routine ambient monitoring DO data indicate potential impairment of the use, LDEQ may collect and use continuous monitoring DO data sets to make a final determination on use support. Continuous monitoring data allows evaluation of the 24-hour diurnal DO fluctuations and an improved determination of whether the frequency of DO exceedances is impairing the use (LDEQ 2008b). Deployment of continuous monitors was also dependent on available resources and a determination of whether collecting the extra data set was appropriate (e.g., if stream impairment was already known, there was no benefit to be gained by deploying a continuous monitor until additional pollution control measures were implemented).

5. Coastal Subsegments with Shared Monitoring Sites

Prior to the 2010/2011 ambient monitoring cycle, LDEQ evaluated coastal subsegments for the potential to have shared data points for multiple contiguous and similar subsegments. Subsidence and other land-altering activities have significantly impacted Louisiana coastal marshes, creating open water areas where subsegments had previously been separated by intact marsh or land. LDEQ collected data in contiguous similar subsegments on an alternating basis (e.g., one subsegment was monitored one month while a similar contiguous subsegment was monitored the next month, etc.). Each monitoring site was sampled approximately six times over the course of the 2010/2011 water monitoring year. LDEQ monitored 21 subsegments using this alternating site approach; the individual and combined assessments are shown in Table 3.2.3. These results were used in the 2012 IR. Due to LDEQ's four-year ambient monitoring cycle and the use of four years of data for each IR, data and assessments from these 21 subsegments were carried over for the 2014 IR. This follows normal protocols established under the four-year ambient monitoring cycle and the biennial IR.

For the 2012 IR, LDEQ assessed the two or three neighboring subsegments separately. The resulting individual subsegment/site assessments were then compared to determine if each tested parameter was the same. If both site assessments were the same for each parameter, then the same assessment results were applied to both subsegments. If the assessments for any specific parameter differed between the two subsegments/sites, then

the data, if sufficient, were reevaluated to determine independent assessments for each subsegment and parameter. If there was insufficient data for independent assessments, then the separate data sets for each parameter were combined for a single assessment applying to both subsegments (Table 3.2.3). For the 2014 IR, the same process was used; however, four additional sites/subsegments were identified as having alternating ambient monitoring sites. Data for these sites (0692/1204 and 1158/1159) were evaluated in the same manner with results included in Table 3.2.3 and in the full assessment results.

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
010901/1204	PCR – INSD but 100% exceedance for fecal criteria; Impaired for SCR with 33.3% of fecals exceeding criterion; Impaired for OYS with 100% of fecals exceeding criterion; Full support all other parameters and uses	ND (p = 0.42)	ND (p = 0.60)	ND (p = 0.97)	NA (no turbidity criterion)	ND (p = 0.87)	Combined data sets for sites 1204 and 0692 indicate impairment for PCR, SCR and OYS due to fecal coliforms; full support of all other parameters and uses
061002/0692	PCR – INSD but 66.7% exceedance for fecal criteria; Impaired for SCR with 33.3% of fecals exceeding criterion; Impaired for OYS with 100% of fecals exceeding criterion; Full support all other parameters and uses						

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
041701/0035	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses	ND (p = 0.62)	ND (p = 0.60)	ND (p = 0.47)	ND (p = 0.82)	ND (p = 0.98)	Combined data sets for sites 0035 and 1072 indicate full support of all parameters and uses
041704/1072	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses						
042102/1080	PCR - INSD but 0 exceedances for fecal and temperature criteria; Impaired for OYS with 42.9% of fecals exceeding criterion; Full support all other parameters and uses	ND (p = 0.79)	ND (p = 0.41)	ND (p = 0.48)	ND (p = 0.61)	ND (p = 0.91)	Combined data sets for sites 1080 and 0007 indicate impairment of OYS use with 42.9% of combined fecal data exceeding criterion; full support of all other parameters and uses
042104/0007	PCR - INSD but 0 exceedances for fecal and temperature criteria; Impaired for OYS with 42.9% of fecals exceeding criterion; Full support all other parameters and uses						

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
042201/1090	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses	ND (p = 0.72)	ND (p = 0.19)	ND (p = 0.39)	ND (p = 0.48)	ND (p = 0.75)	Combined data sets for sites 1090 and 1082 indicate full support of all parameters and uses
042202/1082	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses						
042203/1089	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses	ND (p = 0.29)	ND (p = 0.36)	ND (p = 0.9)	ND (p = 0.75)	ND (p = 0.74)	Combined data sets for sites 1089 and 1091 indicate full support of all parameters and uses
042204/1091	PCR INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses						

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
042205/1088	PCR INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses	ND (p = 0.91)	ND (p = 0.19)	ND (p = 0.69)	ND (p = 0.15)	ND (p = 0.76)	Combined data sets for sites 1088 and 1087 indicate full support of all parameters and uses
042206/1087	PCR INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses						
042207/1083	PCR INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses	ND (p = 0.66)	ND (p = 0.36)	ND (p = 0.56)	ND (p = 0.95)	ND (p = 0.74)	Combined data sets for sites 1083 and 0006 indicate full support of all parameters and uses
042208/0006	PCR INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses						

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
060803/0678	PCR INSD but 50% of fecals exceeding criterion; SCR impaired with 42.9% of fecals exceeding criterion; FWP impaired with 57.1% of turbidity samples exceeding criterion; Full support all other parameters and uses	ND (p = 0.29)	ND (p = 0.37)	ND (p = 0.59)	ND (p = 0.25)	ND (p = 0.45)	Combined data sets for sites 0678 and 0679 indicate impairment of PCR and SCR uses with 62.5% and 64.3%, respectively, of combined fecal data exceeding criteria; combined data sets for turbidity indicate FWP impairment with 35.7% exceeding criterion; full support of all other parameters and uses
060804/0679	PCR INSD but 75% of fecals exceeding criterion; SCR impaired with 85.7% of fecals exceeding criterion; FWP - fully supported but 14.3% of turbidity samples exceeding criterion; Full support all other parameters and uses						

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
061001/0691	PCR INSD but 100% of fecals exceeding criterion; SCR impaired with 33.3% of fecals exceeding criterion; OYS impaired with 83.3% of fecals exceeding criterion; Full support all other parameters and uses	ND (p = 0.96)	ND (p = 0.87)	SD (p = 0.05)	ND (p = 0.6)	ND (p = 0.72)	Combined data sets for sites 0691 and 0316 indicate impairment of PCR with 50% of combined fecal data exceeding criterion; OYS impaired with 54.2% of combined fecal data set indicating impairment; full support of all other parameters and uses, (pH data sets were significantly different; however, both sets indicated full support for the respective sites)
061104/0316	PCR impaired with 33.3% of fecals exceeding criterion; OYS impaired with 44.4% of fecals exceeding criterion; Full support all other parameters and uses						

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
110303/1158	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses	ND (p = 0.80)	ND (p = 0.39)	SD (p = 0.02)	ND (p = 0.27)	ND (p = 0.83)	Combined data sets for sites 1158 and 1159 indicate full support of all parameters and uses, (pH data sets were significantly different; however, both sets indicated full support for the respective sites)
110304/1159	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses						

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
120406/0937	PCR INSD but 33.3% of fecals exceeding criterion; OYS impaired with 50% of fecals exceeding criterion; Full support all other parameters and uses	ND (p = 0.75)	ND (p = 0.46)	ND (p = 0.45)	ND (p = 0.06)	ND (p = 0.91)	Combined data sets for sites 0937 and 0955 indicate impairment of PCR with 33.3% of combined fecal data exceeding criterion; OYS impaired with 58.3% of combined fecal data set indicating impairment; full support of all other parameters and uses
120708/0955	PCR INSD but 33.3% of fecals exceeding criterion; OYS impaired with 66.7% of fecals exceeding criterion; Full support all other parameters and uses						

Table 3.2.3.

Coastal subsegments with shared ambient water quality monitoring sites used for 2014 Integrated Report assessments.

PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; FWP = Fish and Wildlife Propagation; OYS = Oyster Propagation; INSD = Insufficient Data; ND = not significantly different; SD = significantly different (α = 0.05); Satterthwaite approximation utilized when equal variance assumption violated

Subsegments/ Sites	Separate Assessment	Statistical Comparison of Sites by Parameter (based on a t-test unless stated otherwise)					
		Dissolved Oxygen (DO)	Fecal Coliform	pH	Turbidity	Temperature	Combined Assessment
120802/0958	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses	ND (p = 0.84; ANOVA)	ND (p = 0.21; ANOVA)	SD (p = 0.031; ANOVA) 0959 ≠ 0958 (p = 0.030*)	ND (p = 0.46; ANOVA)	ND (p = 0.99; ANOVA)	Combined data sets for sites 0958, 0959, and 0960 indicate full support of all other parameters and uses (pH data sets were significantly different; however, all three data sets indicated full support for pH for the respective sites)
120803/0959	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses						
120804/0960	PCR - INSD but 0 exceedances for fecal and temperature criteria; Full support all other parameters and uses						

6. Use of IRC 3 for Selected Chlorides, Sulfates, Total Dissolved Solids Assessments

Changing the IRC of 42 WICs for chlorides, sulfates, and/or total dissolved solids (TDS) (hereinafter collectively referred to as minerals) from IRC 5 to IRC 3 was based on two factors. First, it was based on an improved understanding of the basis for the criteria and the type and quality of data used for assessment purposes. In an effort to improve the accuracy of water quality assessments, the LDEQ is evaluating alignment of assessment data and processes with the basis used for developing water quality criteria. For example, minerals criteria are based on long-term averages and variability; assessments to determine support of the fish and wildlife propagation use using minerals data are based on a short-term data set with a percent-based exceedance rate. Therefore, LDEQ is re-evaluating minerals criteria assessment processes and associated data sets and has determined insufficient data are available to determine attainment of uses and standards on select subsegments.

A second factor in changing from IRC 5 to IRC 3 for selected minerals assessments was that during the LDEQ's review of the suspected sources for the assessment of minerals, it was determined that many of the criteria failures were due to natural tidal influences. In some cases, drought or tropical storms may have contributed to the tidal influences. Criteria failures for minerals occurred on many coastal subsegments not previously determined to be estuarine but still highly influenced by tides. Because these subsegments were not recognized as estuarine during criteria development, they may have been assigned excessively low criteria. Some of the subsegments begin in upland parts of the state and extend downstream to, or near, the coast. Ambient monitoring sites for these subsegments are frequently near the coast and thus directly influenced by tides.

Review of U.S. Geological Survey (USGS) flow data found significant tidal influences on three major rivers along the Louisiana coast. These included Mermentau River at Mermentau, LA (Figure 3.2.1), Vermilion River at Perry, LA (Figure 3.2.2), and Amite River at Port Vincent (Figure 3.2.3). Mermentau, LA is approximately 42 miles inland; Perry, LA is approximately 14 miles inland; and Port Vincent is approximately 17 miles inland. Because of tidal influences at these inland USGS sites, tributary streams entering near these towns are also tidally influenced. This resulted in elevated minerals levels above concentrations expected when criteria were originally developed for the area.

Figure 3.2.1.

USGS flow data for Mermentau River at Mermentau, LA.

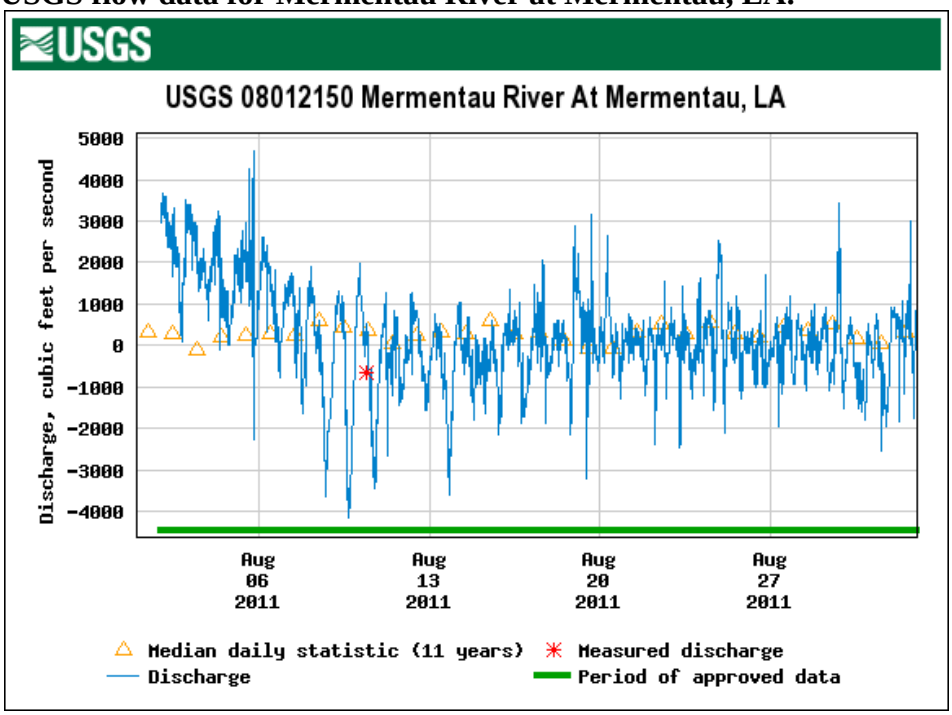


Figure 3.2.2.

USGS flow data for Vermilion River at Perry, LA.

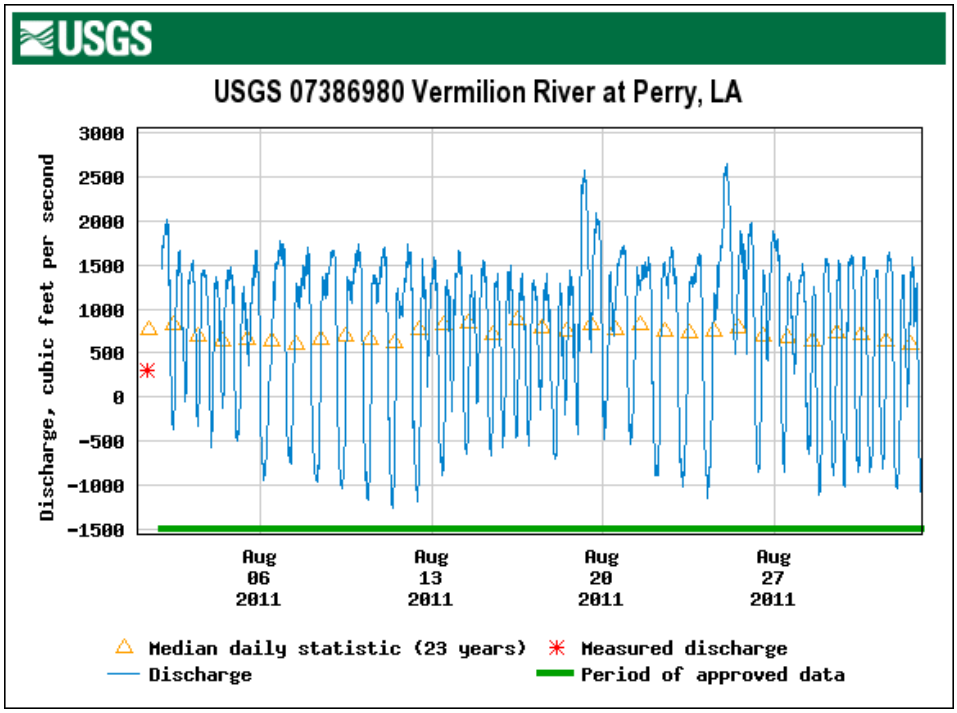
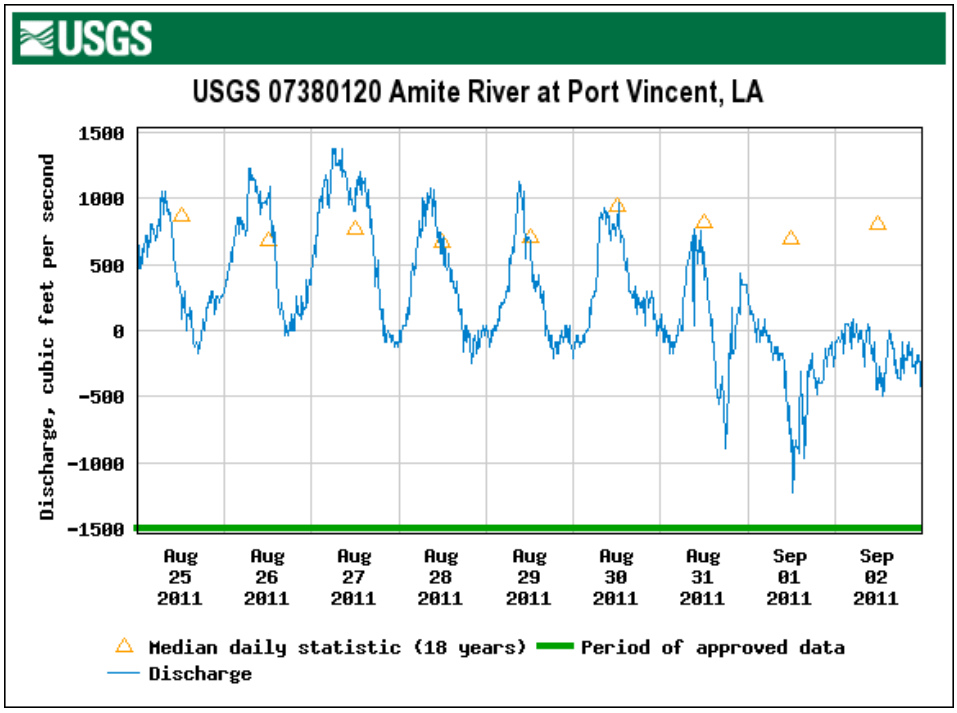


Figure 3.2.3.

USGS flow data for Amite River at Port Vincent, LA.



Based on the preceding discussion, LDEQ has determined there is insufficient data to assess the referenced coastal subsegments as not meeting the FWP use based on chlorides, sulfates, and TDS levels and has placed the subsegments in IRC 3 (Table 3.2.4; Figure 3.2.4).

Table 3.2.4.

Subsegments assessed for chloride, sulfate, and TDS and assigned to IRC 3 due to the suspected source of natural sources.

Subsegment	Subsegment Description	Chloride	Sulfates	Total Dissolved Solids
LA030201_00	Calcasieu River-From Marsh Bayou to saltwater barrier (Scenic)	X	X	X
LA030701_00	Bayou Serpent			X
LA030702_00	English Bayou-From headwaters to Calcasieu River			X
LA030801_00	West Fork Calcasieu River-From confluence with Beckwith Creek and Hickory Branch to mainstem of Calcasieu River	X	X	X
LA030803_00	Beckwith Creek-From headwaters to West Fork Calcasieu River			X

Table 3.2.4.

Subsegments assessed for chloride, sulfate, and TDS and assigned to IRC 3 due to the suspected source of natural sources.

Subsegment	Subsegment Description	Chloride	Sulfates	Total Dissolved Solids
LA030806_00	Houston River-From Bear Head Creek at LA-12 to West Fork Calcasieu River	X	X	X
LA031101_00	Intracoastal Waterway-From Calcasieu Lock to East Calcasieu River Basin boundary	X	X	X
LA040201_00	Bayou Manchac-From headwaters to Amite River	X	X	X
LA040303_00	Amite River-From Amite River Diversion Canal to Lake Maurepas	X		X
LA040304_00	Grays Creek-From headwaters to Amite River	X	X	X
LA040402_00	Amite River Diversion Canal-From Amite River to Blind River	X		
LA040502_00	Tickfaw River-From LA-42 to Lake Maurepas	X	X	X
LA040505_00	Ponchatoula Creek and Ponchatoula River			X
LA040603_00	Selsers Creek-From headwaters to South Slough			X
LA040604_00	South Slough; includes Anderson Canal to I-55 borrow pit	X		X
LA040702_00	Tangipahoa River-From I-12 to Lake Pontchartrain	X	X	X
LA040803_00	Tchefuncte River-From LA-22 to Lake Pontchartrain (Estuarine)	X		X
LA040901_00	Bayou Lacombe-From headwaters to US-190 (Scenic)	X	X	X
LA040902_00	Bayou Lacombe-From US-190 to Lake Pontchartrain (Scenic) (Estuarine)	X	X	X
LA040903_00	Bayou Cane-From headwaters to US-190 (Scenic)	X	X	X
LA040905_00	Bayou Liberty-From headwaters to LA-433	X	X	X
LA040907_00	Bayou Bonfouca-From headwaters to LA-433	X	X	X
LA041101_00	Bonne Carre Spillway	X	X	X

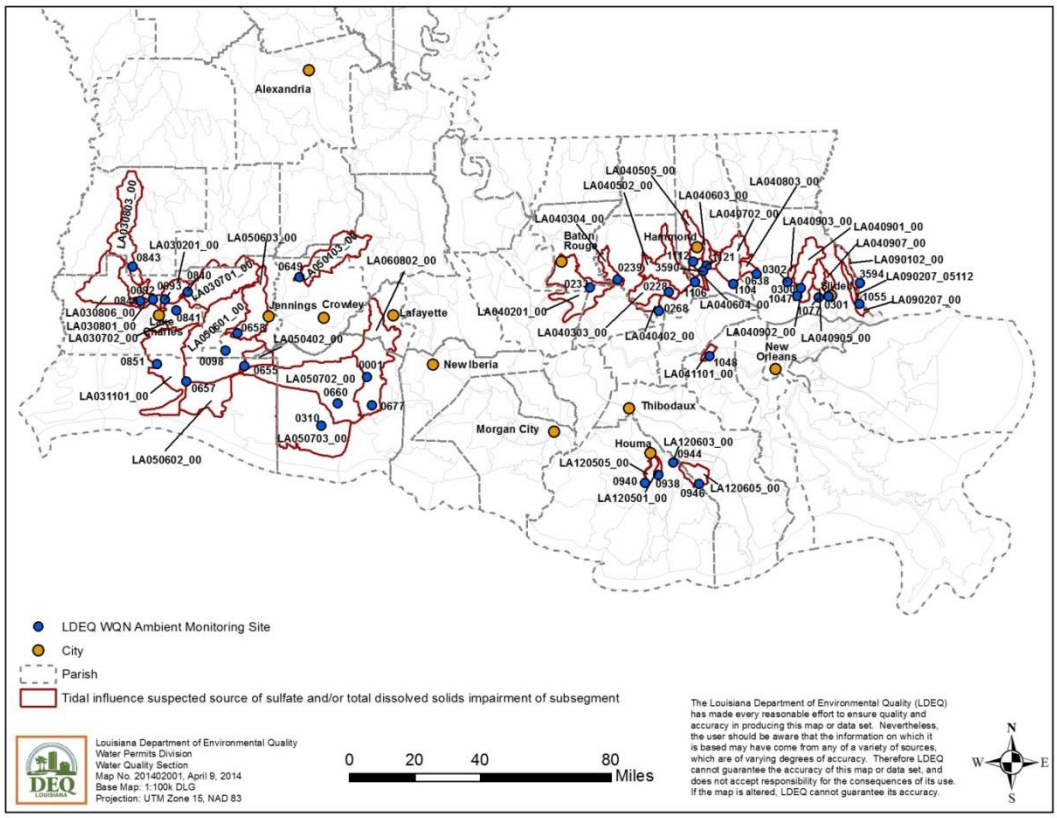
Table 3.2.4.

Subsegments assessed for chloride, sulfate, and TDS and assigned to IRC 3 due to the suspected source of natural sources.

Subsegment	Subsegment Description	Chloride	Sulfates	Total Dissolved Solids
LA050103_00	Bayou Mallet-From headwaters to Bayou Des Cannes			X
LA050402_00	Lake Arthur and Lower Mermentau River to Grand Lake	X	X	X
LA050601_00	Lacassine Bayou-From headwaters to Grand Lake	X	X	X
LA050602_00	Intracoastal Waterway-From Calcasieu Basin Boundary to Mermentau River	X	X	X
LA050603_00	Bayou Chene-From headwaters to Lacassine Bayou; includes Bayou Grand Marais		X	
LA050702_00	Intracoastal Waterway-From Mermentau River to Vermilion Locks	X	X	X
LA050703_00	White Lake		X	
LA060802_00	Vermilion River-From LA-3073 bridge to ICWW			X
LA090102_00	East Pearl River-From Holmes Bayou to I-10	X	X	X
LA090207_00	Middle Pearl River and West Middle Pearl River-From West Pearl River to Little Lake	X	X	X
LA090207_5112	Morgan Bayou-From headwaters near I-10 to Middle Pearl River	X	X	X
LA120501_00	Bayou Grand Caillou-From Houma to Bayou Pelton	X		X
LA120505_00	Bayou Du Large-From Houma to Marmande Canal	X		X
LA120603_00	Company Canal-From ICWW to Bayou Terrebonne	X		X
LA120605_00	Bayou Pointe Au Chien-From headwaters to St. Louis Canal	X	X	X

Figure 3.2.4.

Subsegments and ambient monitoring sites exhibiting tidal influence resulting in the suspected causes of chlorides, sulfates, and/or total dissolved solids. Suspected causes placed in IRC 3 due to the suspected source of natural sources.



7. Consolidation of Suspected Causes of Turbidity, Total Suspended Solids, and Sedimentation/Siltation

Based on discussion with and agreement from USEPA Region 6, LDEQ consolidated all suspected causes of turbidity, total suspended solids (TSS), and sedimentation/siltation (SS) under the single suspected cause category of turbidity. Because all three suspected causes represent the same potential for impairment of FWP and are addressed using a common TMDL, this consolidation does not affect water quality protection activities. As a result, all previous suspected causes of TSS and SS, regardless of IR Category, have been changed to turbidity in the 2014 IR.

8. External Data and Information

LDEQ's routine ambient monitoring data (described above) provided the primary set of data and information used for water quality assessments and listing decisions. However, LDEQ also used external data sets and information.

LDEQ used LDHH fishing and swimming advisory information and enterococci and fecal coliform bacteria data sets collected for the state's Beach Monitoring Program. For water bodies within a subsegment with fish consumption or swimming advisories, the

advisory water body was also named in the 2014 IR. Impairments of this nature are water body-specific issues not directly related to the overall subsegment.

LDEQ evaluated the LDHH beach monitoring data based on the federally-promulgated enterococci criteria for Louisiana and used by LDHH for determining beach closures. LDHH uses a single sample criterion of 104 MPN/100 ml. For marine waters, a geometric mean > 35 MPN/ 100 ml over the period of record used for the IR results in an impairment. Fecal coliform data collected as part of LDHH's beach monitoring was evaluated using LDEQ's standard assessment rule of 25%. Under this rule, if more than 25% of samples exceed 400 MPN/100 ml over the period of record used for the IR, then an impairment for fecal coliform is reported. Duplicate samples in the dataset were treated as QC samples and were not averaged with the target sample to keep evaluation methods consistent with LDEQ protocol.

Finally, LDEQ solicited data and information from the public. LDEQ published a request for data and information during a 30-day public notice period which ended October 25, 2013. As a result of the public request for data, additional water quality data was provided by Lake Pontchartrain Basin Foundation (LPBF). Assessment results based on LPBF data were incorporated into LDEQ's routine assessments where differences between the two occurred. All data considered for assessment purposes were required to meet quality assurance/quality control (QA/QC) procedures comparable to LDEQ's Ambient Monitoring QAPP (LDEQ 2013c). External data sets are available upon request.

Rationale for Not Using Readily Available Data and Information

In accordance with LDEQ's QAPP for the AWQMN (LDEQ 2013c) approved by USEPA-Region 6, LDEQ required at least five data points for parameters collected monthly and a minimum of three data points for parameters collected quarterly; otherwise, insufficient data were available for assessment purposes. LDEQ conducted additional evaluations of data sets to determine usability in accordance with standard operating procedures (LDEQ 2013d) and data quality objectives outlined in the QAPP cited above. Data quality issues that may have necessitated qualifications to data sets resulting in limited and/or no usability include, but are not limited to: limited geospatial data and/or representativeness; limited temporal data and/or representativeness; limited quality control data; and quality control data indicating data that are of limited use (e.g., blank contamination, incorrect laboratory procedures).

Good Cause for Not Listing Waters

In accordance with CWA §303(d) and federal regulations, LDEQ listed waters as impaired and requiring TMDL development (IRC 5 or IRC 5RC; see Table 3.2.1) if sufficient data of appropriate quality were available. Previously, USEPA listed three coastal Louisiana subsegments on Louisiana's 2008, 2010, and 2012 §303(d) lists of impaired waters. LDEQ determined that the core data set used by USEPA for listing the coastal subsegments in 2008, 2010, and 2012 was insufficient. Additional reasons LDEQ did not list the coastal subsegments included: (1) USEPA and LDEQ agree that stratified DO criteria should be investigated for Louisiana coastal waters; (2) the area of the subsegments encroached upon by the Gulf of Mexico hypoxic zone is minimal; (3) NOAA reports indicate excellent coastal fisheries in

Louisiana; (4) USGS studies indicate the three Louisiana coastal subsegments have negligible impact on the Gulf of Mexico hypoxic zone; (5) TMDL development for those coastal subsegments will not resolve the Gulf hypoxia issue; and (6) addressing Gulf hypoxia will, at a minimum, require a multi-state and regional effort.

For the 2014 IR, LDEQ determined sufficient data is lacking to list the three coastal subsegments of LA021102_00 (Barataria Basin Coastal Bays and Gulf Waters to the State three-mile limit), LA070601_00 (Mississippi River Basin Coastal Bays and Gulf Waters to the State three-mile limit), and LA120806_00 (Terrebonne Basin Coastal Bays and Gulf Waters to the State three-mile limit) as not supporting the FWP use due to low DO levels. During preparation of the 2014 IR, no new data of sufficient temporal or spatial detail was found to permit a new assessment of these subsegments or other Gulf Coastal subsegments to the State three-mile limit. Details of the rationale for this decision can be found in the 2012 IR at: http://www.deq.louisiana.gov/portal/DIVISIONS/WaterPermits/WaterQualityStandardsAssessment/WaterQualityInventorySection305b/2012IntegratedReport.aspx. As with the 2012 IR, these three subsegments have been placed in IRC 3 (i.e., insufficient data) for low DO.

Coastal Subsegments Affected by Oil Spill and/or Cleanup Activities

On April 20, 2010, BP's Deepwater Horizon drilling rig operating in the Gulf of Mexico approximately 50 miles off the Mississippi River delta exploded and sank. This triggered an oil spill from the damaged riser at the bottom of the Gulf that continued until August 4, 2010 when a static kill procedure effectively closed the well. The well was then cemented and permanently closed by September 19, 2010. The resulting oil spill affected a large portion of Louisiana's coastline. LDEQ and other agencies continue to analyze the impact of the spill on Louisiana's coastal waters. Results of this analysis will be presented in future reports by LDEQ as well as by other national and state agencies and academic researchers.

For the 2012 IR, LDEQ estimated that 42 coastal area subsegments were impaired by the oil spill and associated cleanup activities. LDEQ assessed these subsegments as being potentially and/or temporarily impaired for FWP, OYS, and/or PCR. The suspected impairments were based on fish, crab, shrimp, and shellfish closures issued by LDWF and LDHH, as well as Shoreline Cleanup Assessment Team (SCAT) surveys of the region. Closure information was taken from the ERMA Gulf Response Website (National Oceanic and Atmospheric Administration (NOAA) 2010).[1]

[1] Disclaimer: The analysis of water quality contained in this report does not rely on information collected as part of the Deepwater Horizon Natural Resource Damage Assessment (NRDA), and is not intended to analyze impacts resulting from the Deepwater Horizon oil spill and related response for NRDA purposes.

1. Fish and Wildlife Propagation and Oyster Propagation Uses

During development of the 2014 IR, LDEQ reviewed LDWF and LDHH fishing and oyster closure areas to determine if oil spill-related closures remain in effect. This review identified four limited portion (partial) subsegments that remain affected by LDWF and LDHH commercial fishing closures for finfish, shellfish, and oysters. These are identified in Table 3.2.5. Therefore, the suspected impairments of FWP and OYS uses associated

with the oil spill and originally reported in the 2012 IR remain in effect for these four limited portion subsegments. All other spill-related FWP and OYS impairments reported in the 2012 IR have been changed to full support due to lifting of the LDWF and LDHH fishing closures. Refer to the LDWF Oil Spill Response website for full details on the revised fishing closures (http://www.wlf.la.gov/oilspill).

Unlike with the 2012 IR, these assessments represent only specific and limited portions of full subsegments. This process is similar to what is done for some fish consumption advisory-based assessments that do not affect the entire subsegment. The four remaining spill-related FWP and OYS use impairments will continue to be placed in IRC 4b. These suspected causes will be reevaluated for the 2016 IR based on future LDWF and LDHH commercial fishing closures. The four limited portion subsegments are shown in Figure 3.2.5.

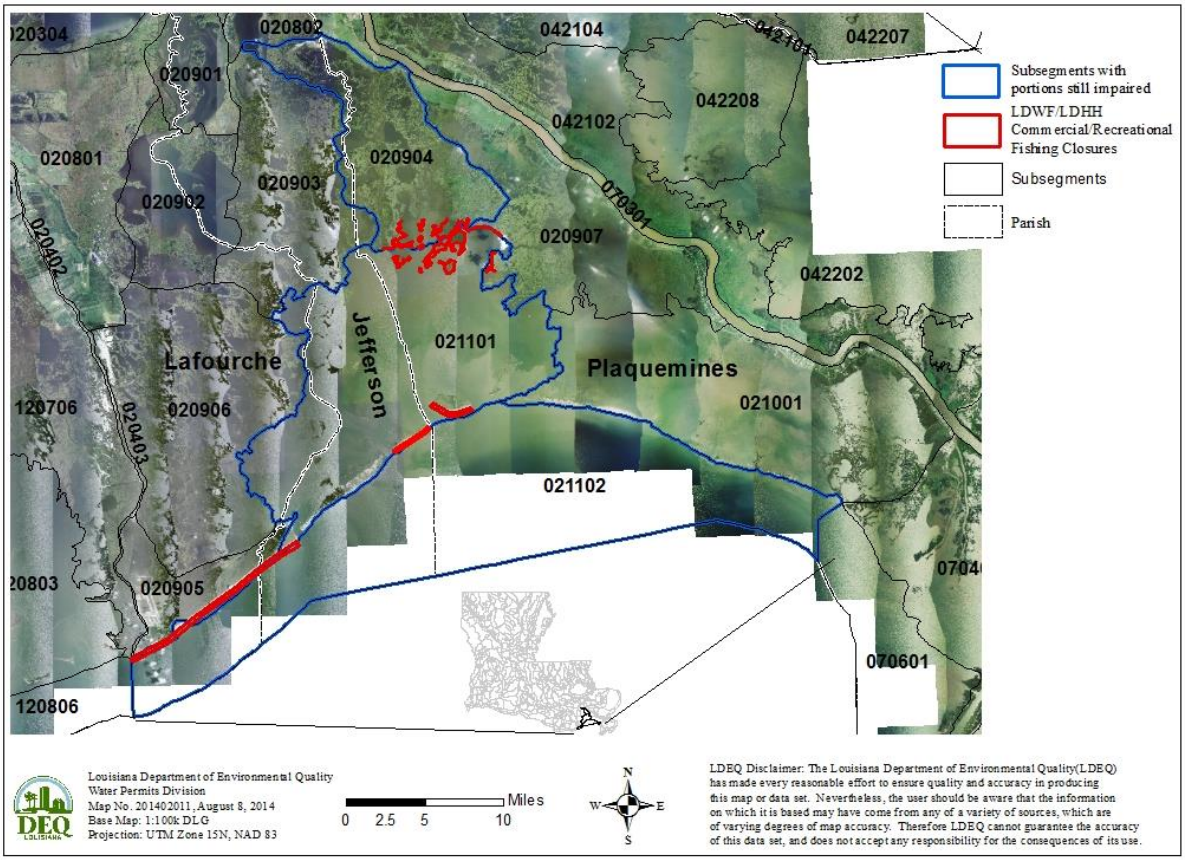
Table 3.2.5.

Partial subsegments suspected of impairment to fish and wildlife propagation and oyster propagation uses due to Louisiana Department of Wildlife and Fisheries and Louisiana Department of Health and Hospitals commercial and recreational fishing closures related to impacts from the Deepwater Horizon oil spill.

Partial Subsegment Number	Partial Subsegment Description
LA020904_001	Shoreline and open water areas within 100 yards of bay shores and unnamed islands within Wilkinson Bay and Bay Chene Fleur, located in southern area of LA020904_00
LA021101_002	Shoreline and open water areas within 100 yards of bay shores and unnamed islands in northern Barataria Bay near Bay Jimmy, Wilkinson Bayou, and Bay Batiste, located in northern area of LA021101_00
LA021101_003	Shoreline and seaward open water areas within 0.25 mile of Grand Terre East Island along Gulf of Mexico, located in southern area of LA021101_00
LA021102_001	Shoreline and seaward open water areas within 0.25 mile of Grand Terre West Island and Elmer's Island along Gulf of Mexico, located in northwest portion of LA021102_00

Figure 3.2.5.

Partial subsegments classified in 2014 Integrated Report category 4b for fish and wildlife use and oyster propagation use due to 2010 Gulf of Mexico oil spill.



To better reflect current conditions in these subsegments, the suspected causes of impairment will be changed to the following:

Cause Name	**Cause Description**
Fish Advisory-Commercial Fishing Restrictions	Restrictions on the taking of any species of finfish or shellfish for commercial purposes from waters within a closed area. The possession, sale, barter, trade or exchange of any finfish, shellfish, or other aquatic life from closed areas during the closure is prohibited.
Residual Surface and Sub-surface Oil/Tar Balls/Tar Mats	Remnant oil, tar balls, or tar mats remaining on shoreline/intertidal areas following past open water oil spills.

The suspected source will be changed to the following:

Source Name	Source Description
Accidental Release/Spill/Petroleum/ Natural Gas Well	Accidental release/spill: Unintentional release of a substance/pollutant from a petroleum/natural gas well to the surrounding environment

2. Primary Contact Recreation

Among the 42 subsegments first reported as impaired due to oil spill impacts in the 2012 IR, LDEQ identified 22 subsegments for suspected impairment of the designated use of PCR. Suspected PCR impairments were based on the location of SCAT oiling observations found on the ERMA Website (NOAA 2010).

For the 2014 IR, LDEQ evaluated the latest SCAT and monitoring plans for the region. Based on this review, a total of 23 limited portions of subsegments have been assessed as being potentially and/or temporarily impaired for PCR. Unlike with the 2012 IR these assessments represent only specific and limited portions of full subsegments. This process is similar to what is done for some fish consumption advisory-based assessments that do not affect the entire subsegment. Table 3.2.6 contains the list of these partial subsegments. The portions of subsegments identified in Table 6 are areas found to still have oil, tar mats, or tar balls present. The areas of the subsegments affected are shown in Figure 3.2.6. The full subsegments are assessed based on routine ambient monitoring data or in some cases other information. As with the previously reported FWP and OYS impairments, these 23 portions of subsegments have been placed in IRC 4b. These suspected causes will be reevaluated for the 2016 IR based on future Natural Resource Damage Assessment (NRDA) or other surveys of the area.

Other water quality impairments in the impacted region not related to the oil spill may or may not still be present on these subsegments. These will be handled according to normal IR procedures.

Table 3.2.6.

Partial subsegments suspected of impairment to primary contact recreation use due to ongoing indications of oiling based on SCAT surveys following the Deepwater Horizon oil spill.[1]

Partial Subsegment Number	Partial Subsegment Description
LA020904_001	Shoreline and open water areas within 100 yards of the bay shores and unnamed islands within Wilkinson Bay and Bay Chene Fleur, located in southern area of LA020904_00
LA020907_001	Shoreline of northern end of Bay Batiste, located along southwest side of LA020907_00
LA021001_001	Shoreline of Bay La Mer and Chaland Pass, both located in southwest corner of subsegment LA021001_00

Table 3.2.6.

Partial subsegments suspected of impairment to primary contact recreation use due to ongoing indications of oiling based on SCAT surveys following the Deepwater Horizon oil spill.[1]

Partial Subsegment Number	Partial Subsegment Description
LA021101_001	Shoreline of southwest Beauregard Island, and Grand Terre Islands in Barataria Bay, both located in southwest area of LA021101_00
LA021101_002	Shoreline and open water areas within 100 yards of bay shores and unnamed islands in northern Barataria Bay near Bay Jimmy, Wilkinson Bayou, and Bay Batiste, located in northern area of LA021101_00
LA021102_001	Shoreline and seaward open water areas within 0.25 mile of Grand Terre West and Elmer's Island along Gulf of Mexico, located in northern area of LA021102_00
LA042201_001	Shoreline of Comfort and unnamed islands. Includes Chandeleur Sound side of Chandeleur Islands, located within LA042201_00
LA042203_001	Shoreline of unnamed islands between West Karako Bay and Chandeleur Sound, located along northeast edge of LA042203_00
LA042204_001	Shoreline of unnamed islands south and north of Drum Bay, located along eastern edge of LA042204_00
LA042205_001	Shoreline of Comfort Island, located along eastern edge of LA042205_00
LA042206_001	Shoreline of Garden Island north of Mississippi River Gulf Outlet, located along southwest side of LA042206_00
LA042208_001	Shoreline of Grise Bourbe Island, located in northern area of LA042208_00
LA042209_001	Shoreline of Chandeleur Sound on Gulf side of islands, located along western side of LA042209_00
LA070401_001	Shoreline of unnamed islands between North Pass and Pass a Loutre (Middle Ground), located on eastern side of LA070401_00
LA070601_001	Shoreline of unnamed islands in East Bay, west of South Pass, located on south central side of LA070601_00
LA120704_001	Shoreline of unnamed islands and marshes north of Bayou Bourbeaux and Oyster Bayou, located at southern end of LA120704_00
LA120706_001	Shoreline of unnamed islands in northern end of Lake Raccourci and Deep Lake, located in southern area of LA120706_00
LA120708_001	Approximately 2.6 miles portion of Gulf shore east of Oyster Bayou in southeast corner of LA120708_00
LA120801_001	Shoreline of Raccoon Island and Isles Derniers, located on southern edge of LA120801_00
LA120802_001	Gulf side shoreline of Timbalier Island, located in southeast area of LA120802_00
LA120803_001	Shoreline of Timbalier Island, Caillou Island, Calumet Island and Casse Tette Island, located in southern area of LA120803_00
LA120805_001	Shoreline of Trinity Island and East Island in Isle Dernier chain, located in southern area of LA120805_00

Table 3.2.6.

Partial subsegments suspected of impairment to primary contact recreation use due to ongoing indications of oiling based on SCAT surveys following the Deepwater Horizon oil spill.[1]

Partial Subsegment Number	Partial Subsegment Description
LA120806_001	Gulf side shoreline of Timbalier Islands, located in northern area of LA120806_00

1. These units were added for Deepwater Horizon spill monitoring and assessment purposes only and are not subsegments as defined by LAC 33:IX.1123.A. et seq. No other assessments were made for these water bodies.

To better reflect current conditions in these subsegments, the suspected cause of impairment will be changed to the following:

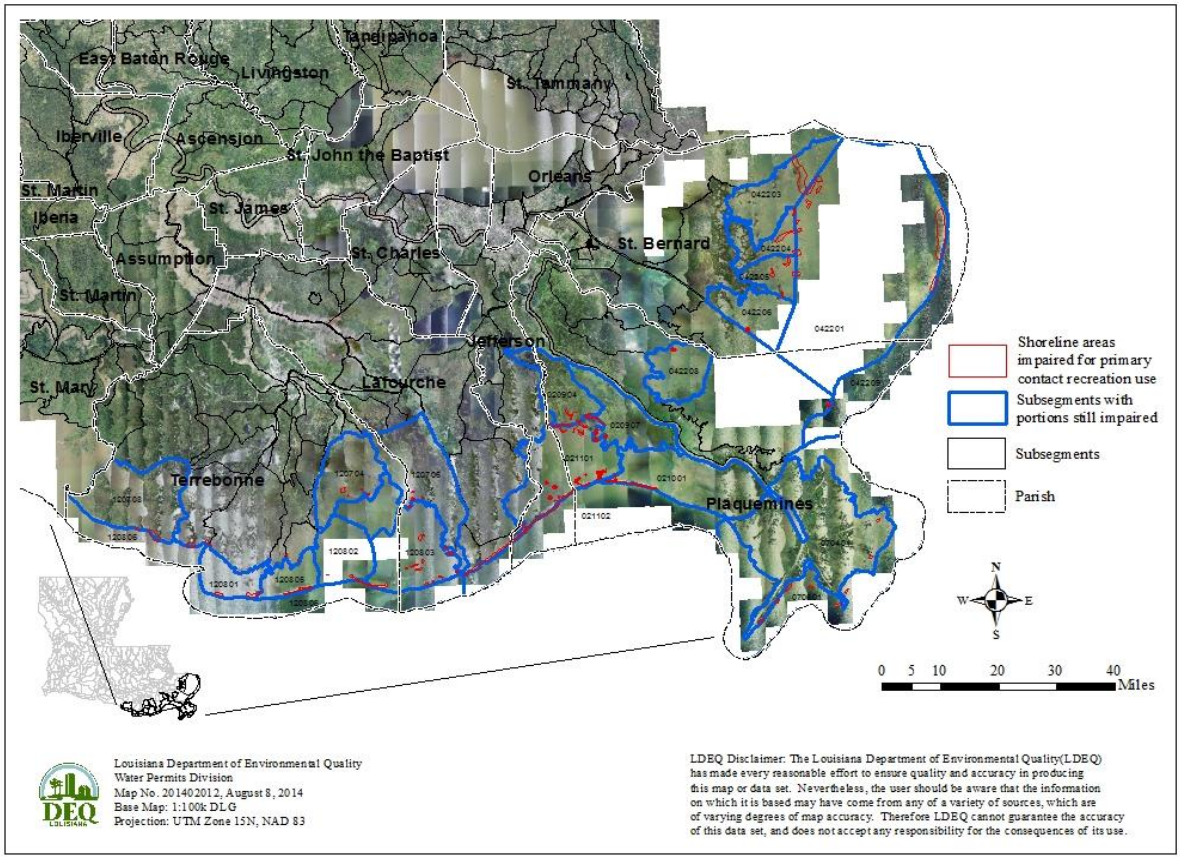
Cause Name	Cause Description
Residual Surface and Sub-surface Oil/Tar Balls/Tar Mats	Remnant oil, tar balls, or tar mats remaining on shoreline/intertidal areas following past open water oil spills.

The suspected source will be changed to the following:

Source Name	Source Description
Accidental Release/Spill/Petroleum/ Natural Gas Well	Accidental release/spill: Unintentional release of a substance/pollutant from a petroleum/natural gas well to the surrounding environment

Figure 3.2.6.

Partial subsegments classified in 2014 Integrated Report category 4b for primary contact recreation use due to 2010 Gulf of Mexico oil spill.



Suspected Sources of Impairment

In addition to the use of water quality data in making assessments, LDEQ, Office of Environmental Compliance (OEC), Inspection Division (ID) staff familiar with local watershed conditions and activities provided input regarding significant suspected sources of impairment. Inspection Division staff also provided input in cases where natural sources were potentially causing criteria exceedances. If criteria exceedances were suspected by the ID staff to be due to natural sources (not man-altered or man-induced), then the subsegment was placed in IRC 3 (insufficient data); see Table 3.2.1). In such cases, LDEQ will evaluate the need for a UAA or other water quality survey for potential criteria revision.

Integrated Report Category Determination

LDEQ made a preliminary determination of IR categorization (Table 3.2.1) based on statistical assessment of criteria exceedances and subsequent determination of a water body's designated use support (Table 3.2.2). LDEQ used additional information such as previous TMDL development (IRC 4a), insufficient data determinations (IRC 3), environmental events (e.g.,

hurricanes, oil spill) (IRC 3 or 4b), remediation activities (IRC 4b), and suspected sources of impairment to determine appropriate IR categories. Multiple IR categories may be assigned to a single subsegment which has multiple criteria for multiple uses.

As noted above, LDEQ placed subsegments LA021102_00, LA070601_00, and LA120806_00 in IRC 3 (insufficient data; see Table 3.2.1) because there is not indisputable evidence that the FWP use is not supported and due to a lack of consistent spatially and temporally representative data (see Good Cause for Not Listing Waters). IR Category 3 was also used for subsegments with potential nutrient enrichment concerns. Listings for nitrate/nitrite nitrogen and total phosphorus were historically based on evaluative assessments. However, the evaluative assessments were based on best professional judgment with no supporting data analysis. LDEQ is currently coordinating with USEPA to collect data that will inform the nutrient standards development and/or revision processes and allow more appropriate assessments in the future.

As noted in Section 6, above, several water body impairment combinations for minerals were placed in IRC 3 due to tidal influences with the suspected source of "Natural Sources."

Total Maximum Daily Load Prioritization

In accordance with CWA §303(d), states are required to prioritize for TMDL development those waters impaired by a pollutant *and still requiring a TMDL*. LDEQ placed such subsegments and suspected impairments in IRC 5 or IRC 5RC ("On the §303(d) list."). TMDL development by LDEQ is currently focused on *revising* existing TMDLs for those water body impairment combinations (WICs) where TMDLs have already been developed but criteria have recently been revised. LDEQ is also working to implement USEPA's new §303(d)/TMDL Vision guidance protocols. Prioritization of TMDL development for new and revised TMDLs based on the §303(d)/TMDL Vision will be provided in the 2016 IR.

Based on the preceding discussion, WICs in IRC 5 or IRC 5RC were given a low or medium priority ranking for the 2014 IR. These impairments will be addressed for TMDL development as time permits or if significant new concerns arise. Prioritization of TMDL development for *only* those §303(d) listed impairments (IRC 5 or IRC 5RC) are as follows:

- WICs listed in IRC 5 with suspected impairments due to fecal coliforms were given medium priority for TMDL development.
- WICs listed in IRC 5 based on LDHH beach monitoring data for enterococci bacteria impairments were assigned low priority to allow LDEQ time to coordinate with USEPA on source and epidemiological studies.
- WICs listed in IRC 5 or IRC 5RC for the following suspected impairments were assigned low priority due to the non-critical nature of the impairments or due to uncertainty regarding the validity of the suspected impairment (e.g., natural conditions, lack of apparent anthropogenic sources, sources outside the scope of TMDL development):
    - Low or high pH
    - Metals
    - Chlorides, sulfates, total dissolved solids
    - Temperature
    - Turbidity
    - Mercury in fish tissue (primary source is regional/global atmospheric deposition)

SUMMARY

The 2014 IR §303(d) list represents a compilation of primarily four different sources of information: (1) the 2012 IR; (2) new data assessments for all 12 Louisiana basins with monitoring data (internal and external) between October 2009 and September 2013; (3) all recent TMDL activities occurring during or after development of the 2012 §303(d) list; and (4) all water bodies under new or existing fish consumption or swimming advisories. It is important to note that removal of a water body from the §303(d) list, for any reason, does not remove water quality protections from that water body. All water bodies in Louisiana, listed or not listed, are subject to the same protections under federal and state laws and regulations, in particular the CWA and Louisiana's surface water quality standards (LAC 33:IX.Chapter 11). LDEQ will continue to monitor and assess the quality of Louisiana's waters; permitted facilities are subject to conditions of their permits; unpermitted point source dischargers are required to obtain a permit or face enforcement actions; violators of permit conditions are subject to enforcement action; and contributors to nonpoint sources of pollution are encouraged to follow BMPs as developed by LDEQ's Nonpoint Source Program and its many collaborators.

Integrated Report Category 4b Documentation

Introduction

Integrated Report Category 4b was used for water body impairment combinations (WICs) where a TMDL is not required or appropriate as a corrective mechanism for improving water quality (Table 3.2.1). USEPA requires well documented justification for placement of a WIC in IRC 4b. The following sections outline the water bodies and subsegments categorized as IRC 4b and information to address EPA's six factors to provide sufficient documentation to place in 4b (USEPA, 2002, USEPA 2005, USEPA 2006).

Bayou Bonfouca, Subsegments LA040907_00 and LA040908_00

1) Identification of Subsegment and Statement of Problem Causing Impairment

Subsegment Description

Bayou Bonfouca (subsegments LA040907_00, Hydrological Unit Code (HUC) 08090201 and LA040908_00, HUC 08090201) is a navigable waterway in St. Tammany Parish in southeastern Louisiana. It flows south for seven miles into Lake Pontchartrain.

Impairment and pollutant causing impairment

Bayou Bonfouca is listed in Louisiana's 2014 Water Quality IR as not fully supporting the primary contact recreation designated use as a result of suspected benzo(a)pyrene (PAHs) impairments. In 1987, LDHH and LDEQ issued an advisory against swimming in and consumption of fish from Bayou Bonfouca (revised 1998). Bayou Bonfouca is currently under an informational health advisory for no swimming or sediment contact (http://new.dhh.louisiana.gov/assets/oph/Center-EH/envepi/fishadvisory/Documents/Other_Chemical_Advisories_Complete_List.pdf and http://www.deq.louisiana.gov/portal/Portals/0/planning/Fish%20Consumption%20Advisory%20Table%20-%202-18-09.pdf).

Sources of pollutant causing impairment

In 1970, several thousand cubic yards of creosote spilled into Bayou Bonfouca and onto an adjacent land area following a fire and tank explosion at the American Creosote Works plant. The creosote plant had been operating for almost 100 years prior to its closure after the fire. The site is within the designated 100-year flood plain of the bayou. Legacy contamination is summarized at:
http://www.epa.gov/region6/6sf/pdffiles/bayou-bonfuca-la.pdf.

In 1976, the U.S. Coast Guard undertook an investigation of the Bayou Bonfouca waterway. This was supplemented by another study in 1978 by USEPA, the Coast Guard, and NOAA. Principal pollutants found at the site were creosote compounds, chemicals composed mostly of PAHs and commonly used as wood preservatives.

Bayou Bonfouca received final placement on the USEPA Superfund National Priorities List (NPL) in 1983 as a result of contamination by creosote. The NPL is a list of hazardous waste sites eligible for investigation and cleanup under the federal Superfund Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program. Approximately 1.5 miles of Bayou Bonfouca were left biologically sterile due to severe creosote contamination. The Bayou Bonfouca Superfund site, located in Slidell, Louisiana on the north shore of Lake Pontchartrain, includes the former American Creosote Works Plant and a portion of Bayou Bonfouca. Bayou Bonfouca forms the southern boundary of the site.
Subsegments LA040907_00 and LA040908_00 were on the 1998 and 1999 court-ordered 303(d) lists and subsequently on the 2002 Consent Decree 303(d) List for priority organics and other impairments.

2) Description of Pollution Controls and How They Will Achieve Water Quality Standards

Water quality target

Since impairment of Bayou Bonfouca is based on an informational health advisory issued by LDHH for no swimming or sediment contact, the water quality target will be achieved when the informational health advisory is rescinded.

Controls that will achieve Water Quality Standards

Beginning in January 1996, USEPA and LDEQ initiated work to correct the contamination at the Bayou Bonfouca Superfund site, including Bayou Bonfouca, under provisions of the federal Superfund program. USEPA and LDEQ jointly provided funds for cleanup of the site, with USEPA as lead agency in charge of remediation. Remediation of the abandoned facility involved the dredging of over 170,000 cubic yards of contaminated sediments from Bayou Bonfouca and removal of 8,000 cubic yards of surface waste materials. The selected remediation and disposal methods for the contaminated site included: excavation; capping the site; incineration of creosote waste piles and heavily contaminated bayou sediment; and pumping, treating, and monitoring contaminated groundwater. A design phase for groundwater remediation was completed in October 1989, and the *in situ* operation began in mid-1991. In November 1993, a cleanup contractor moved an incinerator to the site and completed a trial burn. In early 1994, excavation and incineration of the contaminated sediments was initiated. The ash was placed under a Resource Conservation and Recovery Act (RCRA) landfill cap onsite, and incineration was completed in the summer of 1995. No further surface water remediation is expected.

The second phase of remediation addresses dense nonaqueous phase liquids (DNAPLs) in the surficial aquifer. A statutory Five-Year Review Report of groundwater cleanup activity was completed in September 1996 (http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=3513215&ob=yes&child=yes).

Recommendations included continued groundwater recovery and treatment and an evaluation of treatment performance. In September 1997, USEPA made modifications in the groundwater recovery and treatment process to protect the integrity of the Source Control remedy based on a Performance Evaluation Report. In the spring of 2000, additional groundwater remedial activity began, and additional groundwater recovery wells were installed.

Descriptions of requirements under which pollution controls will be implemented

A Record of Decision (ROD) signed in March 1987 outlined a selected remediation plan for the Bayou Bonfouca Superfund site including bayou dredging, onsite incineration, and groundwater treatment. In June 1988, it was discovered that the extent and depth of the contamination was greater than previously estimated. The original ROD was amended under the "February 1990 Explanation of Significant Difference" (http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=542710&ob=yes&child=yes).

On July 10, 2001, a second Five-Year Review Report was signed by USEPA (http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=3513177&ob=yes&child=yes), and LDEQ took over operations and maintenance at the site. As of December 2013, the Bayou Bonfouca site was in the continuing Operation and Maintenance phase of remediation. Under this phase, groundwater pumping and monitoring will continue for the foreseeable future.

Remediation activity documents are available in LDEQ's Electronic Data Management System (EDMS), including:

- Final Operation and Maintenance Plan Bayou Bonfouca Superfund Site, Slidell, Louisiana: http://www.deq.louisiana.gov/portal/Portals/0/remediation/Bayou-Bonfouca-Op-Maint-Plan.pdf
- Document ID 1496071 – Final Operation and Maintenance Addendum Bayou Bonfouca Superfund Site, Slidell, Louisiana: http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=1496071&ob=yes&child=yes
- Document ID 2186669 – Final Field Sampling Plan: http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=2186669&ob=yes&child=yes
- Document ID 671442 – Final Design: http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=671442&ob=yes&child=yes
- Document ID 2186671 – Final Contractor Quality Control Plan: http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=2186671&ob=yes&child=yes

3) Estimate or Projection of the Time When Water Quality Standards Will Be Met

Between January 2001 and April 2011, LDEQ conducted routine ambient water quality sampling on Bayou Bonfouca at site 0301 in Slidell (approximately one mile downstream from the remediation area) and site 1078 (approximately 4.4 miles downstream from the remediation area). During this sample period, 31 organic compounds were analyzed resulting

in 638 analytical results. Of these samples, only six results were above detection levels. The parameters detected included chloromethane (two detections), toluene (one detection), and methylene chloride (three detections). None of the detections exceeded LDEQ's water quality criteria. All other results were at or below detection levels.

In addition, a review of USEPA's online Superfund Information System found that none of the contaminants in question were reported to be of concern in surface water or terrestrial areas of the Bayou Bonfouca site (http://cfpub.epa.gov/supercpad/cursites/csitinfo.cfm?id=0600574).

4) Schedule for Implementing Pollution Controls

As of December 2013, the Bayou Bonfouca site was in the continuing Operation and Maintenance phase of remediation. USEPA and LDEQ continue to review the operation and maintenance of the groundwater pumping and treatment of creosote oil. Under this phase, groundwater pumping and monitoring will continue for the foreseeable future. The groundwater treatment continues to reduce the volume of contaminated groundwater and prevent migration.

5) Monitoring Plan to Track Effectiveness of Pollution Controls

Monthly operational reports are submitted to USEPA for review and comment (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=9195909&ob=yes&child=yes for the latest monthly report—January 2014).

LDEQ will continue routine surface water quality monitoring of Bayou Bonfouca to ensure protectiveness of remedial actions.

6) Commitment to Revise Pollution Controls, As Necessary

LDEQ Water Quality Program is committed to continuing ambient water quality monitoring as part of the routine monitoring program. In addition, LDEQ Remediation Services is committed to the continuing Operation and Maintenance phase of remediation as outlined in the July 2011 Five-Year Review Report (see http://www.epa.gov/superfund/sites/fiveyear/f2011060004128.pdf).

Bayou Olsen/Olsen Bayou, Subsegment LA030304_001

1) Identification of Subsegment and Statement of Problem Causing Impairment

Subsegment Description

Bayou Olsen/Olsen Bayou (subsegment LA030304_001, HUC 08080206), is located in southwestern Louisiana and is located within the zone of tidal influence of the Gulf of Mexico. Bayou Olsen is approximately 0.5 mile long and lies within a larger water quality subsegment, Moss Lake (subsegment LA030304_00, HUC 08080206). Bayou Olsen is a tributary of Moss Lake.

Impairment and pollutant causing impairment

Bayou Olsen LA030304_001 is listed as impaired in Louisiana's 2014 Water Quality IR based on an LDEQ and LDHH swimming advisory limiting primary contact recreation. Bayou Olsen is listed as not fully supporting the Primary Contact Recreation and Fish and

Wildlife Propagation designated uses as a result of 1,1,2-trichloroethane, 1,2-dichloroethane, and chloroform. In 1989, LDEQ and LDHH issued an advisory against sediment contact and for fish/shellfish consumption limits
(reviewed 1994)
(http://www.deq.state.la.us/portal/Portals/0/planning/Fish%20Consumption%20Advisory%20Table%20-%202-18-09.pdf
and
http://new.dhh.louisiana.gov/assets/oph/Center-EH/envepi/fishadvisory/Documents/Other_Chemical_Advisories_Complete_List.pdf).

Sources of pollutant causing impairment

Adjacent to Bayou Olsen is the Carlyss Pit Remediation Site. The site was owned and operated by an independent disposal company from the late 1950s to 1971. During that time, waste materials, primarily liquid chlorinated hydrocarbons (LCH), were taken to the site and burned. Burning operations were subsequently discontinued, and the site was used for disposal of liquid wastes in surface impoundments or "ponds." In the past, Bayou Olsen received overflow from the waste ponds, which are located east of Highway 27 and 8.5 miles south of Sulphur, Louisiana.

VOCs were detected in Bayou Olsen sediments adjacent to the Carlyss Pit site. However, 2006 baseline surface water monitoring of Bayou Olsen implemented according to the LDEQ-approved Remedial Project Plan (RPP) for this site failed to demonstrate detectable levels of VOCs in the water column. Sampling was repeated in 2013 as described in *Bayou Sediments AOI Monitoring Report for 2013 Carlyss Pit #1 Site, Carlyss, Louisiana AI #7836* (Geosyntec, January 15, 2014
http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=9161181&ob=yes&child=yes). These data support the continued absence of site-related surface water impacts to Bayou Olsen from cross-media transfer of VOCs from the sediments.

2) Description of Pollution Controls and How They Will Achieve Water Quality Standards

Water quality target

For the primary contact recreation designated use, LAC 33:IX:1113.C.Table 1 specifies a 1,1,2-trichloroethane criterion of 6.9 µg/L for non-drinking water supply and a 1,2-dichloroethane criterion of 6.8 µg/L for non-drinking water supply.

For chloroform, LAC 33:IX:1113.C.Table 1 specifies a criterion of 70 µg/L for non-drinking water supply to protect for primary contact recreation.

For aquatic life protection, LAC 33:IX:1113.C.Table 1 specifies 1,1,2-trichloroethane criteria of 1,800 µg/L (acute) and 900 µg/L (chronic) for freshwater and brackish water; LAC 33:IX:1113.C.Table 1 specifies 1,2-dichloroethane criteria of 11,800 µg/L (acute) and 5,900 µg/L (chronic) for freshwater and 11,300 µg/L (acute) and 5,650 µg/L (chronic) for marine and brackish water.

For chloroform, LAC 33:IX:1113.C.Table 1 specifies criteria of 2,890 µg/L (acute) and 1,445 µg/L (chronic) for freshwater and brackish water and criteria of 8,150 µg/L (acute) and 4,075 µg/L (chronic) for marine water to protect aquatic life.

Water column results since at least 2006 have shown no detectable levels of VOCs in the Bayou Olsen water column; however, the advisory issued by LDHH remains in place. Additional sediment sampling and communication between LDEQ and LDHH will be required to lift the LDHH advisory and remove these compounds as suspected causes of impairment.

Controls that will achieve Water Quality Standards

Work began in June 1990 and was substantially completed by February 1992; approximately 1.5 million gallons of LCH were removed from the waste ponds. A Pond Closure Work Plan submitted to close the Carlyss Pit waste ponds was approved in May 1994. Work began in 1994 with the treatment of 6.9 million gallons of water from the Carlyss Pit waste ponds. Following water treatment, the waste ponds were filled with 185,000 cubic yards of clay and very low permeability soil. Subsequently the ponds were covered with clean topsoil, and vegetation was established. Natural attenuation of Bayou Olsen sediments was determined to be the best option for sequestration of remaining contaminants in the bayou. Reinforcement of the berm separating the former east pond from the bayou was completed in the fall of 2013.

Descriptions of requirements under which pollution controls will be implemented

An Interim Agreement was entered into by LDEQ on February 6, 1985 with Browning-Ferris Industries (BFI) and Conoco Inc. to perform work at the site. A preliminary Interim Remedial Action Plan was developed in August 1987 directing the companies to implement remedial activities, including removal of LCH from Bayou Olsen. In February 1990, BFI and Conoco, Inc. submitted the LCH Reclamation Work Plan, which was approved by LDEQ.

A Pond Closure Certification Report was submitted to LDEQ in October 1995. In February 1998, LDEQ indicated all companies had met all requirements for remediation of the site (http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=77580&ob=yes&child=yes.

LDEQ has approved a Monitored Natural Recovery as the remedy for the Bayou Sediments Area of Interest (AOI) (LDEQ letter dated November 30, 2007 http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=5985059&ob=yes&child=yes)

3) Estimate or Projection of the Time When Water Quality Standards Will Be Met

The Monitored Natural Recovery Remedy reduced potential ecological risks by allowing natural sedimentation to occur, thereby isolating the deeper sediments with higher concentrations of VOCs. Until data is available to indicate otherwise, LDEQ will continue to report this water body as impaired due to 1,1,2-trichlorethane, 1,2-dichloroethane, and chloroform. Future sampling data will be used to determine when the water body is fully supporting primary contact recreation uses.

4) Schedule for Implementing Pollution Controls

Remediation activities at the site have been completed.

5) Monitoring Plan to Track Effectiveness of Pollution Controls

Surface water monitoring is currently being implemented as described in the *Remedial Project Plan for Long-Term Monitoring of the Bayou Sediments AOI* (RPP, Geosyntec,

March 11, 2008) http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=3412809&ob=yes&child=yes that was approved by LDEQ in a letter dated April 9, 2008 http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=3443861&ob=yes&child=yes.

In addition to annual site inspections, surface water sampling was initially planned biennially, subject to LDEQ-approved schedule modifications. The next bayou sampling event is scheduled for 2014, as described in the report titled *Bayou Sediments AOI Monitoring Report for 2013, Carlyss Pit #1 Site, Carlyss, Louisiana* (Geosyntec, January 15, 2014) http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=9161181&ob=yes&child=yes that was approved by LDEQ in a letter dated February 13, 2014 http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=9186968&ob=yes&child=yes

According to the RPP of March 11, 2008, monitoring will be conducted until the remedial objectives for sediments have been attained and compliance with surface water quality standards demonstrated. Until such time as the impairment can be removed, IRC 4b remains the most suitable classification for the water body due to the known nature of the impairment and the ongoing remediation inspection actions described above.

The remediation site continues to be inspected on an annual basis, and an Annual Corrective Action Plan (CAP) System Report is submitted to LDEQ. The most recent report is available at: http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=8821681&ob=yes&child=yes.

6) Commitment to Revise Pollution Controls, As Necessary

No further controls are expected to be needed. As stated in the March 11, 2008 RPP, if monitoring results indicate that the remedial objectives will not be met or that the site is causing adverse impacts to the designated water use, then the [responsible parties] will review the cause for this and the appropriateness of the Monitored Natural Recovery Remedy and may propose enhancements or changes to the remedy, if required. All modifications to the RPP will be subject to LDEQ approval before implementation.

Capitol Lake, Subsegment LA070503_00

1) Identification of Subsegment and Statement of Problem Causing Impairment

Subsegment Description

Capitol Lake (subsegment LA070503_00, HUC 08070201) is a small manmade lake formed between 1901 and 1908 when the lower reach of Grass Bayou was dammed approximately 0.25 mile east of the Mississippi River. The lake is located in downtown Baton Rouge adjacent to the State Capitol and the Governor's Mansion. It has a surface area of approximately 60 acres, and its depth varies from one foot in the northern arm to a maximum of eight feet in the southwestern arm. The average depth ranges between four and six feet. Capitol Lake drains an area of approximately 4.5 square miles, consisting primarily of residential, commercial and industrial land uses. The lake receives drainage from two unnamed canals, which are subsurface storm sewers in their upper reaches. At the southwest end of the lake, there is a pumping station, which is the only outlet for the lake. The East Baton Rouge City Parish government operates this pumping station. It is usually turned on

only during storm events and discharges to the Mississippi River. Thus, Capitol Lake is a mostly stagnant system that is only flushed during storm events.

Impairment and pollutant causing impairment

Capitol Lake is listed in Louisiana's 2014 Water Quality IR as not fully supporting the fish and wildlife propagation use as a result of suspected impairment from PCBs. Capitol Lake is under a "no fish consumption" advisory issued by LDEQ and LDHH (http://new.dhh.louisiana.gov/assets/oph/Center-EH/envepi/fishadvisory/Documents/Other_Chemical_Advisories_Complete_List.pdf). The advisory was initiated in 1983 due to the presence of PCBs in fish tissue, surface water, and sediments (http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=7386802&ob=yes&child=yes). The advisory was reviewed in 1994 and remained in effect. Additional information on Capitol Lake water quality can be found in LDEQ's Electronic Document Management System (EDMS) at http://www.deq.louisiana.gov/portal/tabid/2604/Default.aspx, AI#5040 and AI#91420.

Sources of pollutant causing impairment

Pollutant sources to Capitol Lake include both point and nonpoint sources, specifically, discharges, spills and urban stormwater runoff. Investigations were conducted in Capitol Lake by LDEQ's predecessor agencies in 1972, 1973, and 1981 for oil contamination. In 1981, Kansas City Southern Railroad was found to be a significant source of pollution. Later, enforcement actions against responsible industries were issued and corrective measures taken. However, oil and other pollutants continued to accumulate in the lake system, running off from urban surfaces such as streets, parking lots, gasoline stations, industrial and commercial facilities, and residences. In 1983, LDEQ's predecessor agency investigated a complaint concerning the discharge of oily wastes into the northern tributary of the lake system. The investigation revealed that oily wastewater, primarily from oil spillage and an underground storage tank leak, was draining into the canal from a Westinghouse Electric Corporation facility. Analysis of water samples revealed that PCBs were present in runoff water, canal water, and water from the center of the lake. PCBs were also found in fish tissue samples.

Investigation of other sources of pollution resulted in the issuance of enforcement actions and compliance orders requiring the cessation of discharge of oily waste or contaminated wastewater and control of discharges in excess of permit limits against Furlow-Laughlin Equipment Company Inc.; American Asphalt Corporation; City of Baton Rouge and Parish of East Baton Rouge; Comet Distribution Services Inc.; Kansas City Southern Railroad; and Road Runner Motor Re-builder Inc. It was also determined that none of the facilities were contributing PCBs. Other facilities that were possible sources of nonpoint PCB contaminated stormwater runoff from the storage of transformers, electric motors, and heavy equipment included the Louisiana Division of Administration Surplus Property Yard, U.S. Government Surplus Property Yard, and the Louisiana National Guard Armory, all located east of the lake.

2) Description of Pollution Controls and How They Will Achieve Water Quality Standards

Water quality target

For total PCBs, LAC 33:IX:1113.C.Table 1 specifies a freshwater chronic criterion of 0.0140 µg/L for aquatic life protection and a non-drinking water supply criterion of 5.61 x 10-5 µg/L to protect for primary and secondary contact recreation and fish consumption.

For PCBs in fish tissue, a final screening level of 270 µg/kg is suggested in Tissue Screening Level Guidelines for Issuance of Public Health Advisories for Selected Contaminants (May 2011).
http://www.deq.state.la.us/portal/Portals/0/planning/TSL%20and%20Documentation_FINAL_2011.pdf

Controls that will achieve Water Quality Standards

In 1985-86, Westinghouse complied with LDEQ's directive by removing PCB-contaminated soils from its property, installing a French drain system to contain groundwater contamination, and installing a stormwater culvert system through its property, allowing drainage canal stormwater to pass through without contacting PCB-contaminated soil.

Because concentrations of PCBs in the lake sediment are below the 50 ppm level required for designation as a hazardous waste site, Capitol Lake did not rank as a high priority for cleanup funding. Under the federal Superfund Program, this level of contamination is not considered an environmental emergency. Therefore, funding for cleanup has been from sources other than federal monies. Data indicate that the contaminated sediments do not pose a direct threat to the public or to area groundwater. However, the advisory on consumption of fish from the lake system remains in effect.

Descriptions of requirements under which pollution controls will be implemented

Analytical results confirmed that Westinghouse Electric Corporation was a major contributor of PCBs to the northern part of the lake. A compliance order was issued to Westinghouse Electric Corporation requiring the facility to stop all oil-contaminated discharges, to submit plans for evaluation of the extent of PCB contamination in surface and subsurface soils at and surrounding the property, and for the removal and/or containment of PCB contamination (http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=4007642&ob=yes&child=yes). Westinghouse Electric Corporation signed a settlement agreement with LDEQ establishing the framework and timetable for cleanup and containment of PCB contamination at the facility and establishing an automatic monetary penalty system if the company failed to fulfill any provision (http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=4007634&ob=yes&child=yes). Additional documents are available in LDEQ's EDMS, under AI#2056.

In 1988, the Louisiana Legislature created the Capitol Lake Task Force with the purpose of studying and making recommendations on how to preserve and enhance the qualities of Capitol Lake. This task force found that Capitol Lake was seriously contaminated and requested that the governor create a commission to begin implementing the long-term solutions proposed by the Task Force.

In February 1991, an additional report on the chemical contamination of Capitol Lake sediments was submitted to LDEQ, including the conclusion that there was no additional PCB contamination. Later in this same month LDEQ's Inactive and Abandoned Sites Division issued compliance orders against Kansas City Southern Railroad and Louisiana Oil and Re-refining Company, Inc. The compliance orders required these companies to submit to

LDEQ a work plan for remedial investigation and feasibility studies and to begin execution of the work plans no later than 90 days after approval of the plans. In May 1991, the Kansas City Southern Railroad was also issued a compliance order by LDEQ for violating its water discharge permit. In June 1992, LDEQ issued a "cease and desist" order shutting down the Louisiana Oil and Re-refining Company; the owner pleaded guilty to federal charges of conspiracy to illegally discharge pollutants. The owner was sentenced to prison and fined.

In 1993, because of the presence of PCBs in the lake, LDEQ initiated an extensive survey of Capitol Lake with the objectives of: (1) determining whether any exposure risk existed for people consuming fish from the lake system, (2) determining the extent and levels of contamination in the lake system, (3) determining any impacts upon the lake system's biological community, (4) confirming the extent and levels of contamination at the Westinghouse Electric Corporation facility, and (5) determining whether other sources of oil contamination were contributing PCBs to the lake system.

In January 1993, the governor signed an executive order creating the Governor's Commission on the Capitol Lake Rehabilitation Project and designated the LDEQ Secretary as chairman. LDEQ Office of the Secretary designed and conducted an environmental assessment of the Capitol Lakes system in 1997-1998. LDEQ collected and examined representative water, sediment, and fish tissue samples in sufficient quantity and quality to answer questions about human health risk posed by long-term exposure to toxic substances present in the lake system. The agency released a draft Risk Evaluation/Corrective Action Program (RECAP) risk assessment document in November 1998 that calculated and reported health risk. The health risk assessments included all possible pathways of human exposure to the constituents of concern at the concentrations found in the lake system's fish tissues and sediments. The RECAP risk assessment was amended, once in May 1999, and again in February 2000 (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=4985478&ob=yes&child=yes). Each revision responded to issues that were raised during the review of the draft RECAP risk assessment document. Through the risk assessment process for the lake system, LDEQ concluded that human health risks posed by exposure to the lake system, including consumption of edible fish, are within regulatory limits.

3) Estimate or Projection of the Time When Water Quality Standards Will Be Met

In May 2002, LDEQ issued a statement of No Further Action, concluding that the Capitol Lakes system does not require any further management for protection of human health and environment. The June 17, 2002 decision documents are available at: http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=1224436&ob=yes&child=yes. Capitol Lake will continue to be reported as impaired on the IR until the "no fish consumption" advisory has been lifted.

4) Schedule for Implementing Pollution Controls

LDEQ has determined that no further pollution controls are needed.

5) Monitoring Plan to Track Effectiveness of Pollution Controls

LDEQ will continue to monitor Capitol Lake as part of the routine AWQMN. PCB sampling as part of the routine monitoring may take place as resources allow.

6) Commitment to Revise Pollution Controls, As Necessary

Based on the known nature of the suspected contamination and the LDEQ remediation decision reached on June 17, 2002, IRC 4b remains the most suitable classification for the 2014 Integrated Report. LDEQ will continue routine water quality monitoring of Capitol Lake as part of the AWQMN. New data will be used to reassess the water body in 2016. LDEQ will continue to work with LDHH to determine if and when the advisory can be removed.

Coastal Louisiana Partial Subsegments Impacted by 2010 Gulf of Mexico Oil Spill

(Multiple partial subsegments and uses, see Tables 3.2.5 and 3.2.6 for details.)

1) Identification of Partial Subsegments and Statement of Problem Causing Impairment

Subsegment Description

The partial subsegments classified as IRC 4b make up a portion of the coast of southeastern Louisiana stretching from Terrebonne Parish to St. Bernard and Orleans Parishes (Tables 3.2.5 and 3.2.6 (above) and Figures 3.2.5 and 3.2.6 (above)). Southeastern coastal Louisiana consists of flat deltaic and coastal plains with freshwater and saline marshes. The subsegments affected encompass bayous, tidal channels, canals, mudflats, and barrier islands.

Impairment and pollutant causing impairment

The partial subsegments shown in Table 3.2.5 and Figure 3.2.5 are listed in Louisiana's 2014 IR as not fully supporting the fish and wildlife propagation (FWP) or oyster propagation (OYS) designated uses as a result of the suspected causes of *Fish Advisory-Commercial Fishing Restrictions and Residual Surface and Sub-surface Oil/Tar Balls/Tar Mats* impairments. Impairment is based on finfish/shellfish/oyster closures issued by LDWF and LDHH. Partial subsegments not supporting the primary contact recreation (PCR) designated use as a result of the suspected cause of *Residual Surface and Sub-surface Oil/Tar Balls/Tar Mats* impairments due to ongoing indications of oiling are shown in Table 3.2.6 and Figure 3.2.6. The 23 specific and limited portions of full subsegments identified are areas still found to have oil, tar mats, or tar balls present.

Sources of pollutant causing impairment

On April 20, 2010, BP's Deepwater Horizon mobile drilling rig operating in the Gulf of Mexico approximately 50 miles off the Mississippi River Delta exploded and sank. This triggered a crude oil discharge from the damaged riser at the bottom of the Gulf that continued until August 4, 2010, when a static kill procedure effectively closed the well. The well was then cemented and permanently closed by September 19, 2010. The resulting oil spill affected a large portion of Louisiana's coastline. Carried by the tides and currents, oil reached the coast, polluting beaches, bays, estuaries and marshes from the Florida panhandle to west of the mouth of the Mississippi River, including the partial subsegments shown in Tables 3.2.5 and 3.2.6 and Figures 3.2.5, 3.2.6 (all above). Over a period of approximately three months, an estimated five million barrels (210 million gallons) of oil escaped from the well.

2) Description of Pollution Controls and How They Will Achieve Water Quality Standards

Water quality target

From Louisiana's Environmental Regulatory Code LAC 33:IX.1113.B. 6: Free or floating oil or grease shall not be present in quantities large enough to interfere with the designated water uses, nor shall emulsified oils be present in quantities large enough to interfere with the designated uses (see http://www.deq.louisiana.gov/portal/tabid/1674/Default.aspx#Title33).

Controls that will achieve Water Quality Standards

Under the Oil Pollution Act of 1990 (OPA), the federal government and impacted state governments act as "trustees" on behalf of the general public. Trustees are responsible for an assessment of the nature and extent of natural resource injury. Trustees are also responsible for development and implementation of a plan or plans for the restoration, rehabilitation, replacement, or acquisition of the equivalent of the injured natural resources and services those resources provide under their trusteeship (see http://www.gulfspillrestoration.noaa.gov/restoration/early-restoration/phase-iii/). These plans are designed to return impacted areas to the condition they would have been in had the spill not occurred and compensate the public for associated interim loss of services.

Descriptions of requirements under which pollution controls will be implemented

As amended by the Oil Pollution Act of 1990 (OPA), Section 311(d)1 of the CWA authorized the President to develop a National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan or NCP) to specify the federal response actions and authorities related to an oil spill (see http://www.epa.gov/osweroe1/content/lawsregs/ncpover.htm). The CWA thus provides the President with the authority, in coordination with the states, to ensure that an oil spill is effectively removed and actions are taken to prevent further discharge from the source.

In addition, as described in the previous section, OPA provides for the restoration, rehabilitation, replacement, or acquisition of the equivalent of natural resources, and services those resources provide, that are injured by an oil spill, including associated interim loss of services.

3) Estimate or Projection of the Time When Water Quality Standards Will Be Met

Removal, damage assessment, and remediation continue in the listed subsegments to address oil, dispersant, and other pollutants. As stated in NRDA's *Deepwater Horizon Oil Spill Draft Phase I Early Restoration Plan and Environmental Assessment*, "While we do not yet know the extent of the natural resources that were impacted by the spill, we do know that the impacts were widespread and extensive and will take years to assess completely. The full spectrum of the impacts from this spill, given its magnitude, duration, depth and complexity, will be difficult to determine but the Trustees are working hard to assess every aspect of the injury, both to individual resources and lost recreational use of them, as well as the cumulative impacts of the spill. Affected natural resources include ecologically, recreationally, and commercially important species and their habitats across a wide swath of the coastal areas of Alabama, Florida, Louisiana, Mississippi, and Texas, and a huge area of open water in the Gulf of Mexico." (See

http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/2011/12/Final-ERP-121311-print-version-update-ES.pdf.)

4) Schedule for Implementing Pollution Controls

The damaged wellhead was permanently closed by September 19, 2010, although Louisiana has suffered recurring residual oiling since that time. Coastal cleanup is ongoing.

5) Monitoring Plan to Track Effectiveness of Pollution Controls

Coastal habitats may require years or decades to recover from oil exposure. Long-term monitoring of affected coastal habitats by federal and state agencies is anticipated in the aftermath of the Deepwater Horizon disaster, as part of the state's role as trustee of its natural resources. (See, e.g., the NRDA Draft Phase I Early Restoration Plan.)

6) Commitment to Revise Pollution Controls, As Necessary

If future ambient water quality data does not result in full support of the oil, dispersant, and other pollutant observations, LDEQ is committed to continuing ambient water quality monitoring as part of the routine monitoring rotations. In addition, long-term monitoring of the affected coastal habitat will be conducted as part of the NRDA restoration plans.

Devil's Swamp Lake and Bayou Baton Rouge, Subsegment LA070203_00

1) Identification of Subsegment and Statement of Problem Causing Impairment

Subsegment Description

Devil's Swamp Lake (subsegment LA070203_00, HUC 08070201) is a manmade lake near Scotlandville in East Baton Rouge Parish, Louisiana. The lake was created in 1973 by excavation of borrow for construction of levees at the Baton Rouge Barge Harbor. The oxbow-shaped lake, which has an approximate surface area of 24 acres, is in a large flood plain area north of the city of Baton Rouge. Devil's Swamp Lake is surrounded by low-lying bottomlands and receives drainage from the adjacent swamp, Devil's Swamp. The swamps to the north and south of the lake are characterized by numerous small open ponds and water tupelo trees; surface water flow in the swamp is generally from north to south. The 262-acre swamp to the north of the lake extends approximately one mile to Devil's Swamp Lake. The 684-acre swamp to the south of the lake extends approximately 2.2 miles to the east bank of the Mississippi River and is subject to frequent backwater encroachment from the river. The lake is approximately 0.75 mile in length, 400 feet wide, and 20 feet deep at its deepest parts. Devil's Swamp Lake also receives discharges and stormwater runoff from a hazardous waste facility northeast of the lake and from some industrial facilities, and it also receives floodwater from the Mississippi River during high flow periods. During flood conditions, the western and northern boundaries of the lake are indistinct because it coalesces with water of the surrounding swamp. Bayou Baton Rouge drains through Devil's Swamp and flows south into the Mississippi River upstream from the Baton Rouge Harbor Canal (see USGS report at http://pubs.usgs.gov/sir/2006/5301/pdf/sir2006-5301.pdf).

Impairment and pollutant causing impairment

Devil's Swamp Lake is listed in Louisiana's 2014 Water Quality IR as not fully supporting the fish and wildlife propagation and primary contact recreation designated uses as a result of impairment by arsenic, HCB, HCBD, lead, mercury in fish tissue, oil and grease, and PCBs.

Sources of pollutant causing impairment

Industrial facilities have discharged to the swamp surrounding Devil's Swamp Lake since the 1960s. Since 1980, repeated sampling of water, sediment, and fish tissue has demonstrated the presence of organic compounds, including PCBs, in Devil's Swamp Lake. Testing in March 1986 confirmed the presence of PCBs in lake sediments and the effluent channel used by Rollins Environmental Services (RES), now known as Clean Harbors Environmental Services. Following these analyses, both LDEQ and LDHH tested for toxic substance residues in edible tissues of fish samples collected from the lake. The tissue analyses revealed PCB concentrations below the Food and Drug Administration (FDA) action level. However, concentrations of HCB and HCBD were found at levels above action levels protecting against long-term chronic exposure (see http://www.atsdr.cdc.gov/hac/pha/pha.asp?docid=729&pg=2#table10 Table 10). In addition, high levels of lead, mercury, and arsenic were present.

Following review of the analytical results, the state epidemiologist recommended issuance of an advisory against swimming in and consumption of fish from Devil's Swamp Lake (see http://new.dhh.louisiana.gov/assets/oph/Center-EH/envepi/fishadvisory/Documents/Other_Chemical_Advisories_Complete_List.pdf). LDWF, LDHH, and LDEQ issued a joint advisory in October 1987. LDWF, LDHH, and LDEQ issued a revised health advisory that included the remainder of Devil's Swamp and Bayou Baton Rouge in June 1993. The revised advisory recommends no swimming or other primary contact water sports in the area of concern. Also, based on elevated levels of HCB, HCBD and mercury in fish from this area, the agencies advise that consumption of all fish species from these waters be limited to two meals per month; a meal is considered to be 0.5 pound of fish. The boundaries of this advisory may be adjusted in the future to reflect results of new information. The area of concern is bounded on the north by the former Hall-Buck Marine Road, on the east by the bluffs and the Baton Rouge Barge Harbor, and on the south and west by the Mississippi River.

2) Description of Pollution Controls and How They Will Achieve Water Quality Standards

Water quality target

For arsenic, LAC 33:IX:1113.C.Table 1A specifies a criterion of 10.0 µg/L for both human health protection and drinking water supply, which is protective of primary and secondary contact recreation and fish consumption. There is no human health protection, non-drinking water criterion for arsenic. The human health protection and drinking water supply criterion for arsenic is more stringent (more protective) than the applicable freshwater acute and chronic aquatic life protection criteria.

For HCB, LAC 33:IX:1113.C.Table 1 specifies a criterion of 2.5×10^{-4} µg/L for non-drinking water supply, which is protective of primary and secondary contact recreation and fish consumption. There are no freshwater acute and chronic aquatic life protection criteria for HCB.

For HCBD, LAC 33:IX:1113.C.Table 1 specifies a criterion of 0.11 µg/L for non-drinking water supply, which is protective of primary and secondary contact recreation and fish consumption. The non-drinking water supply criterion for HCBD is more stringent (more protective) than the applicable freshwater acute and chronic aquatic life protection criteria.

For lead, LAC 33:IX:1113.C.Table 1A specifies a criterion of 50.0 µg/L for both human health protection and drinking water supply, which is protective of primary and secondary contact recreation and fish consumption. There is no human health protection, non-drinking water criterion for lead. The aquatic life freshwater acute and chronic criteria are hardness dependent. Based on the lowest acceptable hardness value of 25 mg/L used in calculating lead criteria values, the lowest possible chronic lead criterion for aquatic life protection is 0.54 µg/L.

For methylmercury in fish tissue, a final screening level of 230.0 µg/kg is suggested in *Tissue Screening Level Guidelines for Issuance of Public Health Advisories for Selected Contaminants* (May 2011) http://www.deq.state.la.us/portal/Portals/0/planning/TSL%20and%20Documentation_FINAL_2011.pdf.

For oil and grease, according to LAC 33:IX.1113.B. 6: Free or floating oil or grease shall not be present in quantities large enough to interfere with the designated water uses, nor shall emulsified oils be present in quantities large enough to interfere with the designated uses. Future ambient water quality monitoring by LDEQ will evaluate the presence or absence of surface oil and grease that may lead to the impairment of designated uses.

For total PCBs, LAC 33:IX:1113.C.Table 1 specifies a criterion of 5.61×10^{-5} µg/L for non-drinking water supply and to protect for primary and secondary contact recreation and fish consumption. The human health protection and non-drinking water supply criterion for PCBs is more stringent (more protective) than the applicable freshwater acute and chronic aquatic life protection criteria.

Controls that will achieve Water Quality Standards

The land use and hydrology of the watershed is complex and is divided into five areas for investigational purposes:

- North and west of Petro-Processors (Petro-Processors is an NPL site located in the Devil's Lake watershed): This area has not been extensively studied; however, no contaminants associated with industrial activities have been detected at concentrations in excess of background levels in samples from this area. Based on hydrology and drainage patterns, it is unlikely that wastes from industrial activities affect the area.
- Immediately south to about 3,000 feet south of the former Hall-Buck Marine Road: Wastes released from pits during operation of the Petro-Processors NPL site extensively impacted the northeast corner of this area. This area has been extensively investigated and is being remediated under a 1984 Consent Decree. Four remedial processes have been applied. The most contaminated channel was excavated to the maximum depth that could safely be achieved. A second channel has been diverted and the original course filled with clean soil. The remaining less-contaminated sediments are being allowed to continue to naturally attenuate. The sediments are naturally anoxic enough that the chlorinated contaminants are being dechlorinated. The groundwater is also undergoing

remediation by natural attenuation. This area also has an oxygen-reducing environment that allows natural dechlorination of the contaminants.

- Area bounded by the southern boundary of the area described in the preceding bullet and the northern end of Devil's Swamp Lake: There are scattered detections of chlorinated organics at concentrations that are well below levels that pose threats to the environment or human health.
- Devil's Swamp Lake: The lake and the swamp immediately adjacent have been shown to be contaminated by some of the chlorinated compounds present in the area described in the second bullet, above, and by PCBs. The probable source of these contaminants is the former RES site. USEPA is in the process of listing this site on the NPL. The state of Louisiana has agreed with this action.
- South Swamp: This is the area to the south and west of Devil's Swamp Lake that has not been impacted by either the RES site or the Petro-Processors site.

Descriptions of requirements under which pollution controls will be implemented

The Devil's Swamp Lake site was proposed for addition to the NPL in the Federal Register on March 8, 2004. USEPA completed evaluation and negotiations with some Potentially Responsible Parties (PRPs) and issued a Unilateral Administrative Order to PRPs to conduct a Remedial Investigation/Feasibility Study on December 3, 2009. For a history of site enforcement and cleanup actions, see USEPA ID LAD981155872, Devil's Swamp Lake at: http://www.epa.gov/region6/6sf/pdffiles/devils-swamp-la.pdf.

3) Estimate or Projection of the Time When Water Quality Standards Will Be Met

Devil's Swamp Lake is currently under USEPA lead for the NPL. USEPA and LDEQ are working with the responsible parties to investigate the site; it is in the early stages of investigation (Remedial Investigation/Feasibility Study). Initial data has recently been collected and future data will be collected as the investigation proceeds. A fish consumption and swimming advisory remain in place for the area.

Based on AWQMN information and the arsenic criterion described above, LDEQ removed the arsenic impairment from Devil's Swamp Lake/Bayou Baton Rouge with the 2012 IR. Devil's Swamp Lake will continue to be reported as impaired for other WICs until the conclusion of all remediation actions and determination of full support.

Based on the well-established nature of the contamination issues and the ongoing NPL actions, IRC 4b remains the most suitable classification for this water body. Sampling data will be used to determine when the water body is fully supporting fish and wildlife propagation and primary contact recreation uses.

4) Schedule for Implementing Pollution Controls

This site is in the early stages of investigation. The Tier 1 Remedial Investigation Report containing the most recent collection of sample data and summaries for the site is available on LDEQ's EDMS under AI#86800, 2/10/12 (Electronic Document Management System http://www.deq.louisiana.gov/portal/tabid/2604/Default.aspx).

5) Monitoring Plan to Track Effectiveness of Pollution Controls

Monthly progress reports are submitted by Clean Harbors Environmental Services (formerly Rollins Environmental Services-RES) in accordance with the Administrative Order issued by

LDEQ in 2003. See http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=9197589&ob=yes&child=yes for the latest monthly progress report of January, 2014. LDEQ will continue to monitor Devil's Swamp Lake and Bayou Baton Rouge as part of the routine AWQMN.

6) Commitment to Revise Pollution Controls, As Necessary

LDEQ is committed to continuing ambient water quality monitoring as part of the routine monitoring rotations. LDEQ is also committed to working with responsible parties in determining appropriate remedial actions.

Sibley Lake, Subsegment LA101001_00

1) Identification of Subsegment and Statement of Problem Causing Impairment

Subsegment Description

Sibley Lake (subsegment LA101001_00, HUC 11140207) is a 2,250-acre freshwater impoundment located west of the city of Natchitoches in Natchitoches Parish, Louisiana. Sibley Lake is a manmade impoundment constructed in 1958 as a water supply and recreational lake for the City of Natchitoches and the surrounding area. The city's public water intake structure is located on the southeast side of the lake. Average lake depth is nine feet with maximum depths approaching 40 feet.

Impairment and pollutant causing impairment

Sibley Lake is listed in Louisiana's 2014 Water Quality IR as not fully supporting the fish and wildlife propagation use as a result of suspected PCB impairments. Based on the results of laboratory data, LDEQ and LDHH issued a joint advisory in February 1989 against the sale and consumption of fish taken from Sibley Lake. (Most recently reviewed in 2000.) (http://www.deq.state.la.us/portal/Portals/0/planning/Fish%20Consumption%20Advisory%20Table%20-%202-18-09.pdf
and
http://new.dhh.louisiana.gov/assets/oph/Center-EH/envepi/fishadvisory/Documents/Other_Chemical_Advisories_Complete_List.pdf).

Sources of pollutant causing impairment

Since 1946, Tennessee Gas Pipeline Company (TGP) has operated a natural gas compressor station in the northwest corner of the uppermost major branch of the lake. TGP maintains three compressor buildings with 20 compressor engines which compress natural gas to be transported through a pipeline stretching from Texas to northern markets. In August 1988, TGP officials notified LDEQ that analysis of wastewater from one of its outfalls revealed the presence of PCBs. The concentrations found in the outfall wastewater are believed to have been present from residual amounts of PCBs at various locations in the facility resulting from the use of Pydraul, a lubricant containing PCBs, which was used at the facility from 1955 to 1968.

2) Description of Pollution Controls and How They Will Achieve Water Quality Standards

Water quality target

For total PCBs, LAC 33:IX:1113.C.Table 1 specifies a criterion of 5.59 x 10^{-5} µg/L for drinking water supply and to protect for primary and secondary contact recreation and fish consumption. The human health protection and non-drinking water supply criterion for PCBs is more stringent (more protective) than the applicable freshwater acute and chronic aquatic life protection criteria.

Controls that will achieve Water Quality Standards

TGP was ordered to cease discharge of wastewater containing PCBs. In addition, it was ordered to remediate the contaminated area. In November 1992, the contaminated sediment was excavated and removed from Sibley Lake and the area backfilled with clean soil. This remediation was completed in January 1993. The excavated material was sent off-site for proper disposal.

Natural sedimentation is currently remediating Sibley Lake by depositing new sediments over older sediments that may still contain PCBs. As a result, PCBs have not been detected in Sibley Lake since 2000.

Descriptions of requirements under which pollution controls will be implemented

LDEQ issued a compliance order on September 1, 1988 (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=7395597&ob=yes&child=yes) requiring TGP to sample lake sediments, fish tissue, effluent, and lake water and to take any and all measures necessary to cease discharge of wastewater containing PCBs. TGP was also required to submit a written report describing circumstances of cited violations of the discharge permit, remedial actions taken to mitigate any impacts resulting from violations, and actions taken to achieve compliance with the compliance order.

TGP ceased direct discharge of its wastewater and rerouted wastewater through an activated carbon treatment system prior to discharge into Sibley Lake. During 1989, TGP submitted the results of water, sediment and fish analyses to LDEQ for review. Results indicated non-detectable amounts of PCBs in water sampled throughout the lake. However, PCBs were found in lake sediment taken from the area around the TGP outfall and in fish taken from the area. PCB levels in some species of fish exceeded the FDA alert level of 2 ppm for Aroclor 1254. An April 11, 1989 compliance order authorized a long-term fish sampling program for Sibley Lake near Natchitoches, Louisiana (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=4106142&ob=yes&child=yes).

A CERCLA Section 106 Administrative Order on Consent (CERCLA 06-07-90) pertaining to site investigation and source removal was negotiated with USEPA-Region 6 in November 1989 (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=4106141&ob=yes&child=yes).

In February 1990, TGP officials agreed to conduct a study of the sediment in a targeted area around the wastewater outfall to provide data for the development of an appropriate remediation plan. Based on results of the study, LDEQ requested that TGP submit a remedial action plan for the physical removal of PCBs at and adjacent to the discharge pipe in Sibley Lake. In June 1991, LDEQ issued a compliance order to TGP as a result of TGP's lack of

response to requests for a remediation plan. The compliance order also specified an annual fish monitoring program and ordered the submittal of a remedial action plan (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=4106139&ob=yes&child=yes). A request for a hearing was filed by TGP in July 1991, and in October 1991, TGP submitted a remedial action plan and alternative evaluation report for Sibley Lake.

In October 1992, LDEQ and TGP reached a settlement agreement. The settlement agreement set forth three phases of remediation: Phase I, obtaining permits to conduct remediation; Phase II, remediation of Sibley Lake; and Phase III, post-construction monitoring of fish and water, which was to commence upon LDEQ's acceptance of the completion of Phase II. The agreement required the installation of a rainwater control structure; the excavation of sediments from the lake near the facility's wastewater outfall; and the backfilling, grading and restoration of the excavated areas (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=3794297&ob=yes&child=yes).

Excavation and removal of sediments started in November 1992. Excavated material was sent off-site to a hazardous waste disposal site. After removal of the contaminated sediments, TGP backfilled the area with clean soil. In January 1993, TGP completed the excavation and backfilling required by the agreement.

The first set of monitoring data was collected from Sibley Lake in May 1994. The results of that data indicated that the level of PCBs in fish declined by more than 50% within the first three years after remediation. Although the remediation process was gradually reducing the bioavailability of PCBs, in June 1994 the advisory for Sibley Lake was reviewed and continued.

In January 1996, the advisory against the sale and consumption of fish from Sibley Lake was lifted. However, a new advisory was placed into effect at that time (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=7915223&ob=yes&child=yes). The new advisory recommends no consumption of gar, shad, and carp. For other species, within any one-month time period, eating fish from Sibley Lake should be limited to only one of the following two options: (1) one meal per week of largemouth bass or crappie; or (2) one meal per month of channel catfish, striped bass or other species (excluding gar, shad, and carp). All fish consumed should be skinned and trimmed of fat then broiled, grilled, or baked. These fish should not be fried because this traps the contaminants in the fish. A meal is considered 0.5 pound of fish for adults and children.

In March 1997, the CERCLA Administrative Order on Consent 06-07-90 was lifted (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=4099844&ob=yes&child=yes) as a result of TGP's compliance with the terms of the Order.

The Administrative Order of October 14, 2011 requires TGP to perform fish tissue sampling and reporting every five years. Documentation of 2006 fish tissue monitoring is available in LDEQ's EDMS at http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=6021197&ob=yes&child=yes

Additional documents are available under AI#3144 on LDEQ's EDMS (Electronic Document Management System http://www.deq.louisiana.gov/portal/tabid/2604/Default.aspx).

3) Estimate or Projection of the Time When Water Quality Standards Will Be Met

Despite improvements in water column and fish tissue results, Sibley Lake will continue to be reported as impaired due to PCBs until such time as the ongoing monitoring by the responsible party described above indicates the fish consumption advisory can be lifted. The decision to lift or modify the advisory will be made in conjunction with LDHH. IRC 4b remains the most suitable classification for the water body because of the known nature of the contamination in question and the ongoing activities described above.

4) Schedule for Implementing Pollution Controls

In November 1992, the contaminated sediment was excavated and removed from Sibley Lake and the area backfilled with clean soil. This remediation was completed in January 1993. The excavated material was sent off-site for proper disposal.

5) Monitoring Plan to Track Effectiveness of Pollution Controls

The Sibley Lake project is in the Post Remediation Phase (including monitoring) and the lake is still under a fish consumption advisory due to PCBs. The purpose of the monitoring program at Sibley Lake is to document the success of the selected remediation measure. Natural sedimentation is currently remediating Sibley Lake by depositing new sediments over older sediments that may still contain PCBs. As a result, PCBs have not been detected in the water column in Sibley Lake since 2000. The most recently available fish tissue monitoring report (2006) indicated that PCBs were still present in fish; however, average concentrations for all eight target species were below FDA recommendations of 2.0 ppm.

TGP is mandated to perform fish tissue sampling and reporting every five years according to the Administrative Order of October 14, 2011
(see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=8149482&ob=yes&child=yes).

TGP monitors its discharge for PCBs quarterly as required by its 2009 LPDES water permit (see http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=6535247&ob=yes&child=yes) and submits a monthly discharge monitoring report to LDEQ. LDEQ will continue to monitor Sibley Lake as part of the routine AWQMN. PCB sampling as part of the routine monitoring may take place as resources allow.

6) Commitment to Revise Pollution Controls, As Necessary

Based on the known nature of the suspected contamination, IRC 4b remains the most suitable classification for the 2014 IR. LDEQ will continue routine water quality monitoring of Sibley Lake as part of the AWQMN. New data will be used to reassess the water body in 2016. LDEQ is committed to continuing ambient water quality monitoring as part of the routine monitoring rotations. LDEQ is also committed to working with responsible parties in determining appropriate remedial actions.

Statewide Louisiana Subsegments Impacted by Non-Native Aquatic Plants

(Multiple subsegments and uses, see Table 3.2.9 for details.)

1) Identification of Subsegment and Statement of Problem Causing Impairment

Subsegment Description

Subsegments classified as Integrated Reporting Category (IRC) 4b with impairment caused by non-native aquatic plants are located throughout the state of Louisiana. The subsegments encompass rivers, lakes, bayous, tidal channels, and canals and occur in nine of Louisiana's twelve major river basins. Serving as a corridor between the continental United States and the subtropical world beyond the Gulf of Mexico, Louisiana has a humid, subtropical climate with abundant rainfall enabling rapid growth of vegetation. Average annual precipitation varies from 48 inches in the northwestern part of the state near Shreveport to 64 inches in the southeastern coastal plains near Thibodaux. With over one million acres of freshwater lakes/reservoirs, over seven million acres of wetlands, and nearly 8,000 square miles of estuaries and bays at risk, a substantial portion of Louisiana is threatened by invasive aquatic plants (Table 3.2.7).

Table 3.2.7. Subsegments not supporting the designated use of fish and wildlife propagation and classified as Integrated Report Category 4b for suspected cause of non-native aquatic plants.

Subsegment Number	Subsegment Description	Water Body Type	Size[1]
LA010701_00	Bayou Teche-From Berwick to Wax Lake Outlet	River	14
LA020101_00	Bayou Verret, Bayou Chevreuil, Bayou Citamon, and Grand Bayou	River	53
LA020102_00	Bayou Boeuf, Halpin Canal, and Theriot Canal	River	19
LA020103_00	Lake Boeuf	Lake	6100
LA020201_00	Bayou Des Allemands-From Lac Des Allemands to old US-90 (Scenic)	River	7
LA020202_00	Lac Des Allemands	Lake	14720
LA020301_00	Bayou Des Allemands-From US-90 to Lake Salvador (Scenic)	River	14
LA020302_00	Bayou Gauche	River	4
LA020304_00	Lake Salvador	Lake	44800
LA020401_00	Bayou Lafourche-From Donaldsonville to ICWW at Larose	River	68
LA040401_00	Blind River-From Amite River Diversion Canal to mouth at Lake Maurepas (Scenic)	River	5
LA040403_00	Blind River-From headwaters to Amite River Diversion Canal (Scenic)	River	20
LA040404_00	New River-From headwaters to New River Canal	River	24
LA040602_00	Lake Maurepas	Estuary	91
LA060102_00	Cocodrie Lake	Lake	6,099
LA060203_00	Chicot Lake	Lake	1,626
LA070202_00	Raccourci Old River	Lake	4,160
LA080102_00	Bayou Chauvin-From headwaters to Ouachita River	River	6
LA100302_00	Black Bayou Lake-From LA-1 to spillway	Lake	3,968
LA100406_00	Flat River-From headwaters to Loggy Bayou	River	46
LA100502_00	Lake Bistineau	Lake	17,216
LA100603_00	Wallace Lake	Lake	9,248

Table 3.2.7. Subsegments not supporting the designated use of fish and wildlife propagation and classified as Integrated Report Category 4b for suspected cause of non-native aquatic plants.

Subsegment Number	Subsegment Description	Water Body Type	Size[1]
LA100605_00	Clear Lake and Smithport Lake; includes old Edwards Lake	Lake	2,944
LA100702_00	Black Lake Bayou-From one mile north of Leatherman Creek to Black Lake (Scenic)	River	37
LA101302_00	Iatt Lake	Lake	7,104
LA110101_00	Toledo Bend Reservoir-From Texas-Louisiana state line to Toledo Bend Dam	Lake	181,760
LA120108_00	False River	Lake	2,912
LA120110_00	Bayou Cholpe-From headwaters to Bayou Choctaw	River	11
LA120204_00	Lake Verret and Grassy Lake	Lake	14,080
LA120301_00	Bayou Terrebonne-From Thibodaux to ICWW in Houma	River	54
LA120404_00	Lake Penchant	Lake	832
LA120405_00	Lake Hache and Lake Theriot	Lake	1,594
LA120501_00	Bayou Grand Caillou-From Houma to Bayou Pelton	River	8
LA120503_00	Bayou Petit Caillou-From Bayou Terrebonne to LA-24 bridge	River	5
LA120504_00	Bayou Petit Caillou-From LA-24 bridge to Boudreaux Canal (Estuarine)	River	12
LA120505_00	Bayou Du Large-From Houma to Marmande Canal	River	7
LA120506_00	Bayou Du Large-From Marmande Canal to 1/2 mile north of St. Andrews Mission (Estuarine)	River	7
LA120507_00	Bayou Chauvin-From Ashland Canal to Lake Boudreaux (Estuarine)	River	8
LA120601_00	Bayou Terrebonne-From Houma to Company Canal (Estuarine)	River	8
LA120602_00	Bayou Terrebonne-From Company Canal to Humble Canal (Estuarine)	River	10
LA120604_00	Bayou Blue-From ICWW to Grand Bayou Canal	River	29
LA120605_00	Bayou Pointe Au Chien-From headwaters to St. Louis Canal	River	25
LA120606_00	Bayou Blue-From Grand Bayou Canal to Bully Camp Canal (Estuarine)	River	7
LA120703_00	Bayou Du Large-From 1/2 mile north of St. Andrews Mission to Caillou Bay (Estuarine)	River	22

[1] Size Units: River = miles; Lake = acres; Estuary = square miles

Impairment and pollutant causing impairment

Subsegments shown in Table 3.2.7 are listed in Louisiana's 2014 IR as not fully supporting the fish and wildlife propagation (FWP) designated use as a result of *non-native aquatic plants*. Non-native aquatic plants are included in the NPDES list of pollutants as "biological materials" (see http://cfpub.epa.gov/npdes/glossary.cfm#P). Invasive aquatic species are rapid colonizers and are competitively superior to most native plants, quickly dominating the aquatic plant community after introduction to a water body. Specific species of non-native aquatic plants were not reported by LDEQ staff making these impairment determinations. However, typical non-native aquatic plants of concern for the reported subsegments may include but are not limited to water hyacinth (*Eichhornia crassipes*), hydrilla (*Hydrilla verticillata*), giant salvinia (*Salvinia molesta*), and common salvinia (*Salvinia minima*). Many of the following species may also be of concern in the subsegments reported as impaired. All species mentioned below will not be present in all subsegments. According to the *State Management Plan for Aquatic Invasive Species in Louisiana* (Tulane Univ. and Xavier Univ. 2005), the following aquatic plants are classified as "extensively established species" that occur in eight or more drainage basins in Louisiana:

- Water hyacinth – South American native; clogs waterways, impedes boat traffic, slows water currents and blocks light to submerged vegetation, thus lowering DO levels
- Parrot feather (*Myriophyllum aquaticum*) – South American native that can block waterways, preventing fishing and boat traffic and providing ideal mosquito breeding habitat
- Hydrilla – rooted aquatic weed from Asia forms thick mats which can impede boat traffic and swimming, and lower DO levels, killing fish
- Wild taro (*Colocasia esculenta*) – forms dense stands in riparian zones and displaces native vegetation
- Brazilian waterweed (*Egeria densa*) – forms thick mats at the water surface, impeding swimming, boating, and fishing; chokes out native vegetation and degrades water quality and fish habitat
- Eurasian watermilfoil (*Myriophyllum spicatum*) – forms thick mats at the water surface, impeding swimming, boating, and fishing; outcompetes native vegetation and degrades water quality for fish and birds
- Water lettuce (*Pistia stratiotes*) – believed to be native to Africa; impedes swimming, boating, and fishing; degrades water quality for native vegetation and adversely affects fish and bird populations
- Common salvinia – Central and South American native; forms thick mats on the water surface, in some instances up to almost 10 inches deep; shades and outcompetes native plants, diminishing habitat for fish and birds

The following aquatic plants are classified as "locally established species" that occur in three to seven Louisiana drainage basins:

- Giant salvinia – free-floating, rootless plant forms thick mats on the water surface, in some instances up to almost 10 inches deep; shades and outcompetes native plants, diminishing habitat for fish and birds; can double its biomass every seven to 10 days under ideal conditions; chokes waterways and has interfered with floodgate operation
- Cogon grass (*Imperata cylindrica*) (the Louisiana Aquatic Invasive Species (LAIS) taskforce classifies cogon grass as an aquatic invasive because it was introduced through an aquatic pathway and occurs in areas that experience some flooding; it spreads rapidly

with a dense growth pattern that creates unsuitable habitat for native plants, insects, mammals, and birds.)

The following aquatic plants occur in fewer than three drainage basins in Louisiana and are classified as "potential arrivals":

- Purple loosestrife (*Lythrum salicaria*) – European native with prolific seed production; disrupts ecosystems by outcompeting native plants, diminishing habitat for fish and birds; clogs irrigation systems and destroys grazing pastures
- "Cylindro" (*Cylindrospermopsis raciborskii*) – an invasive, subtropical, microscopic species of blue-green algae; believed to have been introduced to Florida over 30 years ago and has spread rapidly across North America; highest concentrations below the water surface; produces neurotoxins and hepatotoxins; has caused deaths of humans and wildlife worldwide; outcompetes other algae and can cause public health impacts by its presence in drinking water reservoirs

The *State Management Plan for Aquatic Invasive Species in Louisiana* places Louisiana second only to Florida in number of introduced aquatic plant species, with 32 and 45, respectively.

Sources of pollutant causing impairment

The suspected source of impairment for these IRC 4b subsegments is *introduction of non-native organisms (accidental or intentional)*. Numerous sources state that the history of invasive aquatic plants in Louisiana started with the distribution of water hyacinth at the 1884 World's Industrial and Cotton Centennial Exposition in New Orleans (see http://www.lsuagcenter.com/en/communications/publications/agmag/Archive/2010/fall/Invasive-Aquatic-Weeds-in-Louisiana.htm). In this century, Louisiana is home to the busiest port system in the nation in terms of tonnage, offering ready access for invasive aquatic plants to enter state waters from bulk and containerized cargoes and through ballast discharge of ships. Other invasive plants were introduced to Louisiana through the aquarium trade, as a result of nursery sales, and, in the cases of Eurasian water milfoil and Brazilian water weed, possibly by federal authorities with beneficial intent. Many species are also transferred among water bodies on boats and boat trailers. Natural sources are also responsible for the spread of invasive aquatic plants, including wind, flooding, and animals, including birds.

2) Description of Pollution Controls and How They Will Achieve Water Quality Standards

Water quality target

As stated in Louisiana's Administrative Code (LAC, see Part IX http://www.deq.louisiana.gov/portal/tabid/1674/Default.aspx)
(LAC 33:IX.1113.B.1), "The waters of the state shall be maintained in an aesthetically attractive condition and shall meet the generally accepted aesthetic qualifications." As set forth in LAC 33:IX.1113.B.12, "The biological and community structure and function in state waters shall be maintained, protected, and restored except where not attainable and feasible as defined in LAC 33:IX.1109. This is the ideal condition of the aquatic community inhabiting the unimpaired water bodies of a specified habitat and region as measured by community structure and function...Reference site conditions will represent naturally attainable conditions…This condition shall be determined by consistent sampling and reliable measures of selected, indicative communities of animals…and/or plants as

established by the department…" The water quality target can be seen as the preservation and restoration of integrity to the native, balanced biological and aquatic community structure in Louisiana's aquatic ecosystems.

USEPA's NPDES vessels program regulates incidental discharges from the normal operation of vessels. The NPDES vessels program does not regulate discharges from military vessels or recreational vessels. Instead, those are regulated by other USEPA programs under §312 of the Clean Water Act. Incidental discharges from the normal operation of vessels include, but are not limited to, ballast water, bilgewater, graywater (e.g., water from sinks, showers), and anti-foulant paints (and their leachate). These discharges may result in negative environmental impacts via the addition of traditional pollutants or, in some cases, by contributing to the spread of Aquatic Invasive Species
(see http://cfpub.epa.gov/npdes/home.cfm?program_id=350).

USEPA currently regulates vessel discharges with the Vessel General Permit (VGP). The current permit, the 2013 Vessel General Permit (VGP) is in effect until 2018. USEPA is proposing a draft 2013 Vessel General Permit (VGP) and Small Vessel General Permit (sVGP) to authorize discharges incidental to the normal discharge of operations of commercial vessels. This site is intended to answer many questions the commercial vessel owner/operator may have concerning the draft VGP and/or the sVGP.
(see http://cfpub.epa.gov/npdes/vessels/vgpermit.cfm)

Management actions described by the LAIS Task Force (see below), should, when implemented, decrease the rate of introduction of invasive aquatic plant species into Louisiana water bodies. It is doubtful that full eradication of invasive aquatic plants will be achieved in light of the numerous natural mechanisms of spread, such as wind, flooding, and birds that cannot be legislated or controlled.

Controls that will achieve Water Quality Standards

The LAIS Task Force convened by order of Governor M. J. Foster determined that "invasive species pose a serious threat to the economic and ecological health of the State of Louisiana" and produced the *State Management Plan for Aquatic Invasive Species in Louisiana* (see http://is.cbr.tulane.edu/docs_IS/Louisiana-AIS-Mgt-Plan.pdf). The plan describes the nature and extent of this environmental problem and proposes a coordinated suite of specific management actions to minimize negative impacts.

LAIS Task Force goal and objectives are as follows:

Goal: Prevent and control the introduction of new nonindigenous species into Louisiana, control the spread and impact of existing invasive species, and eradicate locally established invasive species wherever possible.

Objective 1: Coordinate all aquatic invasive species management activities or programs within Louisiana and collaborate with regional, national, and international aquatic invasive species programs

Objective 2: Prevent and control the introduction/reintroduction of nonindigenous invasive species through education about species and pathways, targeting the general public (including schools), industries, user groups, government agencies, and nongovernmental organizations (NGOs)

Objective 3: Eliminate locally established invasive species through monitoring, early detection, rapid response, and early eradication
Objective 4: Control the spread of established invasive species through cooperative management activities designed to minimize impacts when eradication is impossible
Objective 5: Prevent the introduction of non-native species, or the spread of existing ones, through legislation and regulation

The LAIS Task Force recommends these management actions:

- Hire staff to administer the LAIS Council and Advisory Task Force
- Develop a rapid Response and Early Eradication Plan
- Assess Louisiana ports and waterways for invasive species

Descriptions of requirements under which pollution controls will be implemented

Congress has been concerned about economic and ecological risks from non-native plants since at least 1912, when it passed the Plant Quarantine Act. More recently, Congress passed the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA–see http://www.anstaskforce.gov/Documents/nanpca90.pdf). NANPCA was amended and expanded by the National Invasive Species Act of 1996 (NISA–see http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=104_cong_public_laws&docid=f:publ332.104.pdf) in order to prevent the spread of invasive species and to fund, manage, and disseminate information that will help control the impacts of invasive species. The National Invasive Species Council (NISC) was established by Executive Order 13112 to ensure that federal programs and activities to prevent and control invasive species are coordinated, effective, and efficient (see http://www.invasivespecies.gov/).

Taking the mandates of the CWA into consideration, Congress passed the Clean Boating Act of 2008 (see http://water.epa.gov/lawsregs/lawsguidance/cwa/vessel/CBA/) directing USEPA to develop and promulgate management practices for recreational vessels to mitigate adverse effects from recreational boat discharges such as bilge water, graywater, and deck runoff that may spread invasive species.

The federal government has attempted to control introduction of invasive plant and animal species by requiring commercial shipping interests to submit a ballast water management plan. In March 2012, the Department of Homeland Security/U.S. Coast Guard published the Ballast Water Discharge Standard Rule, adding performance standards for discharges of ballast water (see http://www.gpo.gov/fdsys/pkg/FR-2012-03-23/pdf/2012-6579.pdf).

In Louisiana, LDWF has jurisdiction over listed noxious aquatic plants. La. R.S. 56:328(B) prohibits anyone at any time from knowingly importing or causing the import of listed aquatic plant species or causing them to be transported into Louisiana from any other state or country without first obtaining a written permit from the Wildlife and Fisheries Commission (see http://www.legis.state.la.us/lss/lss.asp?doc=105222).

The LAIS Task Force was formed by authority of Louisiana Executive Order MJF 02-11 on June 4, 2002. In 2004 a bill passed both the Louisiana House and Senate and was signed into law by Governor Kathleen Blanco calling for the creation of the LAIS Council and Advisory Task Force to implement the LAIS management plan (RS 56:360.1 http://www.legis.state.la.us/lss/lss.asp?doc=285476; RS 56:360.2 http://www.legis.state.la.us/lss/lss.asp?doc=285477).

3) Estimate or Projection of the Time When Water Quality Standards Will Be Met

IRC 4b remains the most suitable classification for the listed subsegments because of the known nature of the impairment in question and the ongoing activities described above. Because invasive aquatic plants are spread by numerous pathways to and among water bodies and because legislation is pending to address some of these pathways, it is not yet possible to estimate when non-native aquatic plants will no longer be a concern.

4) Schedule for Implementing Pollution Controls

Non-native aquatic plant control activities are based on the LAIS Task Force management plan. Due to the nature of the impairment in question it is not possible to develop a reasonable schedule for implementation of pollution control activities.

5) Monitoring Plan to Track Effectiveness of Pollution Controls

As outlined in La. R.S. 56:360.3.A(5), the LAIS Task Force is required to submit a status report on the LAIS management plan and its implementation every two years to the state legislature. LDEQ will continue routine surface water quality monitoring of the listed subsegments as part of the AWQMN.

6) Commitment to Revise Pollution Controls, As Necessary

LDEQ is committed to continuing ambient water quality monitoring as part of the routine monitoring rotations, including evaluation of non-native aquatic plant observations. Revisions to controls for non-native aquatic plants through the LAIS management plan and its implementation are required every two years to the state legislature.

Chapter 3: River and Stream Water Quality Assessment

The information reported in Table 3.3.1 is based upon the reported use support for all applicable water body designated uses, as determined through monitoring data assessments. The river miles and subsegment counts of impaired water bodies identified as being impacted by various suspected causes of impairment are shown in Table 3.3.2. The miles and count impacted by various suspected sources of impairment are shown in Table 3.3.3. Tables 3.3.2 and 3.3.3 refer only to those water bodies that were assessed as not supporting designated uses. The tables are not ranked by order of impact, and each subsegment may have multiple designated uses. Assessment results for all water body subsegments, as defined in LAC 33:IX.1123, Table 3, can be found in Appendices A, B.

Table 3.3.1

Summary of designated use support for Louisiana rivers and streams, *2014 Integrated Report* assessment (reported in miles (water body count)).

Designated Use	Size Fully Supported		Size Not Supported		Not Assessed		Total Size for Designated Uses	
Primary Contact Recreation	6,167	(213)	3,014	(118)	12	(2)	9,193	(333)
Secondary Contact Recreation	8,888	(313)	457	(30)	12	(2)	9,357	(345)
Fish and Wildlife Propagation	2,963	(106)	6,294	(232)	10	(1)	9,267	(339)
Drinking Water Supply	887	(16)	182	(6)			1,069	(22)
Outstanding Natural Resource Waters	1,252	(45)	333	(15)	2	(1)	1,587	(61)
Oyster Propagation	290	(16)	180	(13)			470	(29)
Limited Aquatic Life and Wildlife Use	19	(2)	71	(4)			90	(6)
Agriculture	2,034	(59)			10	(1)	2,044	(60)

Suspected Causes of Non-Support of Designated Uses

Table 3.3.2

Total sizes of Louisiana rivers and streams not fully supporting designated uses due to various suspected causes of impairment, *2014 Integrated Report* assessment (reported in miles and water body count).

Suspected Cause of Impairment	Size	Count
1,1,1,2-Tetrachloroethane	12	1
1,2-Dichloroethane	8	1
2,3,7,8-Tetrachlorodibenzofuran	70	2
2,3,7,8-Tetrachlorodibenzo-p-dioxin (only)	70	2
Atrazine	43	1
Benzo(a)pyrene (PAHs)	13	2
Bromoform	12	1
Carbofuran	930	23
Chloride	739	32
Color	182	6
Copper	8	2
DDT	749	6
Fecal Coliform	2,990	115
Fipronil	252	6
Hexachlorobenzene	12	1
Hexachlorobutadiene	12	1
Lead	465	15
Mercury in Fish Tissue	2,395	73
Methoxychlor	8	1
Methyl Parathion	43	1
Nitrate/Nitrite (Nitrite + Nitrate as N)	950	39
Non-Native Aquatic Plants	530	27
Oxygen, Dissolved	4,150	144
pH, High	11	1
pH, Low	63	3
Phenols	8	1
Phosphorus (Total)	886	37
Polychlorinated biphenyls	41	3
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	29	2
Sulfates	926	45
Temperature, water	126	8
Total Dissolved Solids	1,380	63
Toxaphene	420	2
Turbidity	2,113	60

Suspected Sources of Non-Support of Designated Uses

Table 3.3.3

Total sizes of Louisiana rivers and streams not fully supporting designated uses due to various suspected sources of impairment, *2014 Integrated Report* assessment (reported in miles and water body count).

Suspected Sources of Impairment	Size	Count
Agriculture	2,451	65
Algae Bloom	11	1
Atmospheric Deposition - Toxics	2,395	73
CERCLA NPL (Superfund) Sites	13	2
Changes in Tidal Circulation/Flushing	7	1
Contaminated Sediments	13	2
Dairies (Outside Milk Parlor Areas)	10	1
Discharges from Municipal Separate Storm Sewer Systems (MS4)	86	6
Drainage/Filling/Loss of Wetlands	40	2
Dredging (e.g., for Navigation Channels)	40	1
Drought-related Impacts	455	19
Flow Alterations from Water Diversions	147	5
Forced Drainage Pumping	59	5
Freshets or Major Flooding	76	5
Impacts from Hydrostructure Flow Regulation/modification	46	2
Industrial Point Source Discharge	376	14
Introduction of Non-native Organisms (Accidental or Intentional)	530	27
Livestock (Grazing or Feeding Operations)	525	19
Managed Pasture Grazing	23	1
Marina/Boating Sanitary On-vessel Discharges	98	7
Municipal (Urbanized High Density Area)	36	2
Municipal Point Source Discharges	486	23
Natural Sources	2,904	120
Naturally Occurring Organic Acids	63	3
Non-irrigated Crop Production	11	1
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	1,847	81
Package Plant or Other Permitted Small Flows Discharges	755	36
Petroleum/natural Gas Activities	44	2
Residential Districts	86	3
Runoff from Forest/Grassland/Parkland	311	9
Rural (Residential Areas)	337	11
Sanitary Sewer Overflows (Collection System Failures)	332	12
Seafood Processing Operations	7	1
Sediment Resuspension (Clean Sediment)	96	8
Sewage Discharges in Unsewered Areas	313	17
Silviculture Activities	307	11

Table 3.3.3

Total sizes of Louisiana rivers and streams not fully supporting designated uses due to various suspected sources of impairment, *2014 Integrated Report* assessment (reported in miles and water body count).

Suspected Sources of Impairment	Size	Count
Site Clearance (Land Development or Redevelopment)	122	5
Source Unknown	3,795	123
Sources Outside State Jurisdiction or Borders	145	6
Transfer of Water from an Outside Watershed	14	1
Upstream Source	67	5
Waterfowl	397	11
Wildlife Other than Waterfowl	414	21

Chapter 4: Lake Water Quality Assessment

The information reported in Table 3.4.1 is based upon the reported use support for all applicable water body designated uses, as determined through monitoring data assessments. The lake acres and subsegment counts of impaired water bodies identified as being impacted by various suspected causes of impairment are shown in Table 3.4.2. The acres and count impacted by various suspected sources of impairment are shown in Table 3.4.3. Tables 3.4.2 and 3.4.3 refer only to those water bodies that were assessed as not supporting designated uses. The tables are not ranked by order of impact. Assessment results for all water body subsegments, as defined in LAC 33:IX.1123, Table 3, can be found in Appendices A, B.

Table 3.4.1

Summary of designated use support for Louisiana lakes, *2014 Integrated Report* assessment (reported in acres (water body count)).

Designated Use	Size Fully Supported	Size Not Supported	Not Assessed	Total Size for Designated Use
Primary Contact Recreation	594,324 (53)	61,564 (8)	2,322 (4)	658,210 (65)
Secondary Contact Recreation	646,640 (60)	9,248 (1)	2,322 (4)	658,210 (65)
Fish and Wildlife Propagation	25,620 (9)	630,268 (52)	2,322 (4)	658,210 (65)
Drinking Water Supply	259,686 (9)	2,690 (1)	38 (1)	262,414 (11)
Agriculture	425,672 (15)	-- --	326 (1)	425,998 (16)

Suspected Causes of Non-Support of Designated Uses

Table 3.4.2

Total sizes of Louisiana lakes not fully supporting designated uses due to various suspected causes of impairment, *2014 Integrated Report* assessment (reported in acres and water body count).

Suspected Cause of Impairment	Size	Count
Arsenic	24	1
Carbofuran	83,840	1
Chloride	51,840	1
Color	2,690	1
Fecal Coliform	70,530	8
Hexachlorobenzene	24	1
Hexachlorobutadiene	24	1
Lead	24	1

Table 3.4.2

Total sizes of Louisiana lakes not fully supporting designated uses due to various suspected causes of impairment, *2014 Integrated Report* assessment (reported in acres and water body count).

Suspected Cause of Impairment	Size	Count
Mercury in Fish Tissue	318,481	20
Nitrate/Nitrite (Nitrite + Nitrate as N)	11,939	6
Non-Native Aquatic Plants	319,163	16
Oil and Grease	24	1
Oxygen, Dissolved	119,128	25
pH, High	31,840	5
pH, Low	10,623	3
Phosphorus (Total)	11,939	6
Polychlorinated biphenyls	2,260	3
Sulfates	69,199	5
Temperature, water	1,383	2
Total Dissolved Solids	70,476	6
Turbidity	257,311	19

Suspected Sources of Non-Support of Designated Uses

Table 3.4.3

Total sizes of Louisiana lakes not fully supporting designated uses due to various suspected sources of impairment, *2014 Integrated Report* assessment (reported in acres and water body count).

Suspected Source of Impairment	Size	Count
Agriculture	131,442	12
Algae Bloom	31,840	5
Atmospheric Deposition – Toxics	318,457	19
Contaminated Sediments	24	1
Discharges from Municipal Separate Storm Sewer Systems (MS4)	84	2
Drought-related Impacts	6,383	3
Impacts from Hydrostructure Flow Regulation/modification	1,581	1
Industrial Point Source Discharge	2,200	2
Industrial/Commercial Site Stormwater Discharge (Permitted)	84	2
Introduction of Non-native Organisms (Accidental or Intentional)	319,163	16
Livestock (Grazing or Feeding Operations)	26,880	1
Natural Sources	198,543	19
Naturally Occurring Organic Acids	10,623	3
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	7,104	1
Package Plant or Other Permitted Small Flows Discharges	10,349	2
Pesticide Application	1,594	1

Table 3.4.3

Total sizes of Louisiana lakes not fully supporting designated uses due to various suspected sources of impairment, *2014 Integrated Report* assessment (reported in acres and water body count).

Suspected Source of Impairment	Size	Count
Runoff from Forest/Grassland/Parkland	7,104	1
Rural (Residential Areas)	3,300	2
Sanitary Sewer Overflows (Collection System Failures)	9,272	2
Sediment Resuspension (Clean Sediment)	66,778	4
Sewage Discharges in Unsewered Areas	5,869	7
Silviculture Activities	1,747	1
Site Clearance (Land Development or Redevelopment)	10,995	2
Source Unknown	349,046	26
Streambank Modifications/destabilization	1,747	1
Unspecified Land Disturbance	2,598	1
Upstream Source	24	1
Urban Runoff/Storm Sewers	24	1
Waterfowl	70,362	4

Chapter 5: Estuary and Coastal Water Quality Assessment

The information reported in Table 3.5.1 is based upon the reported use support for all applicable water body designated uses, as determined through monitoring data assessments. The estuary square miles and subsegment counts of impaired water bodies identified as being impacted by various suspected causes of impairment are shown in Table 3.5.2. The square miles and count impacted by various suspected sources of impairment are shown in Table 3.5.3. Tables 3.5.2 and 3.5.3 refer only to those water bodies that were assessed as not supporting designated uses. The tables are not ranked by order of impact. Assessment results for all water body subsegments, as defined in LAC 33:IX.1123, Table 3, can be found in Appendices A, B.

Table 3.5.1

Summary of designated use support for Louisiana estuaries, *2014 Integrated Report* assessment (reported in square miles (water body count)).

Designated Use	Size Fully Supported		Size Not Supported		Total Size for Designated Use	
Primary Contact Recreation	3,990	(44)	964	(8)	4,954	(52)
Secondary Contact Recreation	4,053	(46)	901	(6)	4,954	(52)
Fish and Wildlife Propagation	3,196	(39)	1,758	(13)	4,954	(52)
Oyster Propagation	3,105	(31)	1,163	(9)	4,268	(40)

Suspected Causes of Non-Support of Designated Uses

Table 3.5.2

Total sizes of Louisiana estuaries not fully supporting designated uses due to various suspected causes of impairment, *2014 Integrated Report* assessment (reported in square miles and water body count).

Suspected Cause of Impairment	Size	Count
Carbofuran	187	1
Chloride	6	1
Fecal Coliform	1,165	10
Mercury in Fish Tissue	1,657	9
Non-Native Aquatic Plants	91	1
Oxygen, Dissolved	667	5
Sulfates	6	1
Total Dissolved Solids	6	1
Turbidity	187	1

Suspected Sources of Non-Support of Designated Uses

Table 3.5.3

Total sizes of Louisiana estuaries not fully supporting designated uses due to various suspected sources of impairment, *2014 Integrated Report* assessment (reported in square miles and water body count).

Suspected Sources of Impairment	Size	Count
Agriculture	187	1
Atmospheric Deposition - Toxics	1,657	9
Discharges from Municipal Separate Storm Sewer Systems (MS4)	2	1
Drought-related Impacts	2	1
Introduction of Non-native Organisms (Accidental or Intentional)	91	1
Natural Sources	589	5
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	519	4
Package Plant or Other Permitted Small Flows Discharges	701	4
Sanitary Sewer Overflows (Collection System Failures)	4	2
Source Unknown	1,657	9
Upstream Source	663	3
Waterfowl	265	4
Wet Weather Discharges (Non-Point Source)	2	1
Wildlife Other than Waterfowl	266	5

Chapter 6: Wetland Water Quality Assessment

The information reported in Table 3.6.1 is based upon the reported use support for all applicable water body designated uses, as determined through monitoring data assessments. The wetland acres and subsegment counts of impaired water bodies identified as being impacted by various suspected causes of impairment are shown in Table 3.6.2. The acres impacted by various suspected sources of impairment are shown in Table 3.6.3. Tables 3.6.2 and 3.6.3 refer only to those water bodies that were assessed as not supporting designated uses. The tables are not ranked by order of impact. Assessment results for all water body subsegments, as defined in LAC 33:IX.1123, Table 3, can be found in Appendices A, B.

Table 3.6.1

Summary of designated use support for Louisiana wetlands, *2014 Integrated Report* assessment (reported in acres (water body count)).

Designated Use	Size Fully Supported	Size Not Supported	Not Assessed	Total Size for Designated Uses
Primary Contact Recreation	945,280 (4)	80,000 (2)		1,025,280 (6)
Secondary Contact Recreation	952,960 (5)	72,320 (1)	51,773 (10)	1,077,053 (16)
Fish and Wildlife Propagation	622,720 (3)	402,560 (3)	51,773 (10)	1,077,053 (16)
Drinking Water Supply	464,000 (1)			464,000 (1)
Oyster Propagation		72,320 (1)		72,320 (1)

Suspected Causes of Non-Support of Designated Uses

Table 3.6.2

Total sizes of Louisiana wetlands not fully supporting designated uses due to various suspected causes of impairment, *2014 Integrated Report* assessment (reported in acres and water body count).

Suspected Cause of Impairment	Size	Count
Chloride	7,680	1
Fecal Coliform	72,320	1
Mercury in Fish Tissue	199,040	1
Oxygen, Dissolved	402,560	3
Sulfates	7,680	1
Temperature, water	7,680	1
Total Dissolved Solids	7,680	1

Suspected Sources of Non-Support of Designated Uses

Table 3.6.3

Total sizes of Louisiana wetlands not fully supporting designated uses due to various suspected sources of impairment, *2014 Integrated Report* assessment (reported in acres and water body count).

Suspected Sources of Impairment	Size	Count
Agriculture	195,840	1
Atmospheric Deposition - Toxics	199,040	1
Freshets or Major Flooding	7,680	1
Impacts from Hydrostructure Flow Regulation/modification	7,680	1
Natural Sources	7,680	1
Source Unknown	199,040	1
Waterfowl	72,320	1
Wildlife Other than Waterfowl	72,320	1

Chapter 7: Public Health/Aquatic Life Concerns

Fishing and Swimming Advisories Currently in Effect

LDEQ currently issues fish consumption and swimming advisories in conjunction with the LDHH Health/Fish Consumption Advisories Program. Fish consumption advisories are set using a risk assessment-based method that establishes consumption levels designed to prevent adverse effects on public health. Risk assessments are used to determine safe consumption levels for different segments of the population. For example, children, women of childbearing age, or breastfeeding women are often considered separately in developing risk assessments because this population is generally considered to be at greater risk from consumption of contaminated seafood. Therefore, limited consumption advisories will often be stricter for this population.

Swimming advisories are generally established due to fecal coliform contamination of a water body. However, a limited number of swimming advisories have been based on chemical contamination of water or sediments. Fecal coliform contamination of a water body can be caused by a number of possible sources including absent or inadequate sewage treatment systems, poorly maintained septic tanks, direct sewage discharges from camps, pasture and animal holding area runoff, and wildlife. Efforts are being made to correct these problems statewide. For the latest information on advisories please refer to LDEQ's website at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=1631.

PART IV: GROUNDWATER ASSESSMENT

Introduction

The LDEQ Business Community Outreach and Incentive Division's (BCOID) Aquifer Sampling and Assessment Program (ASSET) provides water quality data from freshwater aquifers around the state

(http://www.deq.louisiana.gov/portal/DIVISIONS/BusinessandCommunityOutreach/AquiferEvaluationandProtection.aspx). The ASSET Program is an ambient groundwater monitoring program designed to determine and monitor the quality of groundwater produced from Louisiana's major freshwater aquifers. The ASSET Program samples approximately 200 water wells located in 14 aquifers and aquifer systems across the state. The sampling process is designed so that all 14 aquifers and aquifer systems are monitored on a rotating basis, within a three-year period, so that each well is monitored every three years.

The USEPA has encouraged states to select an aquifer or hydrogeologic setting and discuss available data that best reflects the quality of the resource. For this report, fiscal year 2013 ASSET Program monitoring data from the Sparta aquifer is presented.

Table 4.1.1 shows the hydrogeologic column of aquifers in Louisiana and the occurrence of the Sparta aquifer in regard to other aquifers in the state. Table 4.1.2 is designed to provide an indication of the most critical contaminant sources and contaminants impacting groundwater resources in Louisiana. Table 4.1.3 provides a summary of Louisiana groundwater protection programs with listing of legislation, statutes, rules, and/or regulations that are in place. It also provides an indication of the comprehensive nature of groundwater protection activities in Louisiana. Table 4.1.4 provides information on the number of wells used for this report, the number of wells reporting non-detects for parameter groups of interest, and a more detailed look at the occurrence of nitrite-nitrate (NO2NO3). Table 4.1.5 lists the wells sampled, their total depths, the use made of produced waters, and dates sampled. For quality control, duplicate samples were taken for each parameter at wells BI-212, MO-253, and SA-570.

Table 4.1.6 lists the field and conventional parameters, and Table 4.1.7 lists the inorganic (total metals) parameters for which samples were collected. They also detail the analytical results for those parameters for each well. Table 4.1.8 lists the field and conventional parameters' statistical values for minimum, maximum, and average concentrations, while Table 4.1.9 provides a listing of inorganic statistics of minimum, maximum, and average values. It should be noted that, per departmental standard procedure, one-half the detection limit is used when determining averages when a non-detect (ND) is reported. This procedure is utilized throughout the groundwater portion (Part IV) of this report whenever average values are listed or discussed. Also note that the terms Laboratory Detection Limit, Detection Limit (DL), and Method Detection Limit (MDL), are used interchangeably in Part IV of this report.

Ambient Monitoring Network for the Sparta Aquifer

The data that follow were derived from the ASSET Program, which is conducted as a Clean Water Act activity. The objectives of the program are to determine and monitor the quality of groundwater produced from the freshwater aquifers across Louisiana, and to provide water

quality data to the department, other state and federal agencies, and the corporate and private citizens of Louisiana.

Data contained in Table 4.1.5 show that from August 2012 through January 2013, 14 wells that produce from the Sparta aquifer were sampled. Ten of the 14 wells are classified as public supply and the remaining four are classified as industrial use wells. The wells are located in ten parishes in the north central and western areas of the state.

Well data for registered water wells were obtained from the Louisiana Department of Natural Resources' Water Well Registration Data file, also known as SONRIS (Strategic Online Natural Resources Information System).

Geology

The Sparta aquifer system is within the Eocene Sparta formation of the Claiborne group. The aquifer units consist of fine to medium sand with interbedded coarse sand, silty clay and lignite. Interconnected sands become more massive and coarsen slightly with depth and are laterally discontinuous. The Sparta aquifer is confined downdip by the clays of the overlying Cook Mountain formation and the clays and silty clays of the Cane river formation.

Hydrogeology

The Sparta aquifer is recharged through direct infiltration of rainfall, the movement of water through overlying terrace and alluvial deposits, and leakage from the Cockfield and Carrizo-Wilcox aquifers. The Sparta is pumped in a large area of north central Louisiana and in a narrow band through Natchitoches and Sabine parishes. The two areas are separated by a saltwater ridge below the Red River valley. Groundwater movement is eastward toward the Mississippi River Valley and southward toward the Gulf of Mexico, except when altered by heavy pumping, and the hydraulic conductivity varies between 25 to 100 feet/day.

The maximum depths of occurrence of freshwater in the Sparta range from 200 feet above sea level, to 1,700 feet below sea level. The range of thickness of the fresh water interval in the Sparta is 50 to 700 feet. The depths of the Sparta wells that were monitored in conjunction with the ASSET Program range from 153 to 773 feet.

Program Parameters

The field parameters checked at each sampling site and the list of conventional parameters analyzed in the laboratory are shown in Table 4.1.6 The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 4.1.7. These tables also show the field and analytical results determined for those analytes. Tables 4.1.8 and 4.1.9 provide a statistical overview of conventional and inorganic data for the Sparta aquifer, listing the minimum, maximum, and average results for these parameters. Table 4.1.10 lists the Federal Maximum Contaminant Level (primary and secondary) and Action Level for applicable parameters.

In addition to the conventional and inorganic analytical parameters, the target analyte list includes three other categories of compounds: volatile organic compounds (VOCs), semi-volatile

organic compounds (SVOCs), and pesticides/PCBs. Due to the large number of analytes in these categories, tables were not prepared showing the analytical results for these compounds. A discussion of detections from any of these three categories, if necessary, can be found in their respective sections. Tables 4.1.11, 4.1.12, and 4.1.13 list the target analytes and detection limits for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Figure 4.1.1 shows the geographic locations of the Sparta aquifer and associated wells.

Interpretation of Data

Under the Federal Safe Drinking Water Act, EPA has established maximum contaminant levels (MCLs) for pollutants that may pose a health risk in public drinking water. An MCL is the highest level of a contaminant that EPA allows in public drinking water. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. While not all wells sampled were public supply wells, the ASSET Program does use MCLs as a benchmark for further evaluation.

EPA has also set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 4.1.6 and 4.1.7 show that one or more secondary MCLs (SMCLs) were exceeded in nine of the 14 wells sampled in the Sparta aquifer, with a total of five SMCLs being exceeded.

In addition to primary and secondary MCLs, EPA has established Action Levels for particular compounds. If the action levels are exceeded, then a Treatment Technique is required by public water supply systems to control the corrosiveness of the distributed water. The data show that no Action Level was exceeded in any of the ASSET Program wells sampled for this time period.

Field and Conventional Parameters

Table 4.1.6 shows the field and conventional parameters for which samples are collected at each well and the analytical results for field and laboratory parameters. Table 4.1.8 provides an overview of these parameters for the Sparta aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards

A review of the analysis listed in Table 4.1.6 shows that no primary MCL was exceeded for field and conventional parameters for this reporting period. Those ASSET wells reporting turbidity levels greater than 1.0 NTU do not exceed the Primary MCL of 1.0, as this standard applies to surface water systems and groundwater systems under the direct influence of surface water.

Federal Secondary Drinking Water Standards

A review of the analysis listed in Table 4.1.6 shows that seven wells exceeded the SMCL for pH and color, four for total dissolved solids (TDS), and one well exceeded the SMCL for chloride. The exceedances were as follows.

pH (SMCL = 6.5 – 8.5 Standard Units):
CA-105 – 8.79 SU
L-32 – 8.75 SU
MO-253 – 8.80 SU (Original and duplicate sample)
OU-506 – 8.99 SU
OU-635 – 8.61 SU
SA-570 – 6.11 SU (Original and duplicate sample)
UN-205 – 8.86 SU

Color (SMCL = 15 PCU)
BI-212 – 43.1 PCU (Original sample); ND (Duplicate sample)
L-31 – 25.0 PCU
MO-253 – 43.0 PCU (Original and duplicate sample)
OU-506 – 47.0 PCU
OU-635 – 34.0 PCU
SA-570 – 25.0 PCU (Original sample); 8.0 PCU (Duplicate sample)
W-237 – 86.0 PCU

Total Dissolved Solids (SMCL = 500 mg/L):
MO-253 – 1,250 mg/L (Original sample); 1,200 mg/L (Duplicate sample)
OU-506 – 580 mg/L
OU-635 – 1,020 mg/L
UN-205 – 917 mg/L

Chloride (SMCL = 250 mg/L):
MO-253 – 395 mg/L (Original sample) 367 mg/L (Duplicate sample)

Inorganic Parameters

Table 4.1.7 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 4.1.9 provides an overview of inorganic data for the Sparta aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards

A review of the analyses listed on Table 4.1.7 shows that no primary MCL was exceeded for inorganic (total metals) parameters for this reporting period.

Federal Secondary Drinking Water Standards

Laboratory data contained in Table 4.1.7 show that three wells exceeded the secondary MCL for iron. The exceedances were as follows.

Iron (SMCL = 300 µg/L):
BI-212 – 1,960 µg/L (Original sample); 2,020 µg/L (Duplicate sample)

CL-203 – 1,330 µg/L
SA-570 – 4,020 µg/L (Original sample); 3,190 µg/L (Duplicate sample)

Volatile Organic Compounds

Table 4.1.11 shows the volatile organic compound (VOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however, any detection of a VOC would be discussed in this section.

Four wells reported detectable quantities of VOCs. Of those VOCs detected, only one has a primary MCL established for it. 1,2-Dicholorethane was detected in well SA-570 (an industrial use well) at 0.9 µg/L, whereas the MCL for this compound is 5 µg/L. The remaining VOCs detected are typical lab contaminants and/or by-products of disinfection in public supply water systems and do not have MCLs established for them. However, due to these detections, close attention will be given to VOC testing in future ASSET monitoring of the Sparta aquifer. The exceedances were as follows.

Volatile Organic Compounds detected in Sparta aquifer wells

BI-192
- Chloromethane, 0.84 µg/L

BI-212
- Bromothmethane, 1.6 µg/L (Original, ND in duplicate sample)
- Chloromethane, 0.66 µg/L (Original sample), 0.87 µg/L (Duplicate sample)

L-31
- Bromodichloromethane, 4.4 µg/L
- Bromoform, 5.3 µg/L
- Chloroform, 2.0 µg/L
- Dibromochloromethane, 7.5 µg/L

SA-570
- 1,2-Dichloroethane, 0.9 µg/L (MCL = 5 µg/L)

Semi-Volatile Organic Compounds

Table 4.1.12 shows the semi-volatile organic compound (SVOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however, any detection of a SVOC would be discussed in this section. There were no confirmed detections of any SVOC at or above its detection limit during the sampling of the Sparta aquifer.

Pesticides and PCBs

Table 4.1.13 shows the pesticide and PCB parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however, any detection of a pesticide or PCB would be discussed in this section.

No pesticide or PCB was detected at or above its detection limit during this sampling of the Sparta aquifer.

Summary and Recommendations

In summary, the data show that the groundwater produced from the Sparta aquifer is soft (classification based on hardness scale from: Peavy, H. S. et al., Environmental Engineering, 1985). The data also show that this aquifer is of good quality when considering short-term or long-term health-based risk exposure limits in that no primary MCLs were exceeded. The data show that the Sparta aquifer is of fair quality based on taste, odor, or appearance guidelines, with five SMCLs being exceeded in nine of the 14 wells sampled.

Table 4.1.1

Hydrogeologic column of aquifers in Louisiana.

SYSTEM	SERIES	Stratigraphic Unit		Hydrogeologic Unit: Northern Louisiana — Aquifer or confining unit	Central and southwestern Louisiana — Aquifer system or confining unit	Aquifer or confining unit: Lake Charles area	Aquifer or confining unit: Rice growing area	Southeastern Louisiana — Aquifer system or confining unit	Aquifer[1] or confining unit: Baton Rouge area	St. Tammany, Tangipahoa, and Washington Parishes	New Orleans area and lower Mississippi River parishes
Quaternary	Pleistocene	Red River alluvial deposits Miss. River alluvial deposits Northern La. Terrace deposits Unnamed Pleistocene deposits		Red River alluvial aquifer or surficial confining unit Mississippi River alluvial aquifer or surficial confining unit Upland terrace aquifer or surficial confining unit	Chicot aquifer system or surficial confining unit	"200-foot" sand	Upper sand unit	Chicot Equivalent aquifer system[2] or surficial confining unit	Mississippi River alluvial aquifer or surficial confining unit Shallow sand "400-foot" sand "600-foot" sand	Upland terrace aquifer Upper Ponchatoula aquifer	Gramercy aquifer[3] Norco aquifer[3] Gonzales-New Orleans Aquifer[3] "1,200-foot" sand[3]
						"500-foot" sand "700-foot" sand	Lower sand unit				
Tertiary	Pliocene -----?----- Miocene -----?----- Oligocene	Fleming Formation	Blounts Creek Member	Pliocene-Miocene aquifers are absent in this area	Evangeline aquifer or surficial confining unit			Evangeline equivalent aquifer system[2] or surficial confining unit	"800-foot" sand "1,000-foot" sand "1,200-foot" sand "1,500-foot" sand "1,700-foot" sand	Lower Ponchatoula Aquifer Big Branch aquifer Kentwood aquifer Abita aquifer Covington aquifer Slidell aquifer	
			Castor Creek Member		Castor Creek confining unit			Unnamed confining unit	"2,000-foot" sand "2,400-foot" sand "2,800-foot" sand	Tchefuncte aquifer Hammond aquifer Amite aquifer Ramsay aquifer Franklinton aquifer	
			Williamson Creek Member Dough Hills Member Carnahan Bayou Member		Jasper aquifer system or surficial confining unit	Williamson Creek aquifer Dough Hills confining unit Carnahan Bayou aquifer		Jasper equivalent aquifer system[2] or surficial confining unit			
			Lena Member		Lena confining unit			Unnamed confining unit			
		Catahoula Formation			Catahoula aquifer			Catahoula equivalent aquifer system[2] or surficial confining unit			
		Vicksburg Group, undifferentiated		Vicksburg-Jackson confining unit							
	Eocene	Jackson Group, undifferentiated									
		Claiborne Group	Cockfield Formation	Cockfield aquifer or surficial confining unit							
			Cook Mountain Formation	Cook Mountain aquifer or confining unit							
			Sparta Sand	Sparta aquifer or surficial confining unit							
			Cane River Formation	Cane River aquifer or confining unit							
			Carrizo Sand	Carrizo-Wilcox aquifer or surficial confining unit							
	Paleocene	Wilcox Group, undifferentiated									
		Midway Group, undifferentiated		Midway confining unit							

No fresh water occurs in older aquifers

[1]Clay units separating aquifers in southeastern Louisiana are discontinuous and unnamed.
[2]Four aquifer systems as a group are called the Southern Hills aquifer system.
[3]Four aquifers as a group are called the New Orleans aquifer system.

Source: DOTD/USGS Water Resources Special Report No. 9, 1995

Index to Table 4.1.2

Factors in selecting a contaminant source

A. Human health and/or environmental risk (toxicity)
B. Size of the population at risk
C. Location of the sources relative to drinking water sources
D. Number and/or size of contaminant sources
E. Hydrogeologic sensitivity
F. State findings, other findings
G. Documented from mandatory reporting
H. Geographic distribution/occurrence
I. Other criteria – high to very high priority in localized areas of the state

Contaminants

A. Inorganic pesticides
B. Organic pesticides
C. Halogenated solvents
D. Petroleum compounds
E. Nitrate
F. Fluoride
G. Salinity/brine
H. Metals
I. Radionuclides
J. Bacteria
K. Protozoa
L. Viruses
M. Other – sulfates from gypsum stacks

Table 4.1.2
Major sources of groundwater contamination in the freshwater aquifers of Louisiana.

Contaminant Source	Ten Highest-Priority Sources(✓)	Factors in Selecting a Contaminant Source	Contaminants
Agricultural Activities			
Agricultural chemical facilities			
Animal feedlots			
Drainage wells			
Fertilizer applications			
Irrigation practices			
Pesticide applications			
On-farm agricultural mixing and loading procedures			
Land application of manure (unregulated)			
Storage and Treatment			
Land Application			
Material stockpiles			
Storage tanks (above ground)	✓	A,B,C,D,E,F,G	B,C,D
Storage tanks (underground)	✓	A,B,C,D,E,F,	B,C,D
Surface impoundments	✓	A,B,C,D,E,F,G	C,D,G,H,J,L
Waste piles	✓	D,G	I,M
Waste tailings			
Disposal Activities			
Deep injection wells			
Landfills	✓	A,B,C,D,E,F,G	A,B,C,D,E,H
Septic systems	✓	C,D,G	A,B,C,D,E,H,J,L
Shallow injection wells			
Other			
Hazardous waste generators*			
Hazardous waste sites*			
Industrial facilities*			
Material transfer operations*			
Mining and mine drainage			
Pipelines and sewer lines	✓	A,B,C,D,E,F,G	C,D,G
Salt storage and road salting			
Salt water intrusion	✓	B,C,E,G	G
Spills	✓	B,D,G	C,D
Transportation of materials			
Urban runoff	✓	A,B,D,G	A,B,C,D,E,H,J,L
Small-scale manufacturing and repair shops			
Other sources (please specify)			

* Represents facilities with multiple sources of groundwater contamination rather than unit sources.

Table 4.1.3
State groundwater protection programs for Louisiana with their implementations status.

Programs or Activities	Check	Implementation Status	Responsible State Agency
Active Superfund Amendments and Reauthorization Act (SARA) Title III Program	✓	Fully established	LDEQ
Ambient groundwater monitoring system	✓	Fully established	LDEQ
Aquifer vulnerability assessment	✓	Fully established	LDEQ
Aquifer mapping	✓	Fully established	LDEQ
Aquifer characterization	✓	Continuing efforts	LDOTD
Comprehensive data management system	✓	Continuing efforts	LDEQ
USEPA-endorsed Core Comprehensive State Groundwater Protection Program (CSGWPP)	✓	Pending	LDEQ
Groundwater discharge permits	✓	Fully established	LDNR(UIC)
Groundwater Best Management Practices	✓	Continuing efforts	LDEQ
Groundwater legislation	✓	Continuing efforts	LDNR
Groundwater classification	✓	Continuing efforts	LDNR
Groundwater quality standards	✓	Continuing efforts	LDEQ
Interagency coordination for groundwater protection initiatives	✓	Continuing efforts	LDNR
Nonpoint source controls	✓	Continuing efforts	LDEQ, LDAF
Pesticide State Management Plan	✓	Fully Established	LDAF
Pollution Prevention Program	✓	Continuing efforts	LDEQ
Resource Conservation and Recovery Act (RCRA) Primacy	✓	Fully established	LDEQ
Source Water Assessment Program	✓	Fully established	LDEQ
State Superfund	✓	Fully established	LDEQ
State RCRA Program incorporating more stringent requirements than RCRA Primacy	✓	Continuing efforts	LDEQ
State septic system regulations	✓	Fully established	LDHH
Underground storage tank installation requirements	✓	Fully established	LDEQ
Underground Storage Tank Remediation Fund	✓	Fully established	LDEQ
Underground Storage Tank Permit Program	✓	Fully established	LDEQ
Underground Injection Control Program	✓	Fully established	LDNR
Vulnerability assessment for drinking water/wellhead protection	✓	Fully established	LDEQ
Well abandonment regulations	✓	Fully established	LDNR
Wellhead Protection Program (USEPA-approved)	✓	Fully established	LDEQ
Well installation regulations	✓	Fully established	LDNR

Table 4.1.4

Monitoring Data

Hydrogeologic Setting: **Eocene Age Aquifer**
Spatial Description: **North Central Louisiana**
Map Available: **See Figure 4.1.1**
Data Reporting Period: **August 2012 – January 2013**

Monitoring Data Type	Total No. of Wells Used in the Assess-ment	Parameter Groups	Number of Wells									
			No detections of parameters above MDLs or background levels		Nitrite/nitrate concentrations range from background levels to less than or equal to 5 mg/l. No detections of parameters other than nitrite/nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable.			Nitrite/nitrate ranges from greater than 5 to less than or equal to 10 mg/l. Other parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs.	Parameters are detected at concentrations exceeding the MCLs	Number of wells removed from service	Number of wells requiring special treatment	Back-ground para-meters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas	Nitrite/ nitrate < 1 mg/l	Nitrite/ nitrate ≥ 1 to ≤5 mg/l	Number of wells in sensitive or vulnerable areas					
Ambient Monitoring Network	14	VOC	10					1				
		SVOC	14									
		NO2NO3	12		1	1						
		†Other	2					12				

† For Other category, the following metals with Primary Drinking Water Standards or Action Levels were considered: Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Lead, Mercury, Selenium, and Thallium.

Table 4.1.5

List of ASSET wells and data sampled that are completed in the Sparta aquifer.

DNR Well Number	Parish	Date Sampled	Owner	Depth (Feet)	Well Use
BI-192	Bienville	11/7/2012	Lucky Water System	153	Public Supply
BI-212	Bienville	11/7/2012	RockTenn	490	Industrial
CA-105	Caldwell	8/15/2012	Vixen Water System	525	Public Supply
CL-203	Claiborne	1/31/2013	Town of Homer	460	Public Supply
L-31	Lincoln	8/15/2012	City of Ruston	636	Public Supply
L-32	Lincoln	8/15/2012	City of Ruston	652	Public Supply
MO-253	Morehouse	8/15/2012	Village of Collinston	773	Public Supply
OU-506	Ouachita	8/15/2012	Angus Chemical	506	Industrial
OU-635	Ouachita	8/15/2012	Graphic Packaging International	726	Industrial
SA-570	Sabine	9/25/2012	Boise	545	Industrial
UN-205	Union	8/15/2012	D'Arbonne Water System	725	Public Supply
W-237	Winn	8/16/2012	Town of Winnfield	430	Public Supply
WB-241	Webster	1/31/2013	Town of Springhill	408	Public Supply
WB-269	Webster	1/31/2013	City of Minden	280	Public Supply

Table 4.1.6
Field measurements and conventional laboratory analytical results for parameters listed.

DNR Well Number	pH SU	Sal. ppt	Sp. Cond. mmhos per cm	TDS g/L	Temp Deg. C	Alk mg/L	Cl mg/L	Color PCU	Hard. mg/L	Nitrite-Nitrate (as N) mg/L	TKN mg/L	Tot. P mg/L	Sp. Cond. µmhos/cm	SO4 mg/L	TDS mg/L	TSS mg/L	Turb. NTU
	Laboratory Detection Limits (MDL) →					**5**	**0.25**	**1**	**5**	**0.01**	**0.3**	**0.05**	**10**	**0.25**	**4.0**	**4.0**	**0.3**
	Field Parameters					**Conventional Laboratory Parameters**											
BI-192	6.67	0.01	0.023	0.015	18.03	< 5	1.89	< 1	< 5	1.05	1.53	< 0.05	124	0.50	190	< 4	0.890
BI-212	6.68	0.1	0.204	0.132	18.95	81.2	7.05	43.1	40.0	< 0.05	0.587	0.074	285	8.76	13.0	< 4	6.78
BI-212*	6.68	0.1	0.204	0.132	18.95	85.1	7.14	< 1	30.0	< 0.05	1.04	0.092	256	9.28	207	< 4	7.18
CA-105	8.79	0.06	1.028	0.668	21.60	560	20.8	100	< 5	< 0.01	0.766	0.836	986	< 0.25	730	< 4	< 0.3
CL-203	7.50	0.06	0.134	0.087	19.35	36.0	5.49	< 1	20.0	< 0.01	0.790	0.105	148	6.25	163	< 4	1.67
L-31	7.89	0.16	0.34	0.221	26.02	136	18.4	25.0	< 5	0.022	0.336	0.443	341	13.1	293	< 4	< 0.3
L-32	8.75	0.16	0.335	0.218	22.81	148	9.39	8.00	< 5	< 0.01	0.421	0.284	328	15.5	277	< 4	< 0.3
MO-253	8.80	1.01	1.99	1.293	23.66	392	395	43.0	< 5	< 0.01	1.28	0.520	1,890	< 0.25	1,250	< 4	< 0.3
MO-253*	8.80	1.01	1.99	1.293	23.66	420	367	43.0	< 5	< 0.01	0.991	0.529	1,920	< 0.25	1,200	< 4	< 0.3
OU-506	8.99	0.45	0.905	0.588	21.15	304	109	47.0	< 5	< 0.01	0.956	0.506	874	1.70	580	< 4	< 0.3
OU-635	8.61	0.82	16.33	1.062	23.14	288	354	34.0	< 5	< 0.01	1.06	0.481	1,580	2.15	1,020	< 4	< 0.3
SA-570	6.11	0.09	0.198	0.129	22.06	55.4	12.3	25.0	7.68	< 0.01	2.23	1.77	188	19.2	123	189	12.3
SA-570*	6.11	0.09	0.198	0.129	22.06	53.5	11.4	8.00	38.4	< 0.01	1.39	1.15	186	19.4	150	89.0	14.3
UN-205	8.86	0.77	1.523	0.99	23.45	176	47.4	8.00	< 5	< 0.01	1.03	0.162	1,460	< 0.25	917	< 4	< 0.3
W-237	8.47	0.31	0.635	0.412	21.29	280	14.9	86.0	5	< 0.01	0.558	0.651	613	5.78	473	11	5.86
WB-241	7.80	0.36	0.733	0.477	18.74	208	70.9	< 1	40	< 0.01	1.32	0.151	762	11.1	453	< 4	1.22
WB-269	7.27	0.12	0.247	0.161	18.02	46	30.1	< 1	18	0.654	0.53	0.120	288	10.9	263	< 4	< 0.3

* Denotes Duplicate Sample; Exceeds USEPA Secondary Standards

Table 4.1.7

Laboratory analytical results for the inorganic (Total Metals) parameters listed.

DNR Well Number	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Cadmium µg/L	Chromium µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Mercury µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Thallium µg/L	Zinc µg/L
Laboratory Detection Limits (MDL)	**5/25**	**4/20**	**25**	**2/10**	**2/10**	**4/20**	**2/10**	**100/500**	**1/5**	**0.2**	**3/15**	**5/25**	**1/5**	**2/10**	**6/30**
BI-192	< 5	< 4	29.1	< 2	< 2	< 4	< 2	272	< 1	< 0.2	< 3	< 5	< 1	< 2	11.4
BI-212	< 5	< 4	74.2	< 2	< 2	< 4	< 2	1,960	< 1	< 0.2	< 3	< 5	< 1	< 2	< 6
BI-212*	< 5	< 4	72.9	< 2	< 2	< 4	2.23	2,020	< 1	< 0.2	< 3	< 5	< 1	< 2	< 6
CA-105	< 25	< 20	< 25	< 10	< 10	< 20	< 10	< 500	< 5	< 0.2	< 15	< 25	< 5	< 10	< 30
CL-203	< 25	< 20	67.9	< 10	< 10	< 20	< 10	1,330	< 5	< 0.2	< 15	< 25	< 5	< 10	< 30
L-31	< 5	< 4	13.6	< 2	< 2	< 4	< 2	298	< 1	< 0.2	< 3	< 5	< 1	< 2	< 6
L-32	< 5	< 4	< 5	< 2	< 2	< 4	< 2	< 100	< 1	< 0.2	< 3	< 5	< 1	< 2	20.7
MO-253	< 25	< 20	25.6	< 10	< 10	< 20	< 10	< 500	< 5	< 0.2	< 15	< 25	< 5	< 10	< 30
MO-253*	< 25	< 20	< 25	< 10	< 10	< 20	< 10	< 500	< 5	< 0.2	< 15	< 25	< 5	< 10	< 30
OU-506	< 5	< 4	8.47	< 2	< 2	< 4	13.4	< 100	< 1	< 0.2	< 3	< 5	< 1	< 2	< 6
OU-506	< 25	< 20	34.0	< 10	< 10	< 20	< 10	< 500	< 5	< 0.2	< 15	< 25	< 5	< 10	< 30
SA-570	< 5	< 4	108	< 2	< 2	< 4	< 2	4,020	< 1	< 0.2	3.66	< 5	< 1	< 2	1,830
SA-570*	< 5	< 4	104	< 2	< 2	< 4	< 2	3,190	< 1	< 0.2	< 3	< 5	< 1	< 2	1,100
UN-205	< 25	< 20	37.6	< 10	< 10	< 20	< 10	< 500	< 5	< 0.2	< 15	< 25	< 5	< 10	< 30
W-237	< 5	< 4	22.1	< 2	< 2	< 4	2.98	214	1.25	< 0.2	< 3	< 5	< 1	< 2	< 6
WB-241	< 25	< 20	222	< 10	< 10	< 20	< 10	< 500	< 5	< 0.2	< 15	< 25	< 5	< 10	31.7
WB-269	< 25	< 20	104	< 10	< 10	< 20	< 10	< 500	< 5	< 0.2	< 15	< 25	< 5	< 10	< 30

*Denotes Duplicate Sample. Exceeds EPA Secondary Standards

Table 4.1.8

Field and conventional statistics for ASSET wells sampled in the Sparta aquifer.

	Parameter	Minimum	Maximum	Average
Field	Temperature (^{O}C)	18.02	26.02	23.35
	pH (SU)	6.11	8.99	7.81
	Specific Conductance (mmhos/cm)	0.023	1.990	0.725
	Salinity (ppt)	0.01	1.01	0.36
	TDS (g/L)	0.015	1.293	0.471
Conventional	Alkalinity (mg/L)	<5	560	192
	Chloride (mg/L)	1.9	395	87.2
	Color (PCU)	<1	100	27.8
	Specific Conductance (µmhos/cm)	124	1,920	719
	Sulfate (mg/L)	<0.25	19.4	7.3
	TDS (mg/L)	13	1,250	488
	TSS (mg/L)	<4	189	18.6
	Turbidity (NTU)	<0.3	14.3	3.03
	Hardness (mg/L)	<5	40	13
	Nitrite - Nitrate, as N (mg/L)	<0.05	1.05	0.11
	Total Kjeldahl Nitrogen (TKN)(mg/L)	0.32	2.23	0.99
	Total Phosphorus (mg/L)	<0.05	1.77	0.46

Table 4.1.9

Inorganic (Total Metals) statistics for ASSET wells sampled in the Sparta aquifer.

Parameter	Minimum	Maximum	Average
Antimony (µg/L)	<5	<5	<5
Arsenic (µg/L)	<4	<4	<4
Barium (µg/L)	5	222	56
Beryllium (µg/L)	<2	<2	<2
Cadmium (µg/L)	<2	<2	<2
Chromium (µg/L)	<4	<4	<4
Copper (µg/L)	<2	13.4	3.8
Iron (µg/L)	<100	4,020	891
Lead (µg/L)	<1	1.25	<1
Mercury (µg/L)	<0.0002	<0.0002	<0.0002
Nickel (µg/L)	<3	3.66	<3
Selenium (µg/L)	<5	<5	<5
Silver (µg/L)	<1	<1	<1
Thallium (µg/L)	<2	<2	<2
Zinc (µg/L)	<6	1,830	183

Table 4.1.10

LDEQ ASSET Program field parameters, conventional, and inorganic analytes with applicable USEPA National Primary (MCL) and Secondary (SMCL) Drinking Water Standards and Action Levels (AL).

Parameter/Analyte		MCL Type / Limit	Unit
FIELD	Temperature (Temp)	-	Degrees C.
	pH	SMCL / ≥ 6.5, ≤ 8.5	SU
	Specific Conductance (Sp. Cond.)	-	mmhos/cm
	Salinity (Sal.)	-	ppt
	Total Dissolved Solids (TDS)	SMCL / 0.5	g/L
CONVENTIONALS	Alkalinity (Alk)	-	mg/L
	Chloride (Cl)	SMCL / 250	mg/L
	Color	SMCL / 15	PCU
	Specific Conductance (Sp. Cond.)	-	µmhos/cm
	Sulfate (SO4)	SMCL / 250	mg/L
	Total Dissolved Solids (TDS)	SMCL / 500	mg/L
	Total Suspended Solids (TSS)	-	mg/L
	Turbidity (Turb)	*MCL / 1	NTU
	Ammonia (NH3)	-	mg/L
	Hardness (Hard)	-	mg/L
	Nitrite-Nitrate (NO2NO3)	MCL / 10	mg/L
	Total Kjeldahl Nitrogen (TKN)	-	mg/L
	Total Phosphorus (Tot. P)	-	mg/L
INORGANICS (TOTAL METALS)	Antimony	MCL / 6	µg/L
	Arsenic	MCL / 10	µg/L
	Barium	MCL / 2,000	µg/L
	Beryllium	MCL / 4	µg/L
	Cadmium	MCL / 5	µg/L
	Chromium	MCL / 100	µg/L
	Copper	AL / 1,300	µg/L
	Iron	SMCL / 300	µg/L
	Lead	AL / 15	µg/L
	Mercury	MCL / 2	µg/L
	Nickel	-	µg/L
	Selenium	MCL / 50	µg/L
	Silver	SMCL / 100	µg/L
	Thallium	MCL / 2	µg/L
	Zinc	SMCL / 5,000	µg/L

MCL = Primary Maximum Contaminant Level; SMCL = Secondary Maximum Contaminant Level; AL = Action Level

* Only applies to public water supply (PWS) systems with surface water source, or groundwater source under the direct influence of surface water. Louisiana Department of Health and Hospitals has determined that no PWS well falls in this category.

Table 4.1.11

ASSET Program Volatile Organic Compounds analyte list with method and detection limits.

Compound	Method	Detection Limits (µg/L)
1,1-Dichloroethane	624	0.5
1,1- Dichloroethene	624	0.5
1,1,1-Trichloroethane	624	0.5
1,1,2- Trichloroethane	624	0.5
1,1,2,2-Tetrachloroethane	624	0.5
1,2-Dichlorobenzene	624	0.5
1,2-Dichloroethane	624	0.5
1,2-Dichloropropane	624	0.5
1,3- Dichlorobenzene	624	0.5
1,4-Dichlorobenzene	624	0.5
Benzene	624	0.5
Bromoform	624	0.5
Carbon Tetrachloride	624	0.5
Chlorobenzene	624	0.5
Dibromochloromethane	624	0.5
Chloroethane	624	0.5
trans-1,2-Dichloroethene	624	0.5
cis-1,3-Dichloropropene	624	0.5
Bromodichloromethane	624	0.5
Methylene Chloride	624	0.5
Ethyl Benzene	624	0.5
Bromomethane	624	0.5
Chloromethane	624	0.5
o-Xylene	624	0.5
Styrene	624	0.5
Methyl-t-Butyl Ether	624	0.5
Tetrachloroethene	624	0.5
Toluene	624	0.5
trans-1,3-Dichloropropene	624	0.5
Trichloroethene	624	0.5
Trichlorofluoromethane	624	0.5
Chloroform	624	0.5
Vinyl Chloride	624	0.5
m & p-Xylenes	624	1

Table 4.1.12

ASSET Program Semi-Volatile Organic Compounds analyte list with method and detection limits.

Compound	Method	Detection Limits (µg/L)
1,2-Dichlorobenzene	625	5
1,2,3-Trichlorobenzene	625	5
1,2,3,4-Tetrachlorobenzene	625	5
1,2,4-Trichlorobenzene	625	5
1,2,4,5-Tetrachlorobenzene	625	5
1,3-Dichlorobenzene	625	5
1,3,5-Trichlorobenzene	625	5
1,4-Dichlorobenzene	625	5
2-Chloronaphthalene	625	5
2-Chlorophenol	625	5
2-Methyl-4,6-dinitrophenol	625	10
2-Nitrophenol	625	10
2,4-Dichlorophenol	625	5
2,4-Dimethylphenol	625	5
2,4-Dinitrophenol	625	20
2,4-Dinitrotoluene	625	5
2,4,6-Trichlorophenol	625	5
2,6-Dinitrotoluene	625	5
3,3'-Dichlorobenzidine	625	5
4-Bromophenyl phenyl ether	625	5
4-Chloro-3-methylphenol	625	5
4-Chlorophenyl phenyl ether	625	5
4-Nitrophenol	625	10
Acenaphthene	625	5
Acenaphthylene	625	5
Anthracene	625	5
Benzidine	625	10
Benzo[a]pyrene	625	5
Benzo[k]fluoranthene	625	5
Benzo[a]anthracene	625	5
Benzo[b]fluoranthene	625	5
Benzo[g,h,i]perylene	625	5
Bis(2-chloroethoxy)methane	625	5
Bis(2-ethylhexyl)phthalate	625	5
Bis(2-chloroethyl)ether	625	5
Bis(2-chloroisopropyl)ether	625	5
Butylbenzylphthalate	625	5
Chrysene	625	5
Dibenzo[a,h]anthracene	625	5
Diethylphthalate	625	5
Dimethylphthalate	625	5

Table 4.1.12

ASSET Program Semi-Volatile Organic Compounds analyte list with method and detection limits.

Compound	Method	Detection Limits (µg/L)
Di-n-butylphthalate	625	5
Di-n-octylphthalate	625	5
Fluoranthene	625	5
Fluorene	625	5
Hexachlorobenzene	625	5
Hexachlorobutadiene	625	5
Hexachlorocyclopentadiene	625	10
Hexachloroethane	625	5
Indeno[1,2,3-cd]pyrene	625	5
Isophorone	625	5
Naphthalene	625	5
Nitrobenzene	625	5
N-Nitrosodimethylamine	625	5
N-Nitrosodiphenylamine	625	5
N-nitroso-di-n-propylamine	625	10
Pentachlorobenzene	625	5
Pentachlorophenol	625	10
Phenanthrene	625	5
Phenol	625	5
Pyrene	625	5

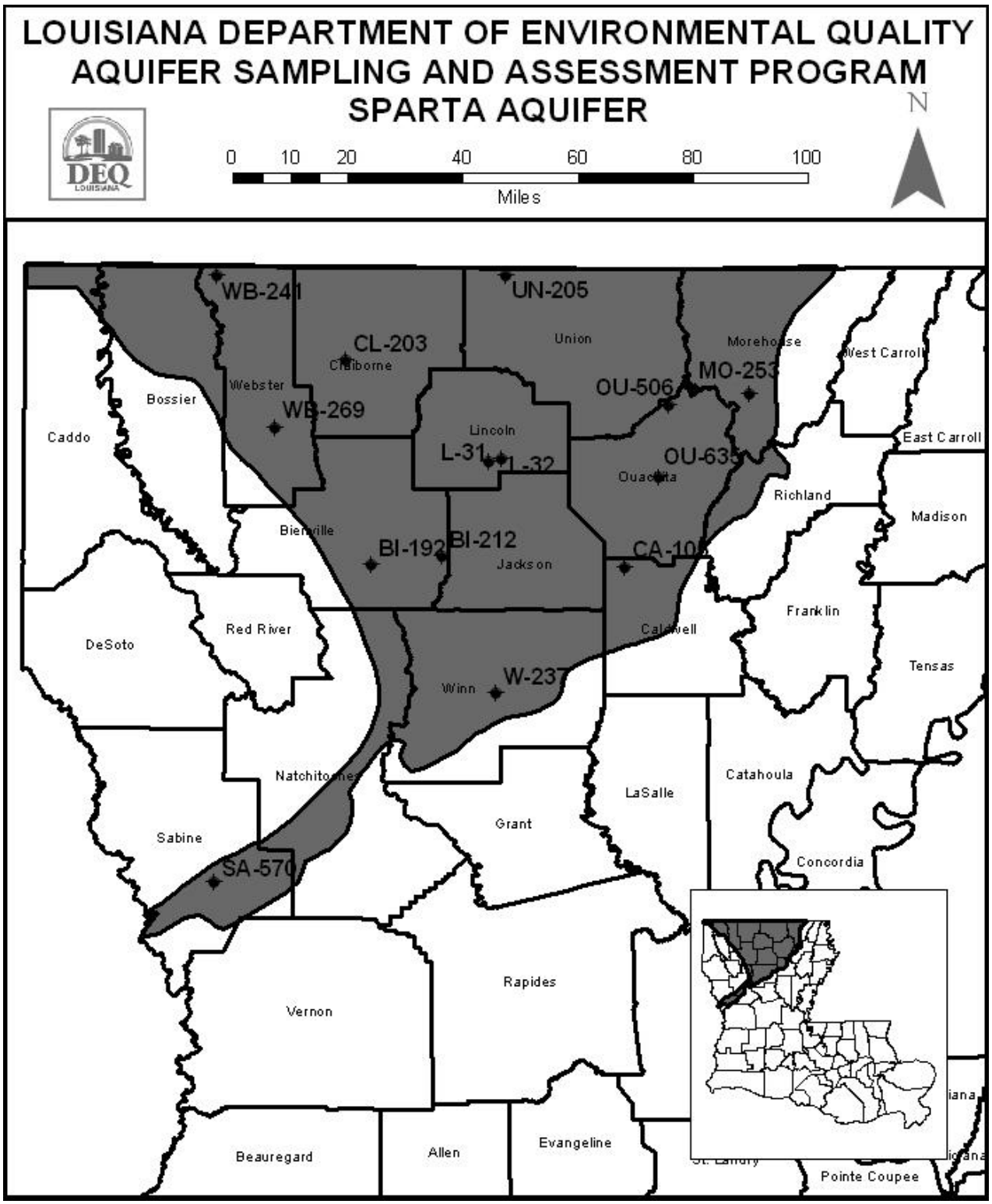
Table 4.1.13

ASSET Program Pesticide and PCB analyte list with method and detection limits.

Compound	Method	Detection Limits* (µg/L)
4,4'-DDD	608	0.05/0.1
4,4'-DDE	608	0.05/0.1
4,4'-DDT	608	0.05/0.1
Aldrin	608	0.05
Alpha-Chlordane	608	0.05
alpha-BHC	608	0.05
beta-BHC	608	0.05
delta-BHC	608	0.05
gamma-BHC	608	0.05
Chlordane	608	0.2
Dieldrin	608	0.05/0.1
Endosulfan I	608	0.05
Endosulfan II	608	0.05/0.1
Endosulfan Sulfate	608	0.05/0.1
Endrin	608	0.05/0.1
Endrin Aldehyde	608	0.05/0.1
Endrin Ketone	608	0.05/0.1
Heptachlor	608	0.05
Heptachlor Epoxide	608	0.05
Methoxychlor	608	0.05/0.5
Toxaphene	608	2/3
Gamma-Chlordane	608	0.05
PCB-1016	608	0.5/1
PCB-1232	608	0.5/1
PCB-1242	608	0.5/1
PCB-1248	608	0.5/1
PCB-1254	608	0.5/1
PCB-1260	608	0.5/1

*Multiple detection limits due to multiple labs performing analyses.

Figure 4.1.1



Location Plat, Sparta Aquifer and Associated Water Wells

GLOSSARY

Agriculture – Agriculture involves the use of water for crop spraying, irrigation, livestock watering, poultry operations and other farm purposes not related to human consumption.

Clean technique metals analysis – an integrated system of sample collection and laboratory analytical procedures designed to detect concentrations of trace metals below criteria levels and eliminate or minimize inadvertent sample contamination that can occur during traditional sampling practices.

Degree of support – The level at which water quality supports the designated uses of a water body specified in the Louisiana Water Quality Standards. The degree of support is divided into two levels: fully supporting uses and not supporting uses.

Designated water use – A use of the waters of the state as established by the Louisiana Water Quality Standards. These uses include primary contact recreation (PCR), secondary contact recreation (SCR), fish and wildlife propagation (FWP), drinking water supply (DWS), outstanding natural resource waters (ONR), oyster propagation (OYS), agricultural activities (AGR), and limited aquatic life and wildlife (LAL). (See also Use Support.)

Dissolved oxygen – The amount of oxygen dissolved in water, commonly expressed as a concentration in terms of milligrams per liter, mg/L.

Drinking water supply – A surface or underground raw water source which, after conventional treatment, will provide safe, clear, potable, and aesthetically pleasing water for uses which include but are not limited to, human consumption, food processing and cooking, and as a liquid ingredient in foods and beverages.

Effluent – Wastewater discharged to waters of the state.

Effluent limitation – Any applicable state or federal quality or quantity limitation which imposes any restriction or prohibition on quantities, discharge rates, and concentrations of pollutants which are discharged into waters of the state.

Effluent-limited segment – Any stream segment where water quality is meeting and will continue to meet applicable water quality standards or where there is adequate demonstration that water quality will meet applicable standards after the application of effluent limitations required by the Clean Water Act, as amended.

Evaluated waters – Water bodies for which assessment is based on information other than current site-specific ambient data, such as data on land use, location of pollutant sources, fisheries surveys, fish kill investigations, spill investigations, and citizen complaints.

Existing use – Those uses actually attained in the water body on or after November 28, 1975. They may or may not be designated uses.

Fecal coliform – Gram negative, non-spore forming, rod-shaped bacteria found in the intestinal tracts of warm-blooded animals.

Fish and wildlife propagation – Fish and wildlife propagation includes the use of water for preservation and reproduction of aquatic biota such as indigenous species of fish and invertebrates, as well as reptiles, amphibians, and other wildlife associated with the aquatic environment. This use also includes the maintenance of water quality at a level that prevents contamination of aquatic biota consumed by humans.

Limited Aquatic Life and Wildlife – A subcategory of fish and wildlife propagation that recognizes not all water bodies are capable of supporting the same level of species diversity and richness. Examples of water bodies to which this may be applied include intermittent streams and manmade water bodies that lack suitable riparian structure and habitat.

Monitored waters – Water bodies for which assessment is based on current site-specific ambient data.

Naturally dystrophic waters – Waters which are stained with organic material and which are low in dissolved oxygen due to natural conditions.

Nonpoint source – A diffuse source of water pollution that does not discharge through a point source or pipe, but instead flows freely across exposed natural or manmade surfaces, such as plowed fields, pasture land, construction sites, and parking lots.

Outstanding natural resource waters – Outstanding and natural resource waters include water bodies designated for preservation, protection, reclamation, or enhancement of wilderness and aesthetic qualities and ecological regimes, such as those designated under the Louisiana Natural and Scenic Rivers System or those designated by the Office of Environmental Compliance as waters of ecological significance. This use designation applies only to the water bodies specifically identified in Louisiana's numerical criteria, LAC 33:IX.1123, Table 3, and not to their tributaries or distributaries, unless so specified.

Oxygen-demanding substances – Organic matter or materials in water or wastewater which utilize oxygen during the decomposition process, and inorganic material, such as sulfides, which utilize oxygen during the oxidation process.

Oyster propagation – The use of water to maintain biological systems that support economically important species of oysters, clams, mussels, or other mollusks so that their productivity is preserved and the health of human consumers of these species is protected. This use shall apply only to those water bodies named in the numerical criteria tables and not to their tributaries or distributaries unless so specified.

Point source – A discernible, confined and discrete conveyance including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

Potentiometric surface – An imaginary surface representing the total head of groundwater in a confined aquifer that is defined by the level to which water will rise in a well.

Primary contact recreation – Any recreational activity which involves or requires prolonged body contact with the water, such as swimming, water skiing, tubing, snorkeling, and skin-diving.

Riparian – Area of land along the banks of a stream which often exhibits slightly different vegetation and habitats than the surrounding landscape. Because of this variation, riparian areas are considered valuable wildlife habitat and important for the protection of water quality.

Subsegment – A named regulatory water body as defined by LAC 33:IX.1123. They are considered representative of the watershed through which they flow and, therefore, have numerical criteria assigned to them. This is the level of watersheds at which §305(b) assessments are applied. Each subsegment has a six digit number assigned in the following manner, 03=basin, 01=segment, 01=subsegment. This would be read as 030101, which represents Calcasieu River-headwaters to Highway 8. For mapping purposes, the subsegment is defined as a polygonal geographical area using GIS (Geographic Information System).

Secondary contact recreation – Any recreational activity which may involve incidental or accidental body contact with the water and during which the probability of ingesting appreciable quantities of water is minimal, such as fishing, wading, and recreational boating.

Toxic substances – Any element, compound or mixture which at sufficient exposure levels induces deleterious acute or chronic physiological effects on an organism.

Wastewater – Liquid waste resulting from commercial, municipal, private, or industrial processes. This includes but is not limited to, cooling and condensing waters, sanitary sewage, industrial waste, and contaminated rainwater runoff.

Water body – Any contiguous body of water identified by the state. A water body can be a stream, a river, a segment of a stream or river, a lake, a bay, a series of bays, or a watershed.

Water quality-limited segment – Any stream segment where the stream does not meet applicable water quality standards or will not meet applicable water quality standards even after application of the effluent limitations required by the Clean Water Act, as amended.

Use support – A determination made by LDEQ as part of the Integrated Report process of whether or not a designated water use is being supported or met based on an analysis of water quality data or other information. Support statements include “Fully Supported,” “Not Supported,” and “Not Assessed” (See also Designated Water Use).

LITERATURE CITED

Code of Federal Regulations. 2000. Water quality planning and management. 40 CFR, 130.7. Washington, D.C.

Federal Water Pollution Control Act, as Amended (Clean Water Act). 1987. Water quality standards and implementation plans. 33 U.S.C. §1313 et seq. Washington, D.C.

LAC. See Louisiana Administrative Code.

LDCRT. See Louisiana Department of Culture, Recreation, and Tourism.

LDEQ. See Louisiana Department of Environmental Quality.

LDWF. See Louisiana Department of Wildlife and Fisheries.

LEQA. See Louisiana Environmental Quality Act.

LOSP. See Louisiana Office of State Parks.

LOT. See Louisiana Office of Tourism.

Louisiana Administrative Code, Title 33, Part IX, Chapter 11 (LAC 33:IX.1101-1123). *Louisiana's Surface Water Quality Standards.* 2011. http://www.deq.louisiana.gov/portal/DIVISIONS/LegalAffairs/RulesandRegulations/Title33.aspx#ERC.

Louisiana Department of Culture, Recreation, and Tourism. 2012. *Sunset Hearing*. Office of the Lieutenant Governor. http://www.crt.state.la.us/Assets/documentarchive/sunset2012.pdf.

Louisiana Department of Culture, Recreation, and Tourism. 2013. *Strategic plan*. Office of State Parks. Baton Rouge. http://www.crt.state.la.us/Assets/strategicplan/06-264-aOSPStrategicPlan.pdf.

Louisiana Department of Environmental Quality. 2008a. *Memorandum of Agreement: Development of Dissolved Oxygen (DO) Criteria and Assessment Protocols to Support Fish and Wildlife Propagation in Louisiana Waters Based on Ecological Regions (Ecoregions) and Water Body Types*. Office of Environmental Assessment, Water Quality Assessment Division. Baton Rouge, Louisiana. Reference available upon request.

Louisiana Department of Environmental Quality. 2008b. *Memorandum of Agreement: Development of Dissolved Oxygen (DO) Criteria and Assessment Protocols to Support Fish and Wildlife Propagation in Louisiana Waters Based on Ecological Regions (Ecoregions) and Water Body Types*. Office of Environmental Assessment, Water Quality Assessment Division. Baton Rouge, Louisiana. Reference available upon request.

Louisiana Department of Environmental Quality. 2010a. *Standard Operating Procedure for Water Sample Collection, Preservation, Documentation and Shipping; Sonde Deployment and Continuous Monitoring (revision 6)*. Office of Environmental Compliance, Surveillance Division. Baton Rouge, Louisiana. Reference available upon request.

Louisiana Department of Environmental Quality. 2010b. *Quality Assurance Project Plan (QAPP) for the Ambient Water Quality Monitoring Network (revision 4)*. Office of Environmental Assessment, Water Quality Assessment Division and Laboratory Services Division, and Office of Environmental Compliance, Surveillance Division. Baton Rouge, Louisiana. Reference available upon request.

Louisiana Department of Environmental Quality. 2013a. *Standard Operating Procedure for Water Quality Assessments and Production of Water Quality Integrated Report (revision 5)*. Office of Environmental Services, Water Permits Division. Baton Rouge, Louisiana. Reference available upon request.

Louisiana Department of Environmental Quality. 2013b. *Quality Assurance Project Plan (QAPP) for Trace Metals Monitoring in Louisiana Surface Waters Using Clean Sampling and Analysis Techniques (revision 0)*. Office of Environmental Services, Water Permits Division and Office of Environmental Compliance, Assessment Division. Baton Rouge, Louisiana. Reference available upon request.

Louisiana Department of Environmental Quality. 2013c. *Quality Assurance Project Plan (QAPP) for the Ambient Water Quality Monitoring Network (revision 7)*. Office of Environmental Services, Water Permits Division and Office of Environmental Compliance, Inspection Division. Baton Rouge, Louisiana. http://www.deq.louisiana.gov/portal/Portals/0/planning/QAPPs/QAPP_1004_r07%202013%20FINAL%2012-12-13.pdf.

Louisiana Department of Environmental Quality. 2013d. *Standard Operating Procedure for Data Evaluation, Assessment and Reporting (revision 3)*. Office of Environmental Services, Water Permits Division. Baton Rouge, Louisiana. Reference available upon request.

Louisiana Department of Wildlife and Fisheries. 2001. *Louisiana coastal marsh-vegetation type map* (Database). Fur and Refuge Division, Baton Rouge, LA in conjunction with U.S. Geological Survey Biological Resources Division, National Wetlands Research Center. Lafayette, LA.

Louisiana Department of Wildlife and Fisheries. 2012. *2011-2012 Annual report*. Louisiana Department of Wildlife and Fisheries. Baton Rouge, LA. http://www.wlf.louisiana.gov/sites/default/files/pdf/publication/36495-2011-2012-annual-report/2011-2012_annual_report_low-res.pdf.

Louisiana Environmental Quality Act. 1995 as amended. Subtitle II of Title 30 of the Revised Statutes. House of Representatives Database. Baton Rouge, LA.

Louisiana Office of State Parks. 2009. *2009-2013 Louisiana statewide comprehensive outdoor recreation plan (SCORP) and appendices*. Louisiana Department of Culture, Recreation, and Tourism. Baton Rouge. http://www.recpro.org/assets/Library/SCORPs/la_scorp_2009.pdf.

Louisiana Office of Tourism. 2013. *Louisiana tourism forecast: 2013-2016*. Louisiana Department of Culture, Recreation, and Tourism. Baton Rouge. http://www.crt.state.la.us/Assets/Tourism/research/documents/2012-2013/Louisiana_Tourism_Forecast_Report_2013-2016.pdf.

Louisiana State University Agricultural Center. 2012. *State totals.* Baton Rouge. http://www.lsuagcenter.com/agsummary/archive/2012/-State-Totals/2012StateTotals.pdf.

LSU AgCenter. See Louisiana State University Agricultural Center.

National Oceanic and Atmospheric Administration. 2010. *Environmental Response Management Application Gulf Response.* http://gomex.erma.noaa.gov/erma.html.

National Oceanic and Atmospheric Administration. 2012. *Fisheries Economics of the United States, 2011*. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-F/SPO-118. http://www.st.nmfs.noaa.gov/economics/publications/feus/fisheries_economics_2011.

NOAA. See National Oceanic and Atmospheric Administration.

SEAFWA. See Southeastern Association of Fish and Wildlife Agencies.

Southeastern Association of Fish and Wildlife Agencies. 2005. *Public opinion on fish and wildlife management issues and the reputation and credibility of fish and wildlife agencies in the southeastern United States-Louisiana.* Responsive Management. Harrisonburg, VA. http://www.responsivemanagement.com/download/reports/SEAFWA_Louisiana_Report.pdf.

Southwick Associates, Inc. 2008. *The economic benefits of fisheries, wildlife and boating resources in the state of Louisiana—2006.* Louisiana Department of Wildlife and Fisheries. Baton Rouge, LA. http://www.wlf.louisiana.gov/sites/default/files/pdf/publication/32728-economic-benefits-fisheries-wildlife-and-boating-resources-state-louisiana-2006/southwick_2006_final_final_report_5-27-08_0.pdf.

Terrell, Dek, and Ryan Bilbo. 2013. *The 2011 Louisiana tourism satellite account: an update.* Louisiana Department of Culture, Recreation, and Tourism and Office of the Lt. Governor. Baton Rouge. http://www.crt.state.la.us/Assets/Tourism/research/documents/2012-2013/2011LouisianaTSA-Final.pdf.

Tulane Univ. and Xavier Univ. 2005. *State Management Plan for Aquatic Invasive Species in Louisiana*. http://is.cbr.(.edu/docs_IS/Louisiana-AIS-Mgt-Plan.pdf

Univ. of New Orleans, Louisiana State Univ., McNeese State Univ., Louisiana State Univ. at Shreveport. 2006. *The impact of the Louisiana Department of Culture, Recreation and Tourism on Louisiana's economy and quality of life for Louisiana citizens*. Louisiana Department of Culture, Recreation, and Tourism. Baton Rouge. http://www.crt.state.la.us/document-archive/impact-report/index.

UNO, LSU, MSU, LSUS. See Univ. of New Orleans, Louisiana State Univ., McNeese State Univ., Louisiana State Univ. at Shreveport.

U.S. Census Bureau. 2008. *Pollution abatement costs and expenditures: 2005*, MA200(05), U.S. Government Printing Office, Washington, DC, 2008 (2005 PACE Survey). http://www.census.gov/prod/2008pubs/ma200-05.pdf.

U.S. Code. Title 33. Section 1251 et seq., 1972. *Federal Water Pollution Control Act (also known as the Clean Water Act).*

http://cfpub.epa.gov/npdes/cwa.cfm?program_id=45.

U.S. Environmental Protection Agency. 2002. *Consolidated assessment and listing methodology (CALM)*, First Edition. July 2002. Office of Wetlands, Oceans, and Watersheds. Washington, D.C.

U.S. Environmental Protection Agency. 2005. *Guidance for 2006 assessment, listing and reporting requirements pursuant to sections 303(d), 305(b) and 314 of the Clean Water Act.* USEPA, Assessment and Watershed Protection Division. Washington, D.C.

U.S. Environmental Protection Agency. 2006. *Information concerning 2008 Clean Water Act Sections 303(d), 305(b), and 314 integrated reporting and listing decisions.* Memorandum. USEPA, Office of Wetlands, Oceans and Watersheds. Washington, D.C.

U.S. Environmental Protection Agency. Various dates. *Integrated Report Guidance* and *303(d) Listing Guidance.* http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/guidance.cfm#listing.

USEPA. See U.S. Environmental Protection Agency.

U.S. Fish and Wildlife Service. Rev. Dec. 2013. *2011 National survey of fishing, hunting, and wildlife-associated recreation.* U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau. Washington, D.C. http://www.census.gov/prod/2013pubs/fhw11-la.pdf.

USFWS. See U.S. Fish and Wildlife Service.

APPENDIX A: 2014 Integrated Report of Water Quality in Louisiana

Appendix A is taken from Louisiana's 2014 Assessment Database (ADB), which contains all water quality assessments for the state. All suspected causes of impairment and suspected sources of impairment are linked in a one to one fashion, meaning, a reported suspected cause of impairment is believed to be affected by the suspected source of impairment provided on the same line of the table. However, as a result of this linking, some suspected causes and/or sources may be listed more than once for a given water body subsegment. This results in cases where a suspected cause of impairment has two or more suspected sources of impairment. Likewise, if a suspected source of impairment affects two or more suspected causes of impairment, the suspected source will be listed more than once. This is important to note in order to prevent double counting when attempting to develop subtotals for the size or number of water bodies affected by a given suspected cause or suspected source of impairment.

The full text of Appendix A, including subsegment assessment maps for each basin can be found at: 14_IR1-Appendix A Text and Maps.

The full water quality assessment table is contained in Appendix A at: 14_IR1-FINAL-Appendix A-All Assessments.

All maps in Appendix A Text and Maps will be updated to 2014 IR information ASAP. Maps are not required for submittal to EPA but will be included in eventual public version on web.

All hyperlinks in this and remaining appendices will be linked to documents on the LDEQ website.

APPENDIX B: 2014 Integrated Report of Water Quality in Louisiana – Category 1 Addendum

Appendix C, the 2014 Integrated Report, Category 1 Addendum, contains those water body impairment combinations (WICs) that were removed from LDEQ's 2012 Integrated Report during development of the 2014 Integrated Report. The WICs were removed because the suspected cause is no longer considered to be impairing water quality of the water body subsegment. Removal may be based on more recent water quality data collected after development of the 2014 Integrated Report, or due to advances in water quality assessment that permit more accurate determinations of water quality. This information does not constitute a formal §303(d) or §305(b) submittal, nor is this Category 1 listing a requirement of the Clean Water Act.

The full Category 1 table is contained in Appendix B at: 14 IR1-FINAL-Appendix B-Category 1.

APPENDIX C: Complete list of suspected causes of impairment and cause descriptions used in USEPA's Assessment Database

The full list of suspected causes of impairment is contained in Appendix C at: 14 IR1-FINAL-Appendix C-Causes.

APPENDIX D: Complete list of suspected sources and source descriptions used in USEPA's Assessment Database

The full list of suspected sources of impairment table is contained in Appendix D at: 14 IR1-FINAL-Appendix D-Sources.

APPENDIX E: Complete Listing of Louisiana's Ambient Surface Water Quality Network Sites

The full list of ambient surface water quality network sites is contained in Appendix E at: 14 IR1-FINAL-Appendix E-Monitoring Sites. Not all sites contained in this list are currently sampled as part of LDEQ's rotating monitoring sites program.

APPENDIX F: Public Comments on the 2014 Integrated Report and LDEQ's Response to Comments

Appendix F is a compilation of all comments received regarding the 2014 Integrated Report, along with LDEQ's response to those comments. Any changes made to the 2012 Integrated Report based on public comments are noted in the column titled, "Summary of LDEQ Responses." Also included in this response are changes made to the 2014 Integrated Report during the review period following public notice.

The full summary of public comments and LDEQ's responses is contained in Appendix F at:
14 IR1-FINAL-Appendix F-Response to Comments

APPENDIX G: Louisiana's 2014 Section 303(d) List

Appendix G represents a subset of Louisiana's 2014 Integrated Report (IR) and includes only those water body impairment combinations (WICs) reported as Categories 5 or 5RC. As has been noted in the body of the IR text, WICs in Categories 5 and 5RC of the IR assessments are the only WICs on Louisiana's 2014 §303(d) List. This table was developed only as an aid to the public and does not constitute Louisiana's "official" §303(d) List. Every effort was made to maintain consistency between Appendix A Categories 5 and 5RC WICs and Appendix H. ***However, in order to ensure the accuracy of the overall Integrated Report, only those WICs in Appendix A, Categories 5 and 5RC, constitute the "official" §303(d) List.***

The full table of §303(d) Listed WICs, with the caveat noted above, is contained in Appendix G at: 12 IR1-FINAL-Appendix G-Cat 5 303d List.