Bayou Du Portage (060703)

Watershed Implementation Plan

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Introduction

Bayou du Portage, a 97,000-acre subsegment located in the Vermilion-Teche River Basin, lies in the prairie region of the Louisiana coastal zone. It falls between the Atchafalaya River to the east, and Bayou Teche to the west, and includes parts of St. Martin and Iberville parishes. The subsegment is impaired for primary contact recreation (PCR), secondary contact recreation (SCR), and fish and wildlife propagation (FWP) due to both natural and anthropogenic sources. This plan sets out to address those impairments to restore water quality and full use support. In addition to restoring water quality in Bayou du Portage, it is expected that implementation of this plan will improve water quality in two impaired lakes in the subsegment immediately downstream.

Designated uses in Bayou du Portage are PCR, SCR, and FWP. According to the 2016 Louisiana Department of Environmental Quality (LDEQ) Integrated Report (IR), the watershed is impaired due to bacteria, low DO, and turbidity. Analyzing the land cover data available for Bayou du Portage shows that nearly 64% of the watershed is engaged in agricultural production with 30% as sugarcane, a known contributor to sediment and turbidity in the water column without proper management. Rice and crawfish are also produced in the subsegment. Developed areas (6% area) consist of small towns and rural residential areas with no community sewage treatment. The IR lists home treatment systems and small package plants as suspected sources of bacteria. Stakeholder concerns in Bayou du Portage are water quality and sediment (local soil and water conservation district (SWCD)) and sedimentation in downstream lakes impairing fisheries (Chitimacha Tribe of Louisiana). Lake Fausse Pointe in the subsegment downstream, a traditional fishery of the Chitimacha, is impaired for turbidity. Preliminary work in that subsegment indicated upstream watersheds as the primary source, likely agricultural runoff (LDEQ). Bayou du Portage drains into Lake Fausse Pointe, contributing to heavy sediment movement into this subsegment. By addressing impairments in Bayou du Portage, we anticipate restoration of FWP use support in the Lake Fausse Pointe subsegment as well as in Bayou du Portage.

Land use in the watershed is comprised primarily of agriculture (64%), wetland (29%), and developed (6%). Agriculture in the western portion of the watershed is dominated by sugarcane, pasture, and rice and aquaculture. In the eastern (lower) portion of the watershed, the primary agriculture is rice and aquaculture (crawfish). Most of the pastureland lies in the northernmost region. The IR lists agriculture as a suspected source of turbidity in the waterbody. In addition, cropland and pasture comprise a significant geographic area in the watershed and contribute to fecal coliform loading and to nutrient loading, which is associated with low DO.
This watershed plan will identify and address sources and causes of pollutant loading, practices to address those loadings, and the restoration of use support. The plan will follow the Environmental Protection Agency (EPA) 9-element watershed plan format. It is intended to be a

living document with adaptive management revisions reflecting new stakeholder input, additional partnerships and opportunities expected in coming years, monitoring results,and improved technical approaches as necessary. This plan is not meant to limit activity in the watershed but to serve as a framework for planning measures to address pollutant loadings and to inform strategies for watershed managers in the future.

Mission Statement

This watershed implementation plan will employ individual engagement and organizational commitment to address water quality issues identified by watershed assessment and stakeholders in Bayou Du Portage through promoting pollution reduction activities that will restore water quality.

Element A. Causes and Sources of Pollution

This section will describe the water quality impairments in Bayou du Portage, summarize both baseline and ambient water quality monitoring data, describe the geography of the watershed, and characterize the region in terms of known and potential sources of pollution.

Bacteria, sediment and turbidity, and low dissolved oxygen (DO) are primary causes of water quality impairment in Bayou du Portage identified by LDEQ sampling and assessment information and by stakeholders in the watershed. Bacteria can originate from human sources when sewage treatment systems fail, and from wildlife and livestock directly accessing streams and indirectly through runoff. Cropland runoff can contribute nutrients, which impact DO, and sediment. Turbidity can be caused by both sediment runoff and re-suspended bed load.

Bayou du Portage Water Quality Assessment

LDEQ uses ambient water quality data to determine use support for designated uses in Louisiana watersheds. Since 1998, the LDEQ assessment lists Bayou du Portage as having designated use impairments along with suspected causes and sources. The 2016 assessment is shown in Table 1.

Table 1. 2016 IR Use Support Status and Suspected Sources and Causes

Subsegment Number	Description	Size (Miles)	Designated Uses			Use for Suspected Cause	Suspected Causes of Impairment	Category for Suspected Causes	Suspected Sources of Impairment
			PCR	SCR	FWP				
LA060703	Bayou Du Portage	13	N	N	N	FWP	Dissolved Oxygen	IRC 4a	Natural Sources
LA060703	Bayou Du Portage	13	N	N	N	FWP	Turbidity	IRC 4a	Agriculture
LA060703	Bayou Du Portage	13	N	N	N	PCR	Fecal Coliform	IRC 4a	On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
LA060703	Bayou Du Portage	13	N	N	N	PCR	Fecal Coliform	IRC 4a	Package Plant or Other Permitted Small Flows Discharges
LA060703	Bayou Du Portage	13	N	N	N	SCR	Fecal Coliform	IRC 4a	On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
LA060703	Bayou Du Portage	13	N	N	N	SCR	Fecal Coliform	IRC 4a	Package Plant or Other Permitted Small Flows Discharges

The PCR criterion for fecal coliform is 400 colony forming units (cfu)/100 ml. No more than 25% samples may exceed that number for the PCR season, which is May-October. Ambient sampling data from 2014-15 show a 50% exceedance rate (see Table 2).

Table 2. Ambient fecal coliform data (PCR) 2014-15

Sampling Date	CFU/100ml
10/8/2014	950
5/7/2015	460
6/4/2015	230
7/8/2015	160
8/6/2015	50
9/10/2015	3,000
Exceeds standard	

The SCR criterion for fecal coliform is 2,000 (cfu)/100 ml. No more than 25% samples may exceed that number for the SCR season, which is year-round. Ambient sampling data from 2014-15 show a 36% exceedance rate (see Table 3).

Table 3. Ambient fecal coliform data (SCR) 2014-15

Sampling Date	CFU/100ml
10/8/2014	950
12/11/2014	13,000
1/7/2015	1,400
2/19/2015	2,200
3/13/2015	2,450
4/22/2015	420
5/7/2015	460
6/4/2015	230
7/8/2015	160
8/6/2015	50
9/10/2015	3,000
Exceeds standard	

The criterion for DO to support FWP is 5 mg/L, with no more than 10% samples falling below that value. Bayou du Portage ambient data show a 93% excursion rate (Table 4).

Table 4. Ambient DO data 2014-15

Sampling Date	mg/L
10/8/2014	0.3
11/19/2014	0.2
1/7/2015	5.4
3/13/2015	6.5
4/22/2015	1.9
2/19/2015	7.4
6/4/2015	2.6
7/8/2015	1.6
5/7/2015	2.1
8/6/2015	2.8
9/10/2015	1.3
Violation (<5.0 mg/L)	

There is no numeric criterion for turbidity in Bayou du Portage. However, the total maximum daily load (TMDL) identified a guideline threshold of 150 NTU. While the TMDL was written for the sediment impairment at that time – total suspended solids (TSS) - it establishes a close linear relationship between TSS and turbidity. The TMDL established a target: no more than 30% samples may exceed 150 NTU. This rate was 67% at the ambient monitoring site in the 2014-15 sampling cycle (see Table 5), which led to its assessment as impaired for FWP.

Table 5 Ambient turbidity data 2014-15

Sampling Date	NTU
10/8/2014	71.5
11/19/2014	289
12/11/2014	23.5
1/7/2015	158
2/19/2015	157
3/13/2015	383
4/22/2015	181
5/7/2015	138
6/4/2015	343
7/8/2015	278
8/6/2015	22.5
9/10/2015	161
Exceeds 150 NTU	

Land Use

The 97,000-acre Bayou du Portage watershed is comprised of four USGS-defined 12-digit hydrologic unit codes (HUCs): 080801020702, 080801020703, 080801020704, and 080801020801.The drainage area is primarily agricultural – 64% land use is cropland and pastureland. The primary remaining land covers are wetland (29%), and developed (6%). Table 6 lists the primary land use / land cover.

Table 6. Land Use / Land Cover

Land Use / Land Cover	Area	Acres
Row Crops (Sugarcane, Soybeans)	41%	40,120
Wetlands	29%	27,830
Grass/Pasture	11%	10,730
Aquaculture/Rice	10%	9,540
Developed	7%	6,640
Other Cropland (Combined)	2%	2,100

The dominant crop type in the watershed is sugarcane. Sugarcane is commonly produced in a five-year cycle. In the fifth year, the field is fallow and the ground is bare. Sugarcane production can contribute sediment runoff and nutrient loading. Rice/crawfish and pastureland are also abundant in Bayou du Portage. Water from rice/crawfish carries sediment, nutrients, oxygen demand, and increases turbidity. Bayou du Portage pastureland (about 10,000 acres) mainly consists of small pastures associated with residential areas. Pastureland areas can contribute sediment runoff, as well as nutrient and bacteria loading particularly where cattle can directly access streams. Developed areas where on-site sewage treatment systems are malfunctioning can cause nutrient and bacteria loading to streams.

Spatial distribution of land use / land cover along with the water quality monitoring locations for this project can be seen in Figure 1.

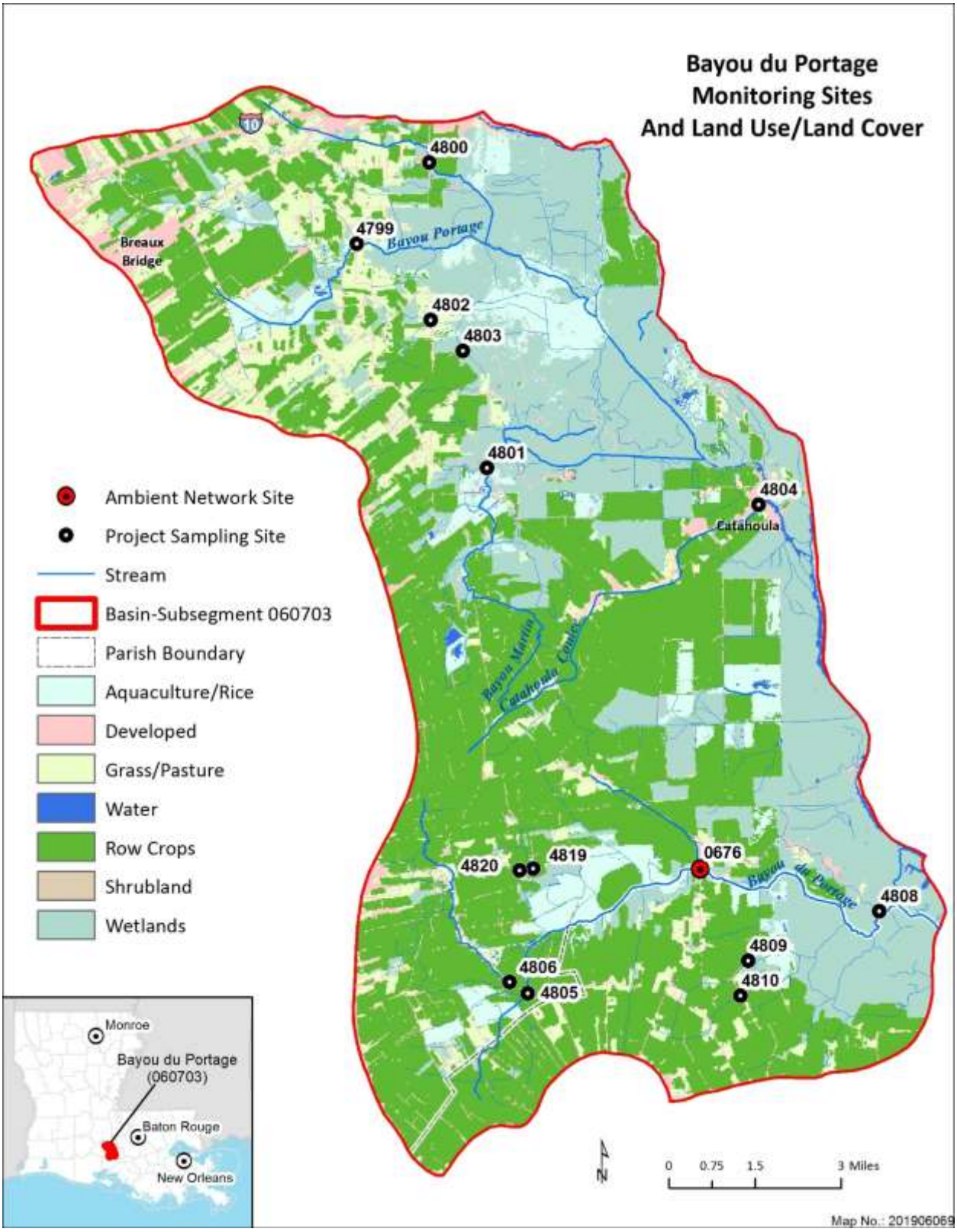

Figure 1. 2016 Land Use and Monitoring Locations

Soils

Soils in Bayou du Portage have relatively high clay content and low permeability, hydrologic groups C, D, and C/D. Hydrologic soil type groupings are based on hydraulic conductivity data or on texture, compaction, clay and organic matter make up, and other factors (NRCS, 2007). These traits influence soil runoff potential from rainfall. Rice and aquaculture are produced on clay soils - predominantly hydrologic group D. These soils have high runoff potential when wet, and permeability is very restricted. Row crops are grown mainly on hydrologic groups C and C/D (drained condition/undrained condition). Group C soils have moderately high runoff potential and movement of water through soil is somewhat restricted. Thus, without conservation practices, high sediment runoff is expected from cropland in this subsegment. Figure 2 shows hydrologic soil groups with crop type overlain.

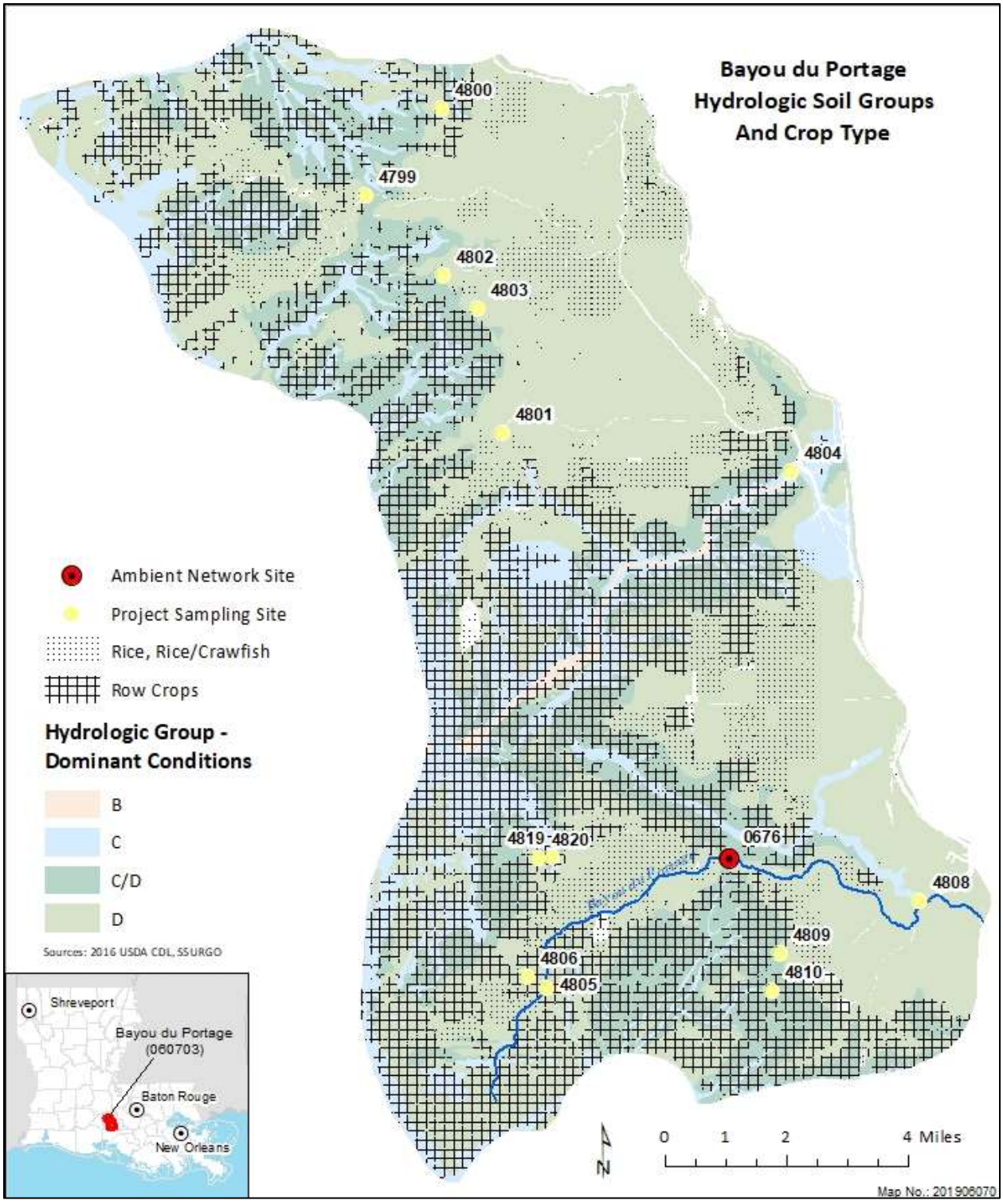

Figure 2. Hydrologic Soils and Crop Type

Elevation and Hydrology

Subsegment 060703 is bounded on the east by the West Atchafalaya Basin Protection Levee (WABPL), curves south and west along Bayou Teche, and then north to just past I-10. The bayou itself - Bayou du Portage - stretches from Highway 345 in the west, east to its outfall into Dauterive Lake. Bayou du Portage has a maximum depth of about 7 feet and slope of the waterway during its 11-mile course is near 0%. The bayou runs mainly along the parish boundary in the lower HUC.

Four 12-digit National Hydrography Dataset Hydrologic Unit Codes (HUCs) comprise the watershed: Bayou Portage-Coulee Portage, Bayou Berard Canal-Catahoula Coulee, Bayou Veillon-Coulee Coteau Holmes, and Bayou Du Portage-Coulee Du Portage (080801020702, 080801020703, 080801020704, and 080801020801 respectively). The bayou falls in the southernmost portion of the subsegment – HUC 080801020801.

Elevation ranges from -0.1 feet to 44 feet (+/- 1 foot). Higher elevations follow the Bayou Teche natural levee on the western and northern portions of the watershed, which is primarily agricultural land. Population in the watershed is located on the higher ground on the western side of the watershed and along natural levees. In general, land elevations decline moving eastward into wetland areas, until reaching the West Atchafalaya Basin Protection Levee, a federal levee bounding the drainage area to the east.

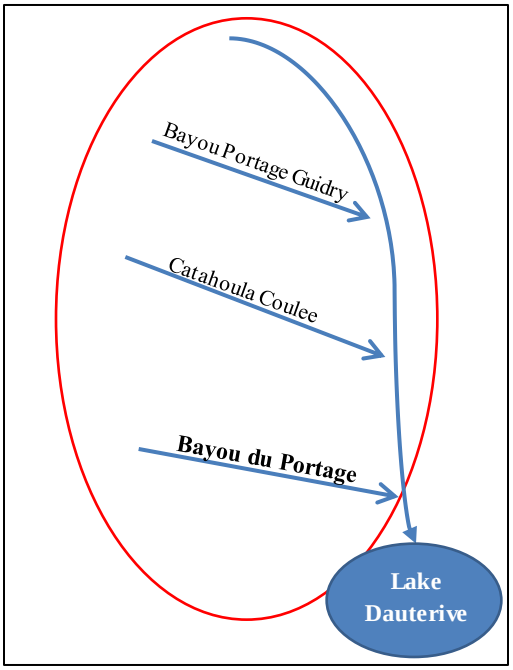

Figure 3. Drainage Schematic for Bayou du Portage Subsegment

Runoff flows via drainage canals and bayous into Bayou du Portage and ultimately into Dauterive Lake, which falls in the adjacent subsegment to the south, Lake Fausse Point and Dauterive Lake, 060702 (Figure 3). As the stream itself is a low-gradient stream, upstream flows have been observed. The majority of the land area in the upper three HUCs drains to the east and into the West Atchafalaya Basin Protection Levee borrow canal, which flows south and enters Dauterive Lake via an unnamed tributary.

All HUCs are characterized by a similar land use pattern: agriculture concentrated on the natural levees in the western half of the subsegment where the elevation is higher, while the eastern half of the subsegment is dominated by wetland/water. Figure 4 shows elevation in the watershed and HUC boundaries.

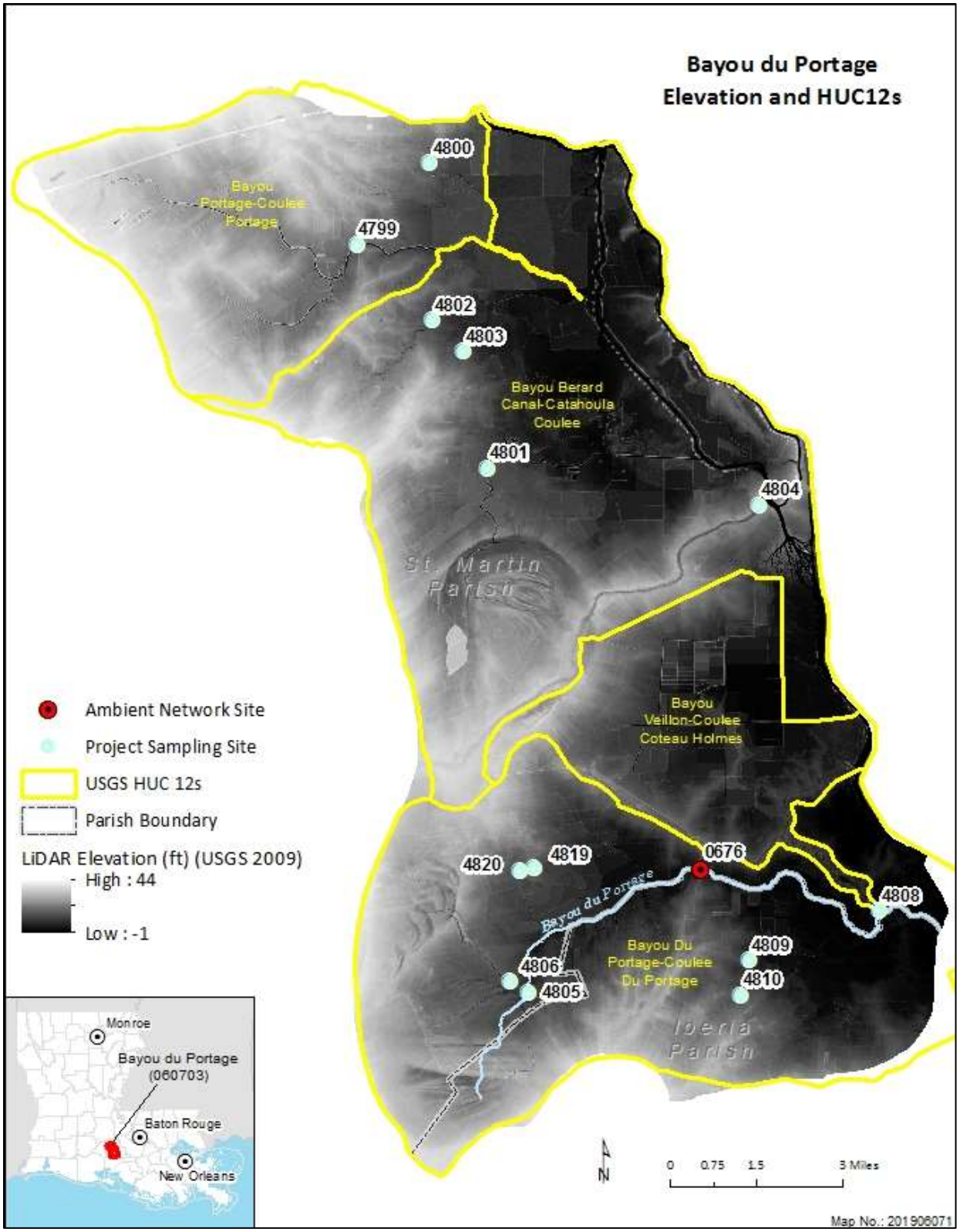

Figure 4. Bayou du Portage Elevation and HUCs

Population Characteristics

Approximately 20,000 people inhabit the Bayou du Portage subsegment according to US Census American Community Survey ACS 2016 5-year estimates. Most of the population is concentrated in the north – in the City of Breaux Bridge and a sliver of the town of Henderson, followed by Catahoula to the east. Rural farmland dominates the remainder of the landscape.

Sewage treatment in the watershed is a combination of individual home systems and small package plants. The IR lists both on-site disposal systems (OSDS) sites and package plants as sources of fecal coliform bacteria. There is one small community system (Iberia Parish Sewerage District #1 – Beau Fleur Estates) that regularly adheres to its permit requirements. Two permitted dischargers (small package plants) in the area show permit violations in their DMRs. One is a fast food restaurant located near Henderson whose discharge ultimately enters the borrow canal to the east. The second is an elementary school in Catahoula discharging into Catahoula Lake (which connects to Catahoula Coulee and the borrow canal). Individual home treatment systems number 2,284 in Bayou du Portage, located in rural residential areas built along the natural levee and in portions of Breaux Bridge, Loreauville, Catahoula, Parks, Henderson, and St. Martinville (Louisiana Department of Health 2016).

Maintenance of home treatment systems has an associated cost, as well as the requirement of homeowner diligence. Poverty as well as absentee ownership often play a role in maintenance issues. Home treatment system sites are depicted with the two aforementioned package plants in **Figure 5**. When targeting bacteria reduction activities, prevalence of OSDS as well as pastureland can help determine potential sources of bacteria and what types of reduction activities would be most beneficial in different watershed subareas (see *Element B. Estimated Load Reductions*).

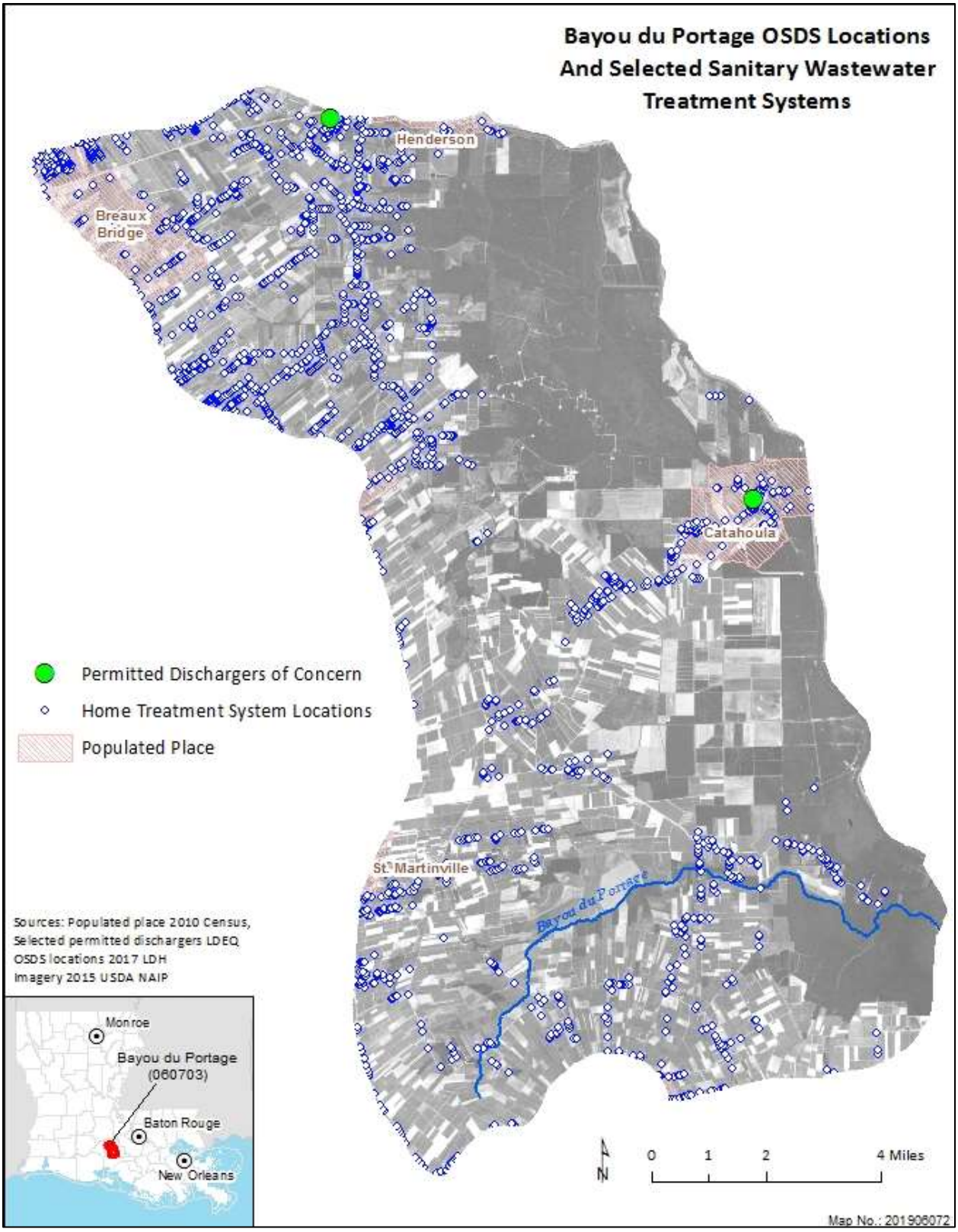

Figure 5. OSDS Locations and Selected Wastewater Dischargers

Baseline Monitoring Data

Baseline monitoring for water quality throughout the subsegment (sites depicted in Figure 1) was analyzed to help determine areas contributing the greatest loading. This analysis is useful for selecting areas to prioritize for education, outreach, and best management practice (BMP) implementation. Baseline monitoring results were examined to identify potential sources and priority areas for each parameter of concern. In cases of fecal coliform, data may show runoff loading spikes during intermittent events such as rainfall or continual loading such as from malfunctioning home treatment systems. Continually high values suggest both processes may be occurring. Turbidity can be caused by runoff, but also exacerbated by wind-driven and bedload disturbances. DO is subject to complex cycling and distribution of results may not point to a distinct loading process. The next section provides graphs and maps of the baseline data with a summary for each parameter.

Fecal Coliform Bacteria:

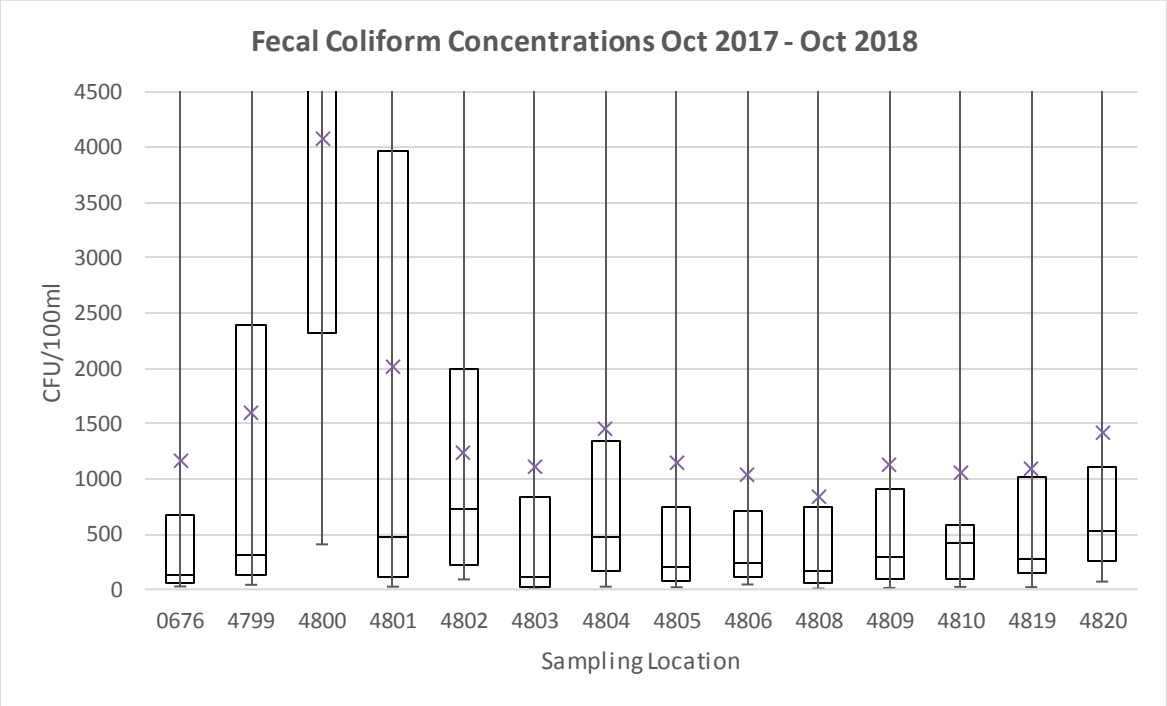

Figure 6. Boxplot of Fecal Coliform Bacteria Data

The box-and-whiskers plot above (Figure 6) shows the range, inter-quartile range, median, and mean of the 2017 PCR baseline sampling data. The y-axis is truncated at 4,500 cfu/100ml for legibility.

Data from site 4800 shows a consistently high bacteria concentration that indicates a continual significant input source as would be found with a malfunctioning facility or a cluster of malfunctioning home systems regularly discharging into the waterbody. Similarly the high and

closely grouped median and mean of site 4802 suggest a similar source type. Data from the remainder of the sites show a divergence between the mean and median. The mean is influenced by the extreme high values, but the median is lower due to a large number of low values. This type of variability with numerous low values and occasional spikes suggests a rainfall/runoff input mechanism. These sources are likely to be smaller home systems and pasture bacteria that may collect in nearby small ditches but are not flushed into the sampled waterbodies until a rainfall event. Note that all sites show an exceedance rate that violates the PCR standard. Sites 4799, 4800, 4801, and 4802 all show an exceedance rate in excess of the SCR standard (See Table 7).

Table 7. Baseline Fecal Coliform Data for 2018 PCR Season

Site	% FC > PCR Standard	% FC > SCR Standard	Maximum FC	Average FC
0676	25%	17%	8000	1126
4799	42%	25%	6000	1544
4800	100%	83%	6000	4082
4801	67%	38%	6000	1940
4802	50%	25%	6000	1190
4803	27%	18%	6000	970
4804	33%	17%	6000	1284
4805	42%	17%	6000	1098
4806	33%	17%	6000	995
4808	33%	17%	6000	819
4809	42%	13%	6000	1080
4810	50%	17%	6000	1014
4819	25%	17%	6000	1099
4820	63%	18%	6000	1417

Several datasets were examined to identify subareas and their ranking for BMP implementation. For OSDS locations, density (count per square mile) was examined using spatial analysis. OSDS density was compared to drainage subareas showing higher bacteria concentrations, and subareas were ranked and mapped. The same process was used for pastureland. Using raster landuse data (USDA 2016 CDL), pastureland pixel density was compared to areas of high bacteria concentrations, and areas were ranked for implementation. Some subjective judgment was used on where and how to combine ranked classes based on watershed knowledge and local hydrology. Figure 7 shows sub-watershed areas and priority areas for OSDS-related bacteria-reduction activities based on a year of baseline sampling throughout the subsegment and density of OSDS locations in the subareas. Figure 8 shows priority areas for pasture BMPs based on baseline sampling data and pasture locations. Bayou du Portage waters suffer from significant bacteria impairment and while priority areas are shown here, all areas of the watershed need major load reductions.

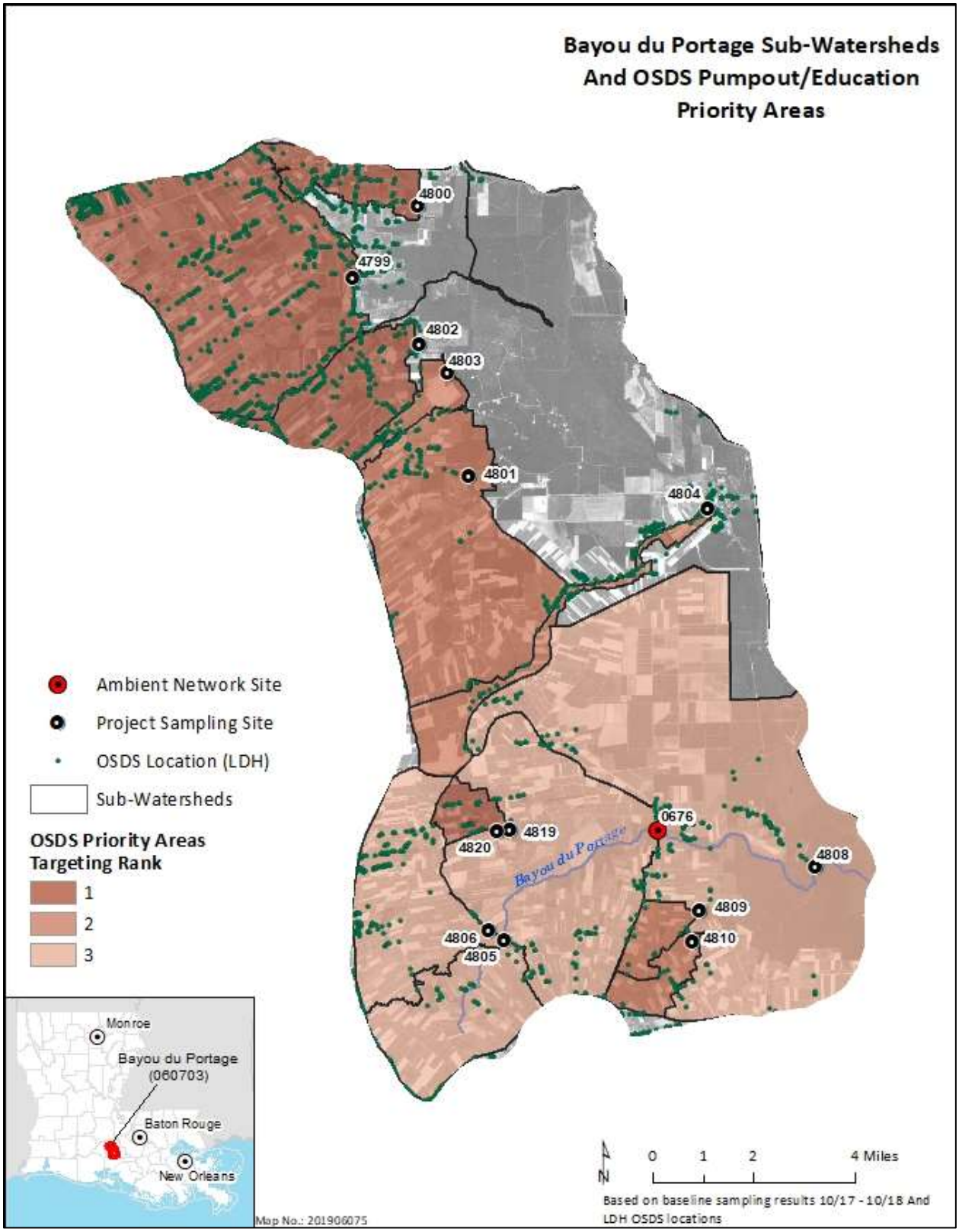

Figure 7. Sub-Watersheds and Priority Areas for OSDS-Related Bacteria Reduction Activities

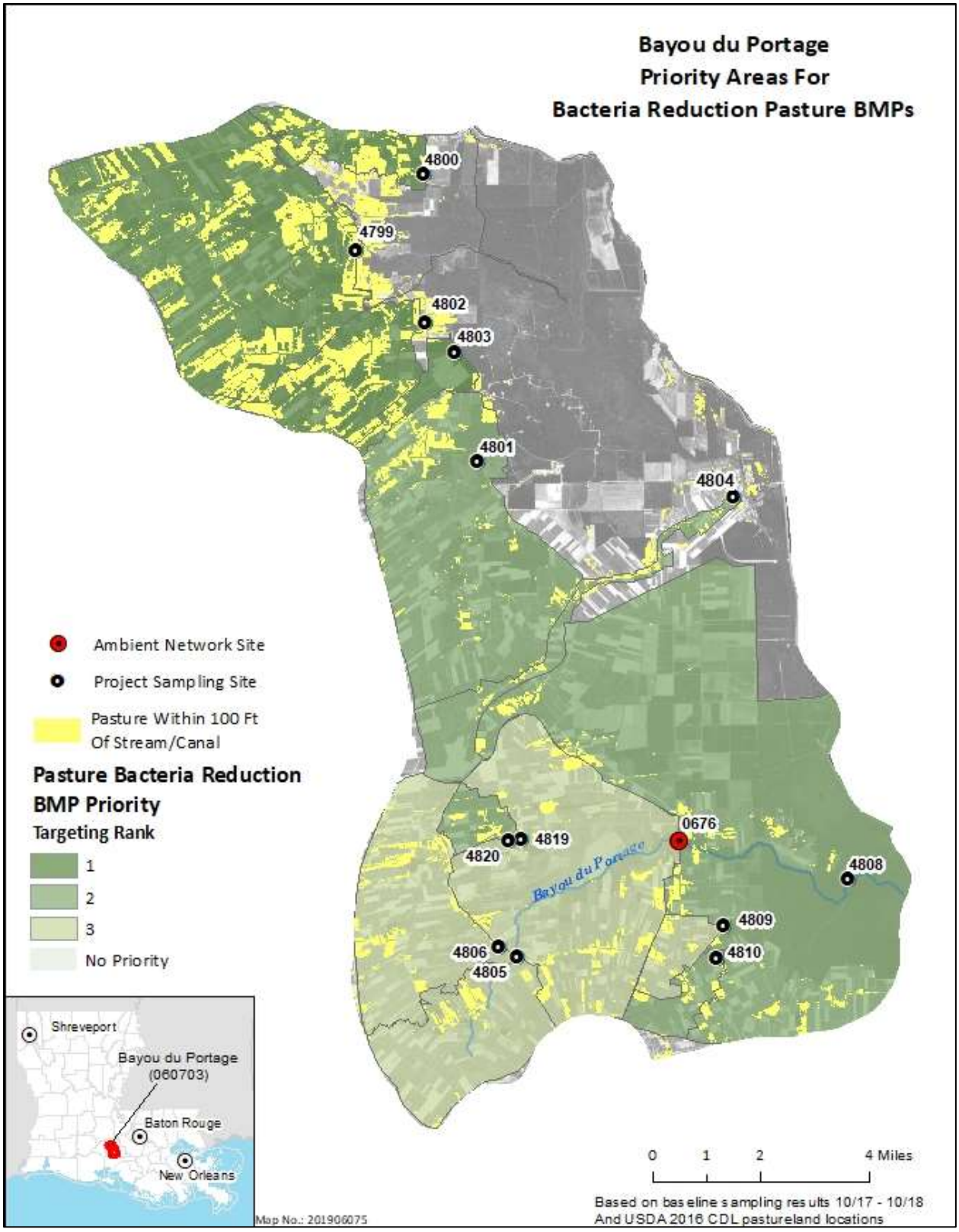

Figure 8. Priority Areas for Pasture BMPs to Reduce Bacteria

Turbidity:

The Bayou du Portage TMDL set a turbidity target of 150 nephelometric turbidity units (NTU) to represent the narrative criterion and determine a level at which the waterbody could reasonably be expected to be unimpaired based on the state's narrative standard to protect FWP. Until background turbidity is established, for purposes of the TMDL and this watershed plan, the waterbody is considered impaired for turbidity if 30 percent or more of the samples collected at Site 0676 during the cycle exceed 150 NTU. This rate was surpassed in the 2014-15 sampling cycle. LDEQ ambient water quality data used for assessing FWP use in its 2016 IR is shown below. The excursion rate is 67%.

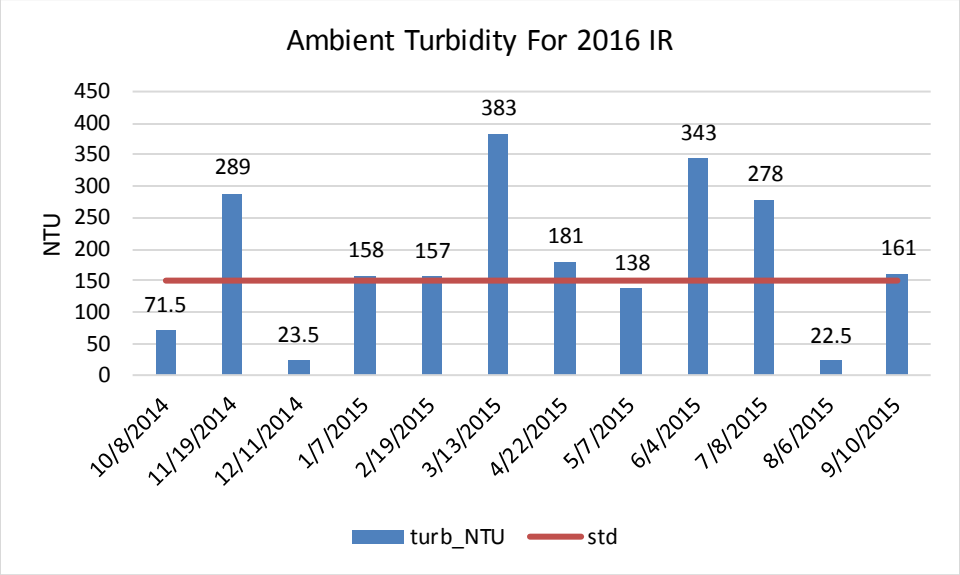

Figure 9. Ambient Turbidity Data

Baseline project data from sites sampled throughout the subsegment show turbidity values vary greatly. The ambient monitoring site, 0676, shows the highest exceedance rate and the highest average. Table 8 shows the exceedance rate and average for each project site. 2017-18 baseline sampling data was used to identify drainage areas corresponding to high turbidity values. These areas were ranked for turbidity reduction BMPs using sampling results, and mapped. **Figure 10** shows the priority implementation areas for sediment loading BMPs based on the year of baseline sampling.

Table 8. Summary of NPS Project Data: Turbidity Oct 2017 – Sep 2018

Site	% > 150 NTU	Average Turbidity
0676	46%	168
4799	13%	57
4800	26%	115
4801	42%	235
4802	21%	85
4803	9%	97
4804	4%	40
4805	38%	150
4806	33%	129
4808	21%	114
4809	17%	81
4810	0%	42
4819	8%	53
4820	11%	62

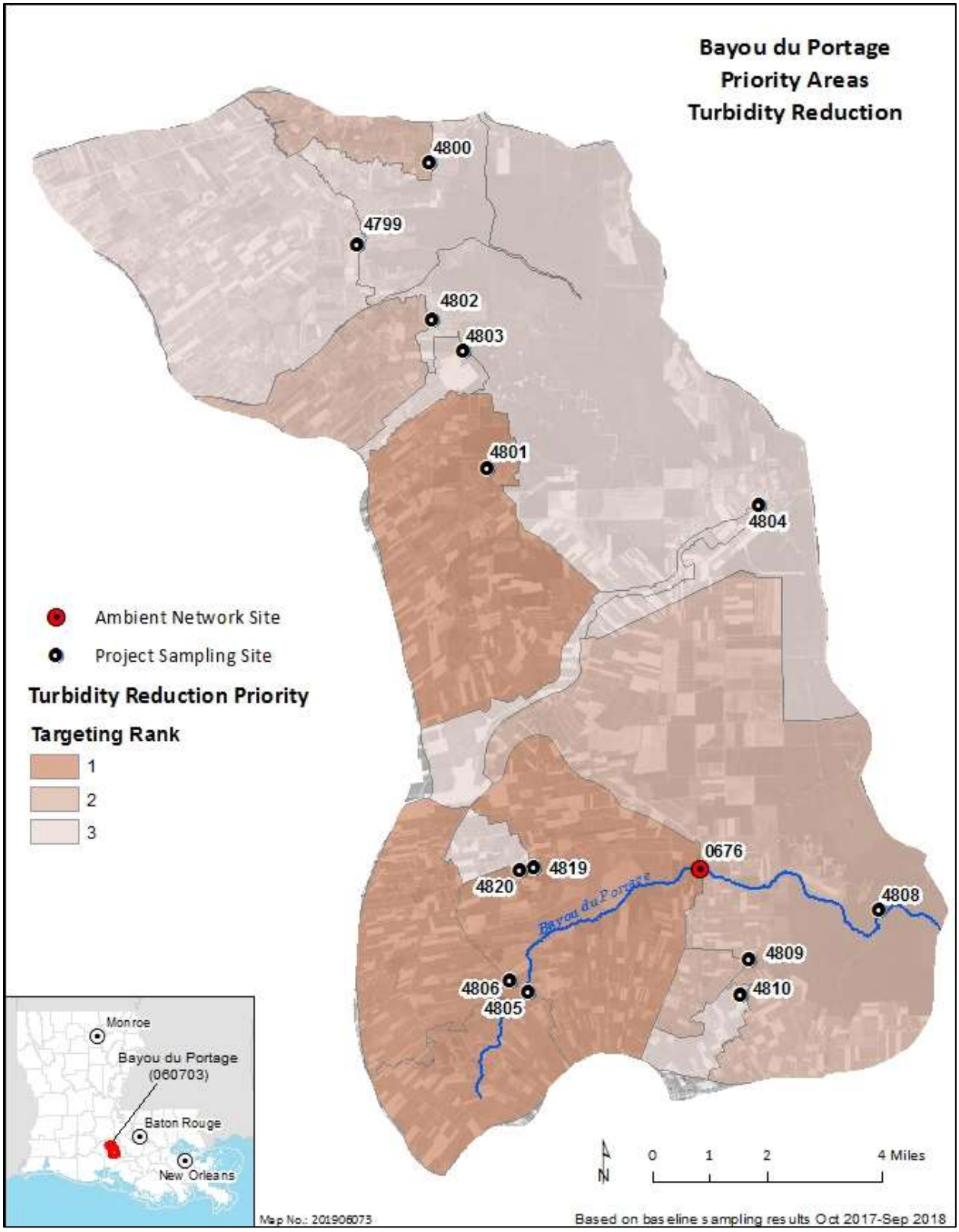

Figure 10. Turbidity Reduction Priority Areas

Dissolved Oxygen:

DO consistently falls below the minimum criterion in the Bayou du Portage watershed. Bayou du Portage has a water quality standard for DO of 5 mg/L minimum year-round. No more than 10% samples may fall below that value or the waterbody is deemed to have impaired support of fish and wildlife propagation. Because of the high excursion rates, LDEQ has determined the waterbody does not support its FWP designated use. LDEQ ambient water quality data used for assessing FWP use in its 2016 IR is shown below (Figure 11). The excursion rate is 27%.

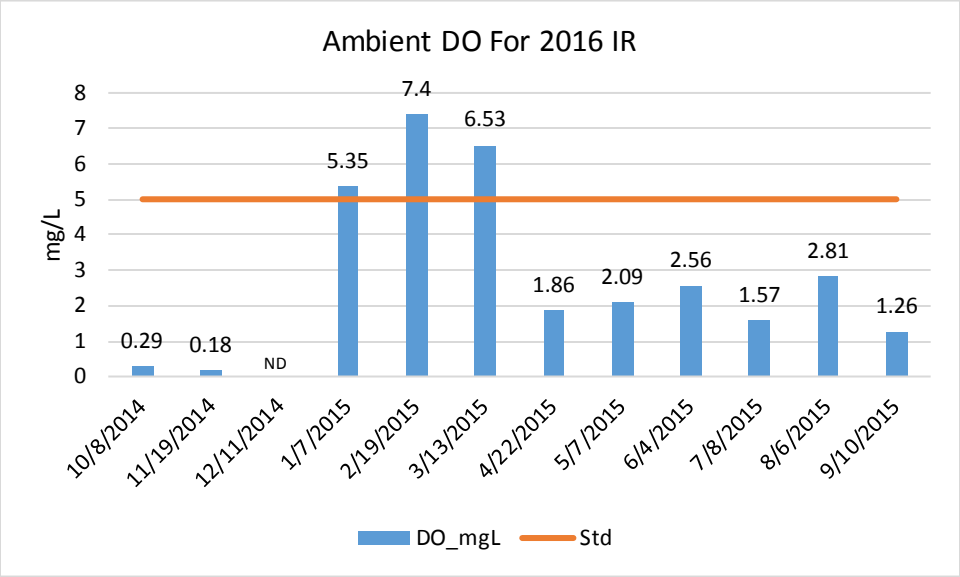

Figure 11. Ambient DO Data

Low DO can occur naturally in Bayou du Portage, due to the sluggish flow and tidal influences. The assessment attributes low DO to natural sources. The TMDL indicates that beyond background oxygen demand, NPS does contribute to oxygen demand and must be reduced by 30% to meet the standard. NPS sources include nutrients from cropland, nutrients from human and animal waste (grazing animals, the absence of community sewage treatment, wildlife), and potentially undisturbed organic bedload.

Baseline data shows that minimal geographic variation exists in DO levels throughout the watershed. All areas show low average DO, and no location exhibits values that would meet the water quality standard. See Table 9 for summarized NPS project data. See *Element B. Estimated Load Reductions* for more information on oxygen-demanding loads.

Table 9. Summary of NPS Project Data: Dissolved Oxygen Oct 2017-Sep 2018

Site	% DO < Standard	Average DO
0676	84%	2.9
4799	56%	4.5
4800	63%	3.8
4801	84%	2.8
4802	64%	3.9
4803	91%	1.9
4804	96%	2.7
4805	88%	3.0
4806	64%	4.1
4808	76%	3.7
4809	88%	2.9
4810	72%	3.9
4819	58%	4.3
4820	50%	5.2

Using baseline sampling data for DO in 2017-2018, priority areas were identified to implement BMPs for nutrient reduction. Areas with lower DO were given higher priority. However, because the entire watershed show low DO values, implementation is appropriate throughout the entire subsegment. Figure 12 shows the nutrient reduction priority areas.

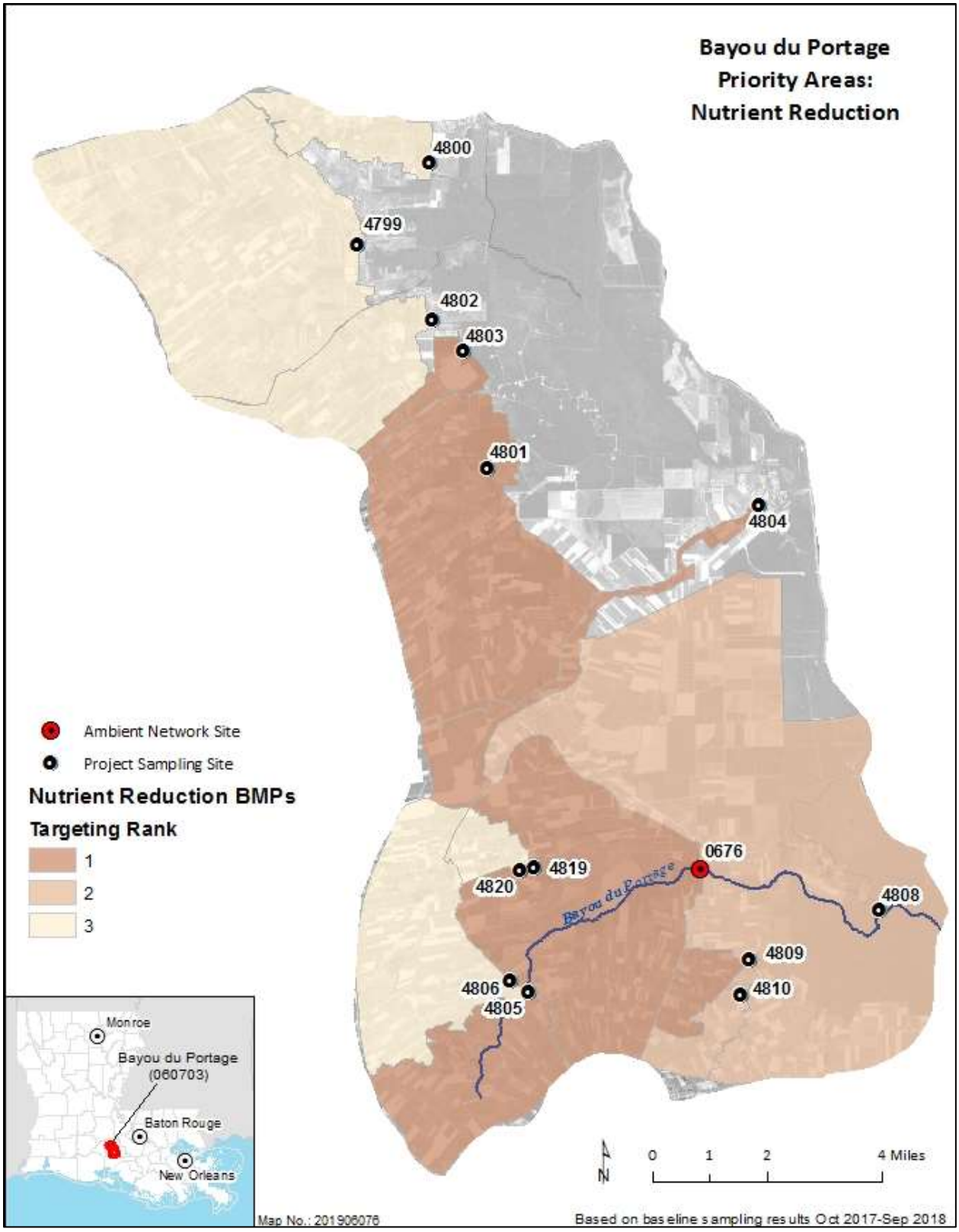

Figure 12. Priority Areas for Nutrient Reduction BMPs

Point Sources

The TMDL called for 0% reduction in point source discharges. This figure is based on the assumption of adherence to permit allowances. However, the IR indicates point sources as a suspected contributor, and as stated previously, discharge monitoring reports (DMRs) show a couple of point sources have exceeded their allowed TSS, bacteria, and biological oxygen demand or BOD discharge. As LDEQ enforcement brings these facilities into compliance, BOD and bacteria levels should improve.

Summary of Sources

The following summarizes the NPS sources for the causes identified in this section.

Bacteria

- OSDS
- Cattle
- Wildlife (especially feral hogs)
- Point Sources

Nutrients

- OSDS
- Cattle
- Row Crops
- Point Sources
- Benthic Load

Sediment

- Row Crops
- Cattle
- Benthic Load

Element B. Estimated Load Reductions

This section will attempt to quantify pollutant loading to Bayou du Portage as seen at the ambient monitoring site, and load reductions necessary to restore water quality. Load calculations and load reductions for each parameter of concern are delineated below.

Estimates of load reductions required to meet restoration goals are based on loading seen during baseline monitoring. Discussion on yearly load reductions tied to specific BMP acreages and counts can be found in *Element G. Interim Milestones*. Those reductions are based on STEP-L modeling, and source-specific bacteria loading from literature and watershed characterization.

Turbidity Reduction Estimates

The TMDL for sediment in Bayou du Portage was written for TSS rather than for turbidity. The TSS-turbidity relationship was evaluated and a correlation coefficient of .99 was found for these two parameters in this watershed. However, the watershed was found to require a 0% reduction in TSS at the time the TMDL was written. For the purposes of this WIP, the reduction target will be based on the 150 NTU TMDL target, and recent baseline data will be used to establish a reduction target percentage. Using the 2017-18 baseline data at the ambient location, in order to achieve the 150 NTU target, an average reduction of 29% would be required.

Seasonality: The TMDL indicated that Feb-May may show higher loading. However, monitoring data at the ambient location show exceedances dispersed throughout the year, and without any apparent relation to precipitation variation, so an overall yearly average reduction target will be used. This reduction target is determined by examination of baseline data. Twenty-three sampling events occurred 2017-18. Of these, 11 exceeded the target for an exceedance rate of 48%. To meet the 30% exceedance rate maximum, only 6 samples can exceed 150 NTU. Using baseline data shown below, by reducing turbidity by 60 NTU, that rate can be achieved. (See Table 10 for turbidity baseline data results at the ambient site.)

Table 10. Project Turbidity Data at the Ambient Location

Sampling Date	NTU	Target NTU	Reduction %
10/31/2017	150	150	0%
11/16/2017	24	150	0%
11/28/2017	60	150	0%
12/19/2017	260	150	42%
1/9/2018	150	150	0%
1/23/2018	19	150	0%
2/1/2018	180	150	17%
2/15/2018	290	150	48%
3/7/2018	750	150	80%
3/21/2018	120	150	0%
4/11/2018	90	150	0%
4/25/2018	160	150	6%
5/9/2018	50	150	0%
5/24/2018	35	150	0%
6/7/2018	210	150	29%
6/21/2018	210	150	29%
7/12/2018	320	150	53%
7/26/2018	37	150	0%
8/9/2018	21	150	0%
8/23/2018	350	150	57%
9/12/2018	210	150	29%
9/27/2018	290	150	48%
10/11/2018	9.1	150	0%

Nutrient (for DO) Reduction Estimates

For nutrients, the 2002 nutrient and DO TMDL (USEPA, 2002) guides load reduction targets. The TMDL recommends a 30% reduction in NPS loading to achieve the year-round 5mg/L standard. However, recent sampling data show higher nutrient concentrations currently than when the TMDL was written. An adjustment from this original reduction target was necessary to set appropriate targets for current loading.

To develop nutrient reduction targets for this plan, the following rationale and process were used:

1. The DO-TMDL provided an organic nitrogen NPS load allocation, but LDEQ baseline data does not include organic nitrogen. Total Kjeldahl nitrogen (TKN) was used as a surrogate since the TMDL provided a linear relationship between the two.

$$\text{Organic nitrogen} = 0.83 * \text{TKN}$$

2. Current (2017-2018) TKN loads were converted to organic N loads using the relationship established in the TMDL (shown in Step 1).
3. Current organic N load from Step 2 was compared to the TMDL's organic N load allocation to estimate a percent load reduction required (45%).
4. That percentage (45% vs TMDL's 30%) was applied to set targets for NPS nutrient reductions.
5. CDL land use data, SSURGO soils data, and local weather information were used as inputs into STEP-L to estimate acreages of BMPs needed to meet that 45% reduction.

The TMDL NPS load allocation with margin of safety for organic nitrogen was established as 131 kg/day. The average current organic N loading is 238 kg/day. The reduction needed was calculated as (238 kg/day – 131 kg/day) / 238 kg/day = 45%.
Monitoring data will be used to track progress toward meeting this target (See *Element H. Progress Determination Criteria*).

Note that STEP-L provides significantly higher load estimates than the TMDL and baseline data. Reasons for this could include: assumptions of the STEP-L model may not apply to this watershed; the model does not take into account geographic variability in location of contributing sources; and baseline data may not be representative of long-term dynamics. To be conservative, this plan will use STEP-L to determine acreages needed to reduce N loads by 45%.

Using load calculated with baseline data, and the 45% reduction targets in STEP-L, the following reductions and BMP acreages are required to reach the DO standard:

- TKN: 104,000 lbs/year Figure 13 (surrogate for Organic N: 86,100 lbs/year Figure 14) (TMDL compared against 2018 baseline data)
- BMP implementation in 12,400 acres cropland area (STEP-L)
- BMP implementation in 2,700 acres pastureland area (STEP-L)

Shown in the graphs below (Figure 13 and Figure 14) are projected cumulative reductions of yearly TKN and organic nitrogen loads.

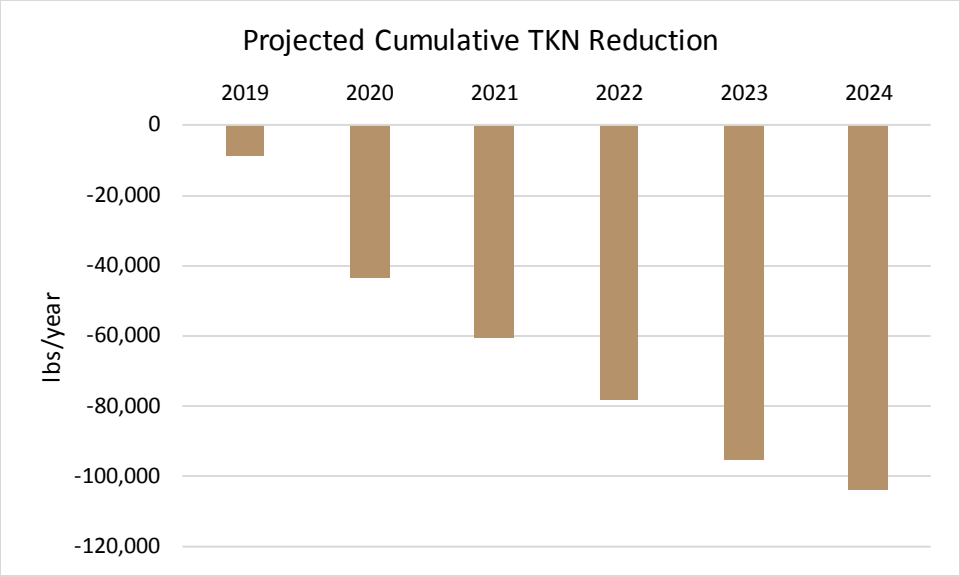

Figure 13. Projected Cumulative TKN Reductions 2019-2024

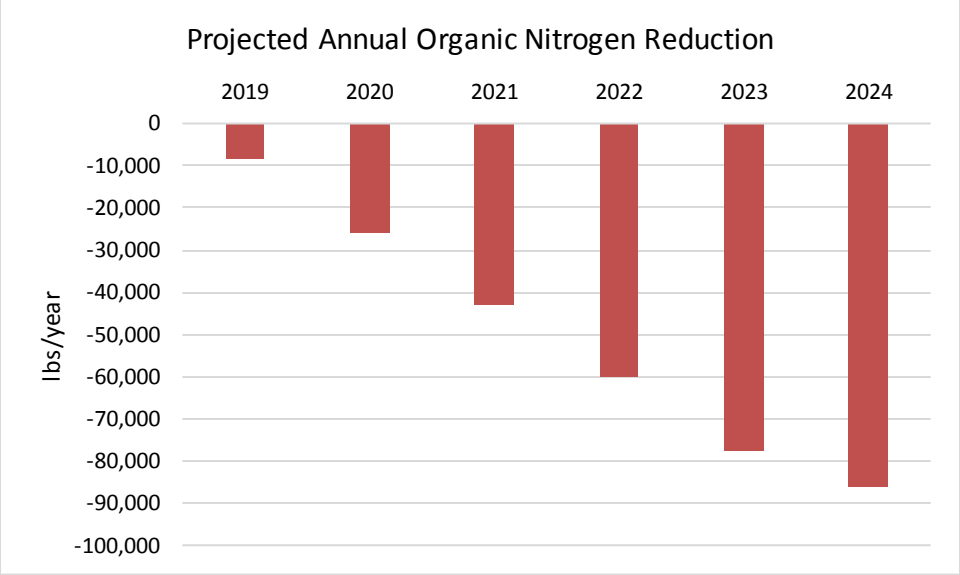

Figure 14. Projected Cumulative Organic Nitrogen Reductions 2019-2024

Note that the water quality assessment indicates natural sources as a factor in low DO concentrations. Thus, while implementation is expected to improve DO, it may not achieve a level of 5mg/L year-round due to those natural sources. If this proves to be the case as post-implementation monitoring results come in, LDEQ NPS will recommend a use attainability analysis be done on Bayou Du Portage to determine whether the DO criterion is appropriate for this subsegment.

Bacteria Load Reduction Estimates

Load reductions are based on achieving the water quality standard and restoring use support for primary and secondary contact recreation.

The fecal coliform TMDL set a reduction target of 95% NPS-related bacteria to meet the PCR WQ standard (USEPA, 2003). There was no SCR impairment at the time the TMDL was developed. Currently the subsegment is impaired for both PCR and SCR. The TMDL assumed loading from point sources was limited to their permitted concentrations. Thus all reductions were assigned to NPS loading. However, because: 1.) the TMDL used a margin of safety equal to 100% when calculating the NPS load allocation (a 200 cfu/100ml target instead of the actual 400 cfu/100ml standard); 2.) the TMDL did not include SCR; and 3.) the TMDL used a flow of 600 cfs whereas the actual flow is a magnitude lower (our measured flows showed a range of 1 to 67 cfs), this plan will look at baseline data to determine load estimates and necessary reductions.

The two seasons for bacteria loading and criteria are the warm season (PCR: May 1 – Oct 31) and year-round (SCR). Current baseline data for 2017-18 was evaluated for both PCR and SCR seasons. The PCR standard states that no more than 25% samples taken May-Oct may exceed 400 cfu/100ml. In order to remain within the allowed exceedance rate, no more than two of the 11 baseline samples may violate the standard. Baseline data at the ambient location showed 3 exceedances, a rate of 27%. The lowest exceedance – 800 cfu/100ml – would need to be reduced by 400 cfu/100ml indicating a 50% load reduction is required (see Table 11).

Table 11. Project PCR Bacteria Data at Ambient Location

Date	FC Bacteria	PCR Exceedance Level
2017-18	cfu/100ml	%
10/31/2017	800	50%
5/9/2018	26	0%
5/24/2018	170	0%
6/7/2018	380	0%
6/21/2018	59	0%
7/12/2018	125	0%
8/9/2018	97	0%
8/23/2018	1500	73%
9/12/2018	238	0%
9/27/2018	6000	93%
10/11/2018	63	0%

The SCR standard states that no more than 25% samples taken year-round may exceed 2,000 cfu/100ml. In order to remain within the allowed exceedance rate, no more than five of 23

samples may violate the standard. For SCR season, baseline data at the ambient location show four exceedances, a 17% exceedance rate, suggesting no load reduction is required (see Table 12). Based on baseline results, if water quality levels remain stable, the next ambient sampling cycle may show a similar conclusion. However, baseline data at other sites show SCR use support problems in other areas of the watershed.

Table 12. Project SCR Bacteria Data at Ambient Location

Date	FC Bacteria	SCR Reduction
2017-18	cfu/100ml	%
10/31/2017	800	0%
11/16/2017	77	0%
11/28/2017	68	0%
12/5/2017	54	0%
12/19/2017	8000	75%
1/9/2018	2200	9%
1/23/2018	560	0%
2/1/2018	67	0%
2/15/2018	338	0%
3/7/2018	6000	67%
3/21/2018	62	0%
4/11/2018	81	0%
4/25/2018	44	0%
5/9/2018	26	0%
5/24/2018	170	0%
6/7/2018	380	0%
6/21/2018	59	0%
7/12/2018	125	0%
8/9/2018	97	0%
8/23/2018	1500	0%
9/12/2018	238	0%
9/27/2018	6000	67%
10/11/2018	63	0%

There are about 2,150 acres of pasture within 1,000 feet of a stream. Assuming cows on these pastures have access to and spend time in streams, there is a significant bacteria loading potential. There are 2,284 home treatment systems in the subsegment. At an estimated failure rate of 50% (based on inspections in other watersheds and field surveys), human waste from 1,142 home systems also contributes a significant bacteria load. In addition, wetlands and rice fields in the area draw wildlife, especially waterfowl, and there is a large feral hog population, both contributing bacteria to the system. Stakeholders have identified wild hog populations as a problem in the watershed. Potential sources and estimated loads are seen in Table 13 below.

Table 13. Bacteria Load Estimates for Specific Sources

Source	Population / Units	CFU/Day	Potential Land Load: CFU/Day	% Loading to Stream[2]	Potential Stream Load CFU/Day	Relative Contribution
Cattle on Land	1,000	3.30E+10	3.30E+13	3%	9.90E+11	10%
Cattle in Stream[1]	215	3.30E+10	7.10E+12	100%	7.10E+12	68%
Feral Pigs/Other Wildlife	Data Gap	1.10E+10	Data Gap	26%	Data Gap	Data Gap
Malfunctioning OSDS	1,142	2.00E+09	2.28E+12	100%	2.28E+12	22%
Total	-	-	4.24E+13	-	1.04E+13	100%

1 Based on proportion of Bayou du Portage pasture within 1000ft of stream, density .1 cow/acre, 8.3% time in stream.

2 Assumed rate based on California Regional Water Quality Control Board (2012)

Sources: USDA National Agricultural Statistical Service, US Census, USDA CDL CropScape

Using the table above to calculate load estimates, a 50% reduction would consist of removing 5.18E+12 cfu from the daily load in the watershed. Distributing that 50% reduction rate evenly entails restricting stream access for 108 cows, repairing 571 home systems, and addressing pasture runoff where streams are not directly accessible.

Site-specific baseline data was analyzed and reduction targets set for those individual sites. Table 14 below shows the site-specific percent load reductions required to restore PCR and SCR. These reductions are based on baseline sampling data at each location in the watershed. Note that although for SCR, data at the ambient location indicates a 0% reduction is required, data from the other sites show there is an SCR problem in the watershed at other locations. These targets will help prioritize areas for implementation, and help adjust efforts as post-implementation monitoring results are analyzed.

Table 14. Site-Specific Bacteria Reductions Required for PCR Restoration

Site	0676	4799	4800	4801	4802	4803	4804	4805	4806	4808	4809	4810	4819	4820
PCR Reduction %	50%	80%	93%	93%	83%	87%	70%	93%	56%	33%	64%	90%	0%	25%
SCR Reduction %	0%	67%	23%	67%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Note: Site 4819 is frequently pooled and is not sampled during pooling events.

Figure 15 shows the cumulative total load reductions required for PCR restoration using the 5.18E+12 cfu daily load reduction target.

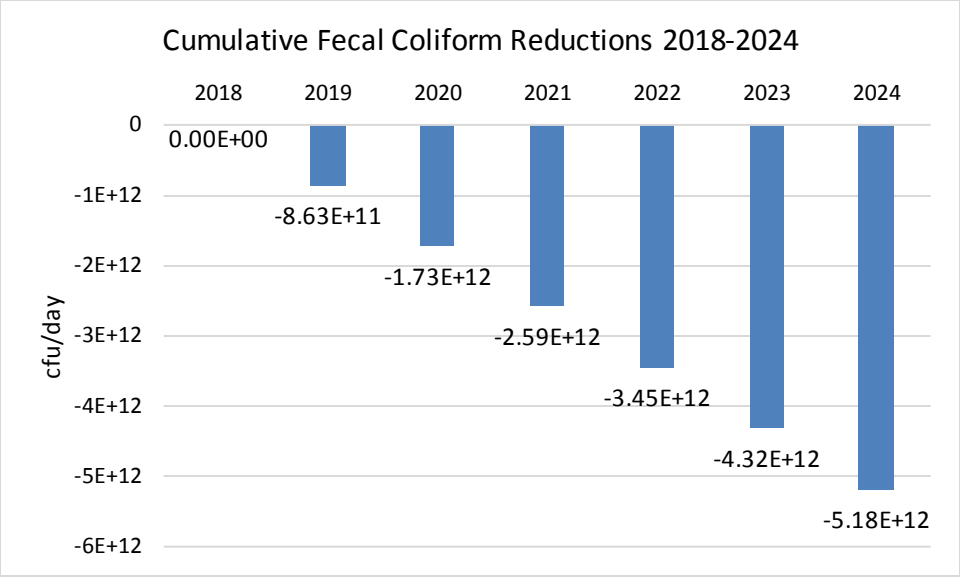

Figure 15. Projected Cumulative Yearly Fecal Coliform Load Reductions

Summary of NPS load reductions:

Nutrients: 45% overall (TMDL adjusted using baseline data loading)
Turbidity: 29% (turbidity using water quality standard and basedata loading)
Bacteria: 50%, or, 5.18E+12cfu/day (using water quality standards and basedata loading)

Priority areas for BMPs are shown on maps in Figures 7, 8, 10, and 12 in *Element A. Causes and Sources of Pollution.*

Element C. Best Management Practices

This section will describe pollution reduction measures identified by key stakeholders, including LDEQ, that are selected to reduce runoff causing water quality impairments. It is understood that baseline monitoring data collected throughout the watershed will help guide geographic targeting of those measures.

For purposes of categorizing strategies to reduce NPS in Bayou du Portage, LDEQ identified the following implementation program goals and strategies. Responsible parties for implementation are shown below.

Strategy I – Reduce nutrient and sediment loading through implementation of conservation practices to stem cropland and pastureland runoff (Louisiana Department of Agriculture and Forestry, or LDAF)

Strategy II – Reduce bacteria loading through inspections of home sewage treatment systems (LDEQ), and an education-outreach campaign (LDEQ Source Water Protection Program)

Strategy III – As funding becomes available, reduce bacteria loading through home system pump-outs (LDAF)

Strategy I – Practices to Reduce Runoff Loading from Pastureland and Cropland

The Clean Water Act Section 319(h) Program allows LDAF, in partnership with other state and federal agencies, to provide technical and financial assistance to farmers for implementation of conservation systems. Under the 319 Program, LDAF will implement BMPs to reduce bacteria loading from cattle that access waterbodies directly, and to reduce runoff from pastureland.

LDAF also will implement practices to reduce runoff from cropland. Bayou du Portage is listed as impaired for turbidity, and sedimentation is a concern of the Chitimacha Tribe particularly in the lake system downstream. Nutrient loading from cropland will also be addressed by conservation practices. These are listed in Table 15 with their respective water quality physical impacts, which form the rationale for implementing these BMPs. Associated costs are listed in Table 16.

Table 15. BMPs and Water Quality Effects (NRCS)

NRCS Code	Practice	Selected Impacts	Reduce Nutrients	Reduce Bacteria	Reduce Salts	Reduce Sediment
328	Conservation Crop Rotation	Reduce erosion, reduce water quality degradation due to excess nutrients, maintain or improve soil health				
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	Reduce erosion				
340	Cover Crop	Reduce erosion, capture and recycle nutrients				
342	Critical Area Planting	Stabilize streambanks and reduce erosion				
344-6	Residue and Tillage Management, Reduced Till	Reduce erosion, improve soil heatlh				
382	Fence	Reduce erosion and nutrient runoff, support other BMPs				
386	Field Border	Reduce erosion, compaction, and excess nutrients				
410	Grade Stabilization Structure	Reduce runoff and erosion				
430	Irrigation Pipeline	Reduce energy use and erosion as part of a complete irrigation system				
449	Irrigation Water Management	Minimize irrigation-induced soil erosion				
462	Precision Land Forming	Erosion control				
464	Irrigation Land Leveling	Reduce excess irrigation-induced runoff				
472	Access Control	Reduce erosion and nutrient loading				
512	Forage and Biomass Planting	Reduce erosion				
516	Livestock Pipeline	Reduce bank erosion and nutrient loading by reducing access				
528	Prescribed Grazing	Reduce erosion and maintain soil condition				
561	Heavy Use Area Protection	Reduce erosion				
576	Livestock Shelter Structure	Provide protection for livestock from heat/cold. Reduce erosion and nutrient loading into surface waters				
578	Stream Crossing	Reduce sediment and nutrient loading, reduce streambank and streambed erosion	*	*		
590	Nutrient Management	Reduce nutrient runoff, maintain/improve soil condition				
595	Integrated Pest Management	Prevent and mitigate pest suppression impacts				
614	Watering Facility	Meet water requirements, improve animal distribution				
642	Water Well	Meet water needs, enable proper use of range, pasture, and wildlife areas		*		
644	Wetland Wildlife Habitat Management	Maintain or develop habitat for wetland flora/fauna				

Sources: LDAF personal communication, https://efotg.sc.egov.usda.gov/references/public/LA/2015_CPPE-Water_Quality_Degradation.pdf *Component part of a system, some adverse localized impacts but overall beneficial to water quality

Table 16. BMPs and Associated Costs

NRCS Code	Practice	Cost
328	Conservation Crop Rotation	$9.70/ac
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	$14.78/ac
340	Cover Crop	$48.60/ac
342	Critical Area Planting	$157.24/ac
345	Residue and Tillage Management, Reduced Till	$11.32/ac
382	Fence	$1.14/ft
386	Field Border	$93.26/ac
410	Grade Stabilization Structure	$1.29/DiaInFt
430	Irrigation Pipeline	$14.40/ft
449	Irrigation Water Management	$9.30/ac
462	Precision Land Forming	$176.10/ac
464	Irrigation Land Leveling	$226.22/ac
472	Access Control	$419.10/each
512	Forage and Biomass Planting	$199.69/ac
516	Livestock Pipeline	$3.57/ft
528	Prescribed Grazing	$30.71/ac
561	Heavy Use Area Protection	$2.84/sq ft
576	Livestock Shelter Structure	$3.14/sq ft
578	Stream Crossing	$9.65/sq ft
590	Nutrient Management	$6.41/ac
595	Integrated Pest Management	$13.11/ac
614	Watering Facility	$2.45/gal
642	Water Well	$28.74/ft
644	Wetland Wildlife Habitat Management	$8.52/ac

*Source: LDAF

Strategy II – Home System Inspections and Education/Outreach

Residents in this subsegment are served by individual home systems that rely on aeration units and settling compartments to treat wastewater. Soils in the area are generally poorly drained and do not support a passive septic system. These mechanical units require maintenance and upkeep, and often fall into disrepair.

Using Clean Water Act 319 funding, LDEQ will initiate inspections of home systems in the subsegment. Priority bacteria reduction area maps will help guide inspection activity. In addition, on establishment of a funding source, LDAF will lead home system pump-outs activity. Because the resulting load impact of these activities is unpredictable, sampling results will determine efficacy toward reducing bacteria load.

Starting in 2020, LDEQ's source water protection program will initiate a water quality education campaign, meeting with and presenting to residents and stakeholders on NPS threats to wells and surface water intakes and ways to mitigate those impacts. This is intended to provide additional context for understanding the importance of reducing nutrient, sediment, and bacteria runoff. Part of this effort includes working with Louisiana Rural Water Association (LRWA) to educate homeowners on proper system maintenance.

Finally, the Louisiana Department of Wildlife and Fisheries (LDWF) indicates feral hogs contribute to erosion and fecal bacteria loading into waterways. The agency provides information and resources for residents to address another source of bacteria in Bayou du Portage, feral hog populations. This includes information on hog populations and impacts, trapping technologies, current research, and information and permitting for helicopter/shooting control. LDWF and LDAF can provide information on animal transport regulations passed by the Louisiana Legislature in 2018. (http://www.wlf.louisiana.gov/wildlife/feral-hog)

Three SWCDs in Louisiana annually conduct hog aerial gunning/strategic trapping programs through the Wildlife Services division of the USDA Animal & Plant Health Inspection Service. Costs range between $0.50 and $0.75/acre. This activity generally occurs before greening, in February-March. However, expansion of this program into larger areas is constrained by both the number of helicopters available and by suitable ground cover.

Strategy III – Reduce Bacteria Loading through OSDS Pump-outs

As funding becomes available, LDAF will initiate home system pump-outs. Pump-out costs vary, but $450/each is an average cost (using data from other Louisiana watersheds). Through informational packets and potentially with face-to-face interactions, LDAF or district staff will relay to homeowners the importance of system maintenance. Pump-outs and related education activities can be conducted to further address bacteria and loading from home systems.

Element D. Technical and Financial Assistance

This section will describe assistance provided by those partners that have committed to working in the watershed, and funding information (where available) for that assistance.

Technical assistance for Bayou du Portage restoration is provided to agricultural producers by LDAF. Additional assistance is provided to the Soil and Water Conservation District (SWCD) by LDAF, working with the Natural Resources Conservation Service (NRCS). LDEQ will initiate the home system inspections effort and LDEQ Source Water Protection Program will provide water quality protection education and outreach beginning in 2020. LDAF will lead home system pump-outs. Table 17 shows funding for specific components of Bayou du Portage water quality restoration projected out through 2023. If work continues beyond that, the plan will be revised and funding sources identified at that time (as per the schedule in Element F).

As a pilot approach in Louisiana, LDAF will attempt to structure assistance contracts in Bayou du Portage on a five-year basis rather than a three-year basis. This will entail a smaller contract amount over a longer period to assure a longer period of implementation. It is expected that with certain management practices, a longer period will enable producers to see a longer-term result in yield. While up to 80% of producers may drop some management practices after a three-year commitment, that many will continue following a five-year commitment (USEPA, 2018).

Table 17. Financial Assistance for Bayou du Portage Restoration

Total Estimated Funding for Bayou du Portage Watershed Restoration							
Bayou du Portage	**2017-18**	**2019**	**2020**	**2021**	**2022**	**2023**	**Total**
LDEQ 319(h) NPS WQ planning, sampling, analysis/source water protection education and outreach	$100,900	$100,900	$100,900	$100,900	$100,900	$100,900	$605,400
LDAF 319 Agricultural technical assistance	$0	$0	$45,000	$150,000	$225,000	$180,000	$600,000
LDEQ 319(h) OSDS Education and outreach*	$0	$0	$0	$30,000	$30,000	$30,000	$90,000
NRCS agricultural technical assistance	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$600,000
LDAF Home system pump-outs*			$25,000	$25,000	$25,000	$25,000	$100,000
TOTAL	$200,900	$200,900	$270,900	405,900	$480,900	$435,900	$1,995,400

Sources: LDAF, LDEQ, NRCS; Other potential funding for fishery restoration and sediment work is grant funding applied for by the Chitimacha Tribe and its partners. NRCS yearly funding is estimated based on previous implementation expenditures.
*As funding becomes available.

Previous Assistance

Bayou du Portage is a National Water Quality Initiative (NWQI) watershed, but despite targeted implementation, signups in this area have remained slow. NRCS has spent approximately $1,029,382 implementing in the four HUCs over an 8-year period (NRCS ProTracts). This figure may include some duplicate amounts, and represents a small portion – less than 1% – of NRCS spending in Louisiana during this period. NRCS is expected to continue to provide implementation assistance in this subsegment.

Element E. Education and Outreach

This section will describe key stakeholders in the watershed and partnerships that are essential to establishing goals and to local implementation. In addition, this section outlines current and planned education and outreach activities that will occur on a local level in the watershed.

Partners and Key Stakeholder Involvement

Stakeholders in the Bayou du Portage watershed include residents, local and state government, non-governmental organizations, and businesses – primarily agricultural producers – among others. Stakeholders involved in the planning and baseline data collection phase of the watershed planning process include the soil and water conservation district, the Chitimacha Tribe of Louisiana, LDAF, and LDEQ. This project originally began downstream in the Lake Fausse Pointe subsegment. Lake Fausse Pointe actually includes two lakes – Fausse Pointe and Dauterive Lake. These lakes formerly were part of the Atchafalaya River hydrologic system, but after levees cut off overflow, they serve as sumps for Bayou du Portage and other upstream drainage. Ultimately, south of Dauterive Lake, this system connects to Bayou Teche at a canal with a lock located south of the town of Loreauville, and further south via drainage canal near the town of Charenton. The Chitimacha, concerned about sedimentation affecting the lakes' fisheries, reached out to NRCS and LDEQ to assist in addressing those impacts. After initial sampling and NRCS implementation in Lake Fausse Pointe subsegment, it became evident that upstream sources would need to be addressed to stem sediment inflow.

While efforts shifted to upstream sources, NRCS continued implementation near Dauterive Lake and Lake Fausse Pointe, and baseline sampling began upstream in Bayou du Portage. LDEQ and LDAF presented the water quality issues and the sampling effort at a conservation district meeting in 2017. Stakeholders at that meeting (primarily rice and sugarcane producers) identified water quality as a primary concern in their district. One Louisiana Master Farmer (sugarcane) is on the SWCD board and is expected to serve as an example producer in this region.

LDEQ and LDAF will continue to share data and information, and to solicit concerns, comments, and suggestions from stakeholders in the region, participate in local meetings and in public education opportunities when appropriate.

Chitimacha Tribe of Louisiana is concerned about sedimentation and infilling in traditional fishing areas in and near the Atchafalaya Basin, including Lake Fausse Pointe. Concern was expressed initially at a local SWCD meeting, and LDAF and NRCS met with the Tribe to discuss issues and concerns. NRCS and LDEQ initiated work in Lake Fausse Pointe subsegment, and later Bayou du Portage. Currently the tribe is partnering with academic researchers to study historic subsistence fisheries, species, adaptation and resource resilience. Fishery restoration is a tribal goal, and toward that end LDEQ will collaborate with the Tribe and its partners in this

effort. While dredging is one de-sedimentation approach the tribe is pursuing, LDAF, NRCS, and LDEQ NPS efforts are put toward reducing the upstream sediment entering the system to prevent future problems.

Lafayette/St. Martin Soil and Water Conservation Districts The top five resource concerns identified by the districts in 2018 in ranked order are:

1. Top soil erosion
2. Drainage
3. Awareness/outreach to urban groups in ag areas
4. Water conservation and water quality
5. Invasive species and over-grazing

These stakeholder concerns align with CWA 319 goals and efforts. LDAF and LDEQ have introduced the 319 program and baseline data analysis and maps at locally led district meetings. A number of stakeholders, including local producers, St. Martin SWCD board members, LSU AgCenter, NRCS, etc. expressed interest in the program and are assisting in identifying causes. Master farmers within the district will be requested to take a leadership role in conservation practice education.

Louisiana Department of Agriculture and Forestry Through the St. Martin Parish SWCD (majority of the watershed area), LDAF established interest in the project and LDEQ began baseline sampling. Through the CWA 319 program, LDAF will be a lead agency for BMP implementation. Using baseline monitoring results and additional data, LDAF will target areas for implementation, provide project management on a day-to-day basis, assist in developing and implementing BMPs, and provide reimbursement to project participants for cost-share. LDAF/Office of Soil and Water Conservation will track the rate and extent of BMP implementation within the subsegment. LDAF staff will share information and conduct education and outreach about current water quality issues in Bayou du Portage through locally led meetings, conservation practice sign-ups, and follow-up technical assistance and reporting.

In addition to BMP implementation, home system pump-outs include distribution of informational packets containing applications. These face-to-face interactions provide an effective means of education and communication on the importance of home system maintenance when they occur.

Lake Fausse Point, Lake Dauterive, and Grand Avoille Cove Advisory Board

The Louisiana Department of Wildlife & Fisheries created the Lake Fausse Point, Lake Dauterive and Grand Avoille Cove Advisory Board in 2009 "to advise the secretary on matters pertaining to the preservation of the Lake Fausse Point, Lake Dauterive and Grand Avoille Cove area and on the development of recreational opportunities." The Board has the authority to assess environmental impacts of human and natural processes and advise the secretary on projects and

activities designed to preserve the natural state. In this case, education will move upward to policy and decision makers in the agency and potentially to the state Legislature. The Board has identified such issues as fish kills due to anoxic swamp water driven in by hurricanes, sediment impacts on fisheries, erosion from land use change including forest clearing for agriculture and urban use, and nutrient impacts, among other issues. As this project develops, LDEQ NPS expects to engage the Board to further education on efforts in the watershed.

Louisiana Department of Environmental Quality is conducting baseline water quality monitoring and watershed planning in this subsegment. LDEQ Water Surveys is sampling throughout the watershed. LDEQ NPS is conducting watershed planning, including watershed characterization, modeling, data analysis and mapping, and sampling plan design. LDEQ NPS analyzes monitoring results for sharing with LDAF, the conservation district, tribe, and other partners. As the project progresses, LDEQ will provide updated data and maps to stakeholders quarterly and as requested, to assist with communicating issues and trends. LDEQ staff will assist in prioritizing areas for implementation. LDEQ Source Water Protection staff will conduct educational activities in the watershed beginning in 2020 with cooperation from LRWA. This education will focus on home treatment system maintenance, preventing runoff, and communicating pollution risk and prevention to local residents and businesses.

USDA NRCS In response to tribal concerns over fishery impairment in Lake Fausse Pointe due to sediment, NRCS initiated an NWQI project in HUC12 080801020801, Bayou Du Portage-Coulee Du Portage, in Iberia Parish to address sedimentation into the lake. The HUC is located in the southernmost portion of the Bayou du Portage subsegment. NRCS continues NWQI in that HUC, and Environmental Quality Incentives Program (EQIP) in the remaining HUCs in the subsegment.

In addition to NWQI and EQIP, NRCS assists LDAF and the local SWCDs in developing project-ranking criteria and with outreach and education activities to ensure landowners and operators are aware of program opportunities. NRCS staff work closely with LDAF to ensure that RMS level conservation plans developed for this project meet NRCS planning standards. The field and area staff will assist in providing technical assistance for BMP plan designs, implementation, and certification. The NRCS staff will assist LDAF and the local SWCDs in collecting data and assembling semi-annual and annual reports for this project.

Element F. Implementation Schedule

This section provides a schedule of tasks and activities required for plan implementation (see Figure 16). If progress is slower than planned, and/or uses are not restored by 2023, the plan will be extended through 2025 or as necessary.

Implementation strategies may occur simultaneously and consist of:
Strategy I – Reduce nutrient and sediment loading through implementation of conservation practices to stem cropland and pastureland runoff (LDAF)

Strategy II – Reduce bacteria loading through OSDS inspections (LDEQ) and an education-outreach campaign (LDEQ Source Water Protection Program)

Strategy III – As funding becomes available, implementation of home system pump-outs (LDAF)

Bayou du Portage Timeline											
			2017	2018	2019	2020	2021	2022	2023	2024	2025
GOALS	1	Project Term									
	2	Ambient Monitoring									
	3	IR Assessment									
	4	Uses Restored								or	
LDEQ	1	Assessment, Recon, Site Selection									
	2	QAPP/Sampling Plan Drafting & Approval									
	3	Baseline Sampling & Assessment									
	4	General NPS Outreach/Education									
	5	Stakeholder Meetings									
	6	WIP Development									
	7	Longterm Monitoring / Data Analysis									
	8	Home System Education (Sourcewater)									
	9	Home System Inspections									
	10	Plan Revision (if required)									
LDAF / Partners	1	Planning Phase									
	2	Develop Ranking Criteria/Select BMPs									
	3	Meet with Participants/Sign-Ups									
	4	Prepare Individual BMP Plans									
	5	Ag BMP Implementation (LDAF)									
	6	Ag BMP Implementation (NRCS)									
	7	Home System Pump-outs/Education									

Figure 16. Bayou du Portage Project Timeline

Element G. Interim Milestones

This section lists quantitative and qualitative indicators that will be used to gauge progress of implementing the plan and its effectiveness. Feedback on achieving these milestones will come in the form of water quality data, participation rates, and stakeholder input. This information will inform any adjustments to the plan elements: scheduling, locating practices, adding or removing specific practices, and education/outreach approach.

The short-term goals of this plan are to:

- Identify areas contributing pollutant loading within the watershed,
- Reduce cropland and pastureland runoff in four 12-digit HUCs,
- Reduce home sewage pollution loading through inspections, education, and pump-outs
- Monitor water quality to track changes in the watershed.

The long-term goal of this plan is to restore use support in Bayou du Portage.

Progress toward achieving these goals will be determined using interim indicators and milestones as depicted in Table 18. Quantitative milestones are based on baseline monitoring data, water quality criteria, and STEP-L modeling. Specifically, BMP implementation milestones are based on STEP-L estimates, OSDS milestones are based on Louisiana Department of Health permitted system counts and an estimated failure rate, bacteria loading milestones are based on potential loading from sources identified in the watershed, nutrient milestones are based on observed baseline loads at the ambient site, and exceedances milestones are based on ambient sampling data used for assessment. Other sources of information used in analysis include: agricultural statistics (USDA, 2018), land use data, and the Bacteria Source Load Calculator (BSCL) tool (Zeckoski, R.W., 2005). Assumptions and calculations are available from LDEQ upon request. Limitations of this approach include:

- STEP-L does not represent geographic variability within the watershed,
- An additive approach to load reductions does not reflect complexities of bacteria and nutrient cycling in the natural environment,
- Response of DO to nutrient loading and nutrient ratios is unknown in Bayou du Portage,
- Benthic load is not represented.

In light of these limitations, monitoring and tracking data will be key to measuring progress. In addition, because implementing BMPs on cropland and pasture relies on volunteers, acreages under implementation during a given year are difficult to predict. As implementation of this plan progresses, new information will be used to adjust activities as required. This adaptive management strategy will occur in the context of these milestones and plan adjustments will occur with continued stakeholder involvement.

Table 18. Restoration Milestones

Bayou Du Portage Restoration Milestones						
	2019	2020	2021	2022	2023	2024
Implementation-Based Milestones						
Acres in Cropland BMPs*	0	2480	4960	7440	9920	12,400
Acres in Pastureland BMPs*	0	540	1080	1620	2160	2,700
OSDS Repaired (cumulative)	100	300	500	700	900	1,142
Water Quality-Based Milestones (Ambient Monitoring Site)						
Bacteria Load (cfu/day)**	8.63E+11	1.73E+12	2.59E+12	3.45E+12	4.32E+12	5.18E+12
N Load (tons/yr TKN + NO3-NO2)	130	116	102	88	74	58
P Load (tons/yr)	7	7	6	5	4	3
Bacteria PCR Exceedances	50%	45%	40%	40%	40%	20%
Bacteria SCR Exceedances	36%	35%	30%	30%	25%	20%
Turbidity Exceedances	67%	60%	53%	46%	39%	30%
DO Exceedances	73%	65%	55%	45%	30%	10%

* Based on Step-L estimates

** Potential current load

Qualitative milestones include:

- Communicating water quality issues to stakeholders and compiling a team of interested and invested local individuals and organizations (began in 2016 and continues),
- Identifying and overcoming obstacles to agricultural BMP implementation, including enlisting assistance from Master Farmers in the watershed (2016-ongoing),
- Cooperating with stakeholders and partners for sharing research and monitoring data, and information on updates on activities in the watershed,
- Plan adjustments as indicated by monitoring data.

Element H. Progress Determination Criteria

This section summarizes benchmarks used to determine progress and long-term success.

Data collected from water quality monitoring will be used to determine whether NPS loads are improving over time and progress is being made toward meeting water quality standards. Progress will be determined by comparing implementation and monitoring data to milestones in *Element G. Interim Milestones*. Monitoring locations, parameters to be analyzed, and monitoring frequency are specified in the following section, *Element I. Monitoring*. Success will be determined using water quality data sampled at the ambient monitoring location measured against Louisiana's water quality criteria to assess the watershed's use support restoration. LDEQ formally assesses use support every two years and publishes this assessment in its biannual Integrated Report.

LDEQ water quality standards used to assess use support in this subsegment are:

- DO – 5mg/L year-round (maximum 10% excursion rate),
- Fecal coliform limits for Primary Contact Recreation – 400 cfu/100ml May-Oct (maximum 25% exceedance rate),
- Fecal coliform limits for Secondary Contact Recreation – 2,000 col/100ml year-round (maximum 25% exceedance rate),
- Turbidity – no numeric criteria, target of 150 NTU (maximum 30% exceedance rate) as specified in the TMDL

Continued sampling throughout the watershed will serve as a feedback mechanism and provide information needed for any plan adjustments in the future. Specifically, following each PCR and SCR season, bacteria loading estimates and concentration data will be analyzed and compared to milestones in the previous section to assess progress. In addition, assessment of turbidity and nutrient reduction progress will be determined yearly through annual analysis of monitoring data and of acres participating in BMPs. Associated reductions will be estimated using STEP-L. Acreages and modeled reductions will be compared against milestones in the previous section to determine progress. Corrective action will be taken with partner and stakeholder input to adjust planned activities as indicated.

Element I. Monitoring

This section describes the purpose, method, sites, parameters, and schedule of water quality monitoring that will support this plan.

The purpose of water quality monitoring in Bayou du Portage is to characterize water quality issues throughout the watershed, to help identify geographic areas contributing high NPS runoff, to inform any strategy adjustments, and to provide a quantitative tracking of water quality before, during, and after BMP implementation.

Water Quality Monitoring

Ambient water quality monitoring at Bayou du Portage Site Number 0676 occurs on a four-year rotation and determines use support. Through CWA Section 319(h) funding, LDEQ Water Surveys collects water quality samples for LDEQ NPS at the ambient location and thirteen additional locations throughout the watershed twice monthly. Table 19 on the following page provides further detail. On each site visit, survey staff record site conditions observed during monitoring. NPS water quality data is used to identify priority areas for BMP implementation and track changes over time before, during, and after BMP implementation. NPS water quality data may be used for assessment. Data collection and analysis occur under EPA-approved QAPP #3050 and the current EPA-approved sampling plan (LDEQ NPS, 2018).

Measured and Estimated Parameters

Water quality parameters are listed in Table 19. Survey staff collect in situ measurements and samples are analyzed in a certified laboratory for bacteria, sediment, and nutrients. Flow is measured at the ambient location once monthly, during the first water quality sampling event each month. Flow and pollutant concentrations are used to calculate load at the ambient site location. Data and project progress toward reaching interim milestones are shared with stakeholders throughout the project term through stakeholder meetings, and presentations.

Table 19. Bayou du Portage Monitoring Sites and Parameters

LEAU Site No.	Waterbody Name	Site description	Latitude	Longitude	Parish	Water Quality		Site Characterization With Photos[1]	Sample Frequency
						Lab[3]	In Situ[2]	Quarterly and as needed	
4799	Bayou Portage	Bayou Portage at Nursery Hwy LA3039 bridge	30.28141	-91.82453	St. Martin	X	X	X	Twice per month
4800	Coulee Nicole Guidry	Coulee Nicole Guidry at Old Trash Pile Rd bridge	30.30171	-91.80316	St. Martin	X	X	X	Twice per month
4801	Bayou Martin	Bayou Martin at Section 28 Rd bridge	30.22438	-91.78737	St. Martin	X	X	X	Twice per month
4802	Unnamed tributary to Coulee Nicole Guidry	Unnamed tributary to Coulee Nicole Guidry at Grand Bois Rd	30.26198	-91.80318	St. Martin	X	X	X	Twice per month
4803	Unnamed tributary to Coulee Nicole Guidry	Unnamed tributary to Coulee Nicole Guidry at High Pocket Rd	30.25403	-91.79400	St. Martin	X	X	X	Twice per month
4804	Catahoula Coulee	Catahoula Coulee at Catahoula Hwy	30.21435	-91.70835	St. Martin	X	X	X	Twice per month
0676	Bayou du Portage (ambient site)	Bayou du Portage at Parish Rd 679	30.12236	-91.72661	Iberia	X	X	X	Twice per month
4805	Coulee du Portage	Coulee du Portage at Burton Plantation Hwy	30.09159	-91.77702	St. Martin	X	X	X	Twice per month
4806	Unnamed tributary to Coulee du Portage	Unnamed tributary to Coulee du Portage at Burton Plantation Hwy (345)	30.09444	-91.78236	St. Martin	X	X	X	Twice per month
4808	Bayou du Portage	Unnamed tributary to Bayou Portage at end Bayou Portage Rd (dock)	30.11136	-91.67460	St. Martin	X	X	X	Twice per month
4809	Unnamed tributary to Bayou Portage	Unnamed tributary to Bayou Portage at Fernand Crochet Ln	30.09927	-91.71285	Iberia	X	X	X	Twice per month
4810	Unnamed tributary to Bayou Portage	Unnamed tributary to Bayou Portage at Braquet Rd	30.09045	-91.71527	Iberia	X	X	X	Twice per month
4819	Unnamed tributary to Coulee du Portage	Unnamed tributary to Coulee du Portage at Francis Loop	30.12309	-91.77514	St. Martin	X	X	X	Twice per month
4820	Unnamed tributary to Coulee du Portage	Unnamed tributary to Coulee du Portage at Francis Loop	30.12266	-91.77901	St. Martin	X	X	X	Twice per month

1) Field Data Sheets will be completed at each sampling event and a NPS Site Characterization Form will be conducted initially and as needed.

2) The in situ parameters to be measured are pH, temperature, DO, DO percent saturation, specific conductance, and salinity. Discharge will be collected at selected sites monthly or as needed.

3) The water quality parameters to be collected for laboratory analysis are fecal coliform, turbidity, TDS, and nutrients (TKN, NO_3-NO_2, and total phosphorous).

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